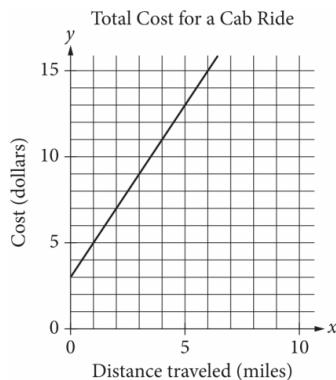


Question ID 3f5375d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3f5375d9

The line graphed in the xy -plane below models the total cost, in dollars, for a cab ride, y , in a certain city during nonpeak hours based on the number of miles traveled, x .



According to the graph, what is the cost for each additional mile traveled, in dollars, of a cab ride?

- A. \$2.00
- B. \$2.60
- C. \$3.00
- D. \$5.00

ID: 3f5375d9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The cost of each additional mile traveled is represented by the slope of the given line. The slope of the line can be calculated by identifying two points on the line and then calculating the ratio of the change in y to the change in x between the

two points. Using the points $(1, 5)$ and $(2, 7)$, the slope is equal to $\frac{7-5}{2-1}$, or 2. Therefore, the cost for each additional mile traveled of the cab ride is \$2.00.

Choice B is incorrect and may result from calculating the slope of the line that passes through the points $(5, 13)$ and $(0, 0)$. However, $(0, 0)$ does not lie on the line shown. Choice C is incorrect. This is the y -coordinate of the y -intercept of the graph and represents the flat fee for a cab ride before the charge for any miles traveled is added. Choice D is incorrect. This value represents the total cost of a 1-mile cab ride.

Question Difficulty:

Easy

Question ID fdee0fbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fdee0fbf

In the xy -plane, line k intersects the y -axis at the point $(0, -6)$ and passes through the point $(2, 2)$. If the point $(20, w)$ lies on line k , what is the value of w ?

ID: fdee0fbf Answer

Rationale

The correct answer is 74. The y -intercept of a line in the xy -plane is the ordered pair (x, y) of the point of intersection of the line with the y -axis. Since line k intersects the y -axis at the point $(0, -6)$, it follows that $(0, -6)$ is the y -intercept of this line. An equation of any line in the xy -plane can be written in the form $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept. Therefore, the equation of line k can be written as $y = mx + (-6)$, or $y = mx - 6$. The value of m can be found by substituting the x - and y -coordinates from a point on the line, such as $(2, 2)$, for x and y , respectively. This results in $2 = 2m - 6$. Solving this equation for m gives $m = 4$. Therefore, an equation of line k is $y = 4x - 6$. The value of w can be found by substituting the x -coordinate, 20, for x in the equation of line k and solving this equation for y . This gives $y = 4(20) - 6$, or $y = 74$. Since w is the y -coordinate of this point, $w = 74$.

Question Difficulty:

Hard

Question ID 620fe971

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 620fe971

A team of workers has been moving cargo off of a ship. The equation below models the approximate number of tons of cargo, y , that remains to be moved x hours after the team started working.

$$y = 120 - 25x$$

The graph of this equation in the xy -plane is a line. What is the best interpretation of the x -intercept in this context?

- A. The team will have moved all the cargo in about 4.8 hours.
- B. The team has been moving about 4.8 tons of cargo per hour.
- C. The team has been moving about 25 tons of cargo per hour.
- D. The team started with 120 tons of cargo to move.

ID: 620fe971 Answer

Correct Answer:

A

Rationale

Choice A is correct. The x -intercept of the line with equation $y = 120 - 25x$ can be found by substituting 0 for y and finding the value of x . When $y = 0$, $x = 4.8$, so the x -intercept is at $(4.8, 0)$. Since y represents the number of tons of cargo remaining to be moved x hours after the team started working, it follows that the x -intercept refers to the team having no cargo remaining to be moved after 4.8 hours. In other words, the team will have moved all of the cargo after about 4.8 hours.

Choice B is incorrect and may result from incorrectly interpreting the value 4.8. Choices C and D are incorrect and may result from misunderstanding the x -intercept. These statements are accurate but not directly relevant to the x -intercept.

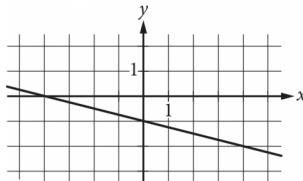
Question Difficulty:

Medium

Question ID b2845d88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b2845d88



Which of the following is an equation of the graph shown in the xy -plane above?

A. $y = -\frac{1}{4}x - 1$

B. $y = -x - 4$

C. $y = -x - \frac{1}{4}$

D. $y = -4x - 1$

ID: b2845d88 Answer

Correct Answer:

A

Rationale

Choice A is correct. The slope of the line can be found by choosing any two points on the line, such as $(4, -2)$ and $(0, -1)$. Subtracting the y -values results in $-2 - (-1) = -1$, the change in y . Subtracting the x -values results in $4 - 0 = 4$, the change in x .

Dividing the change in y by the change in x yields $\frac{-1}{4} = -\frac{1}{4}$, the slope. The line intersects the y -axis at $(0, -1)$, so -1 is the y -coordinate of the y -intercept. This information can be expressed in slope-intercept form as the equation $y = -\frac{1}{4}x - 1$.

Choice B is incorrect and may result from incorrectly calculating the slope and then misidentifying the slope as the y -intercept. Choice C is incorrect and may result from misidentifying the slope as the y -intercept. Choice D is incorrect and may result from incorrectly calculating the slope.

Question Difficulty:

Easy

Question ID f75bd744

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: f75bd744

$$\begin{aligned}4x - 6y &= 10y + 2 \\ty &= \frac{1}{2} + 2x\end{aligned}$$

In the given system of equations, t is a constant. If the system has no solution, what is the value of t ?

ID: f75bd744 Answer

Correct Answer:

8

Rationale

The correct answer is 8. The given system of equations can be solved using the elimination method. Multiplying both sides of the second equation in the given system by -2 yields $-2ty = -1 - 4x$, or $-1 - 4x = -2ty$. Adding this equation to the first equation in the given system, $4x - 6y = 10y + 2$, yields $4x - 6y + -1 - 4x = 10y + 2 + -2ty$, or $-1 - 6y = 10y - 2ty + 2$. Subtracting $10y$ from both sides of this equation yields $-1 - 6y - 10y = 10y - 2ty + 2 - 10y$, or $-1 - 16y = -2ty + 2$. If the given system has no solution, then the equation $-1 - 16y = -2ty + 2$ has no solution. If this equation has no solution, the coefficients of y on each side of the equation, -16 and $-2t$, must be equal, which yields the equation $-16 = -2t$. Dividing both sides of this equation by -2 yields $8 = t$. Thus, if the system has no solution, the value of t is 8.

Alternate approach: A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in the form $Ax + By = C$, where A , B , and C are constant terms, are parallel if the ratio of the x -coefficients is equal to the ratio of the y -coefficients, and distinct if the ratio of the x -coefficients are not equal to the ratio of the constant terms. Subtracting $10y$ from both sides of the first equation in the given system yields $4x - 6y - 10y = 10y + 2 - 10y$, or $4x - 16y = 2$. Subtracting $2x$ from both sides of the second equation in the given system yields $ty - 2x = \frac{1}{2} + 2x - 2x$, or $-2x + ty = \frac{1}{2}$. The ratio of the x -coefficients for these equations is $-\frac{2}{4}$, or $-\frac{1}{2}$. The ratio of the y -coefficients for these equations is $-\frac{t}{16}$. The ratio of the constant terms for these equations is $\frac{2}{2}$, or $\frac{1}{4}$. Since the ratio of the x -coefficients, $-\frac{1}{2}$, is not equal to the ratio of the constants, $\frac{1}{4}$, the lines represented by the equations are distinct. Setting the ratio of the x -coefficients equal to the ratio of the y -coefficients yields $-\frac{1}{2} = -\frac{t}{16}$. Multiplying both sides of this equation by -16 yields $-\frac{1}{2} \cdot -16 = -\frac{t}{16} \cdot -16$, or $t = 8$. Therefore, when $t = 8$, the lines represented by these equations are parallel. Thus, if the system has no solution, the value of t is 8.

Question Difficulty:

Hard

Question ID 17d80dc3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 17d80dc3

In the xy -plane, line k has a slope of 5 and a y -intercept of $(0, -35)$. What is the x -coordinate of the x -intercept of line k ?

ID: 17d80dc3 Answer

Correct Answer:

7

Rationale

The correct answer is 7. An equation of a line in the xy -plane can be written in the form $y = mx + b$, where m is the slope of the line and $(0, b)$ is the y -intercept of the line. It's given that line k has a slope of 5 and a y -intercept of $(0, -35)$. Therefore, $m = 5$ and $b = -35$. Substituting 5 for m and -35 for b in the equation $y = mx + b$ yields $y = 5x - 35$. The x -intercept of a line in the xy -plane is the point where the line intersects the x -axis, which is a point with a y -coordinate of 0. Substituting 0 for y in the equation $y = 5x - 35$ yields $0 = 5x - 35$. Adding 35 to both sides of this equation yields $35 = 5x$. Dividing both sides of this equation by 5 yields $7 = x$. Therefore, the x -coordinate of the x -intercept of line k is 7.

Question Difficulty:

Medium

Question ID b3abf40f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b3abf40f

$$F(x) = \frac{9}{5}(x - 273.15) + 32$$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.10 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

- A. 16.38
- B. 48.38
- C. 475.29
- D. 507.29

ID: b3abf40f Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function $F(x) = \frac{9}{5}x - 273.15 + 32$ gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. A temperature that increased by 9.10 kelvins means that the value of x increased by 9.10 kelvins. It follows that an increase in x by 9.10 increases $F(x)$ by $\frac{9}{5}9.10$, or 16.38. Therefore, if a temperature increased by 9.10 kelvins, the temperature increased by 16.38 degrees Fahrenheit.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6ac23de7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6ac23de7

$$\frac{4x}{5} = 20$$

In the equation above, what is the value of x ?

- A. 25
- B. 24
- C. 16
- D. 15

ID: 6ac23de7 Answer

Correct Answer:

A

Rationale

Choice A is correct. Multiplying both sides of the equation by 5 results in $4x = 100$. Dividing both sides of the resulting equation by 4 results in $x = 25$.

Choice B is incorrect and may result from adding 20 and 4. Choice C is incorrect and may result from dividing 20 by 5 and then multiplying the result by 4. Choice D is incorrect and may result from subtracting 5 from 20.

Question Difficulty:

Easy

Question ID 6e6a3241

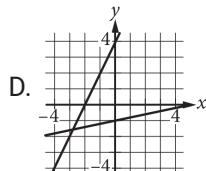
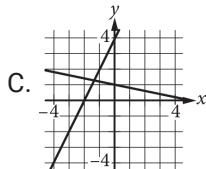
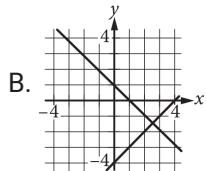
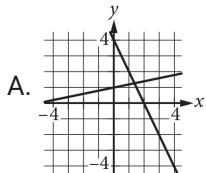
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e6a3241

$$x + 5y = 5$$

$$2x - y = -4$$

Which of the following graphs in the xy -plane could be used to solve the system of equations above?



ID: 6e6a3241 Answer

Correct Answer:

C

Rationale

Choice C is correct. The graph of a system of equations is the graph that shows the lines represented by each of the equations in the system. The x -intercept of the graph of each given equation can be found by substituting 0 for y in each equation: $x + 5(0) = 5$, or $x = 5$, and $2x - 0 = -4$, or $x = -2$. The y -intercept of the graph of each equation can be found by substituting 0 for x in each equation: $0 + 5y = 5$, or $y = 1$, and $2(0) - y = -4$ or $y = 4$. Using these x - and y -intercept values, the line that has equation $x + 5y = 5$ passes through the points $(0, 1)$ and $(5, 0)$, and the line that has equation $2x - y = -4$ passes through the points $(0, 4)$ and $(-2, 0)$. Only the lines in choice C pass through these points and can be used to solve the given system of equations.

Choices A, B, and D are incorrect. In choices A and B, neither line passes through $(0,1)$ and $(5,0)$ or $(0,4)$ and $(-2,0)$. In choice D, although one line passes through $(0,4)$ and $(-2,0)$ the other line doesn't pass through $(0,1)$ and $(5,0)$.

Question Difficulty:

Medium

Question ID e6cb2402

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e6cb2402

$$3(kx + 13) = \frac{48}{17}x + 36$$

In the given equation, k is a constant. The equation has no solution. What is the value of k ?

ID: e6cb2402 Answer

Correct Answer:

.9411, .9412, 16/17

Rationale

The correct answer is $\frac{16}{17}$. It's given that the equation $3kx + 13 = \frac{48}{17}x + 36$ has no solution. A linear equation in the form $ax + b = cx + d$, where a , b , c , and d are constants, has no solution only when the coefficients of x on each side of the equation are equal and the constant terms aren't equal. Dividing both sides of the given equation by 3 yields $kx + 13 = \frac{48}{51}x + \frac{36}{3}$, or $kx + 13 = \frac{16}{17}x + 12$. Since the coefficients of x on each side of the equation must be equal, it follows that the value of k is $\frac{16}{17}$. Note that 16/17, .9411, .9412, and 0.941 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID af711d1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: af711d1b

Distance (kilometers)	Average time (minutes)
0.32	8
0.56	14
0.68	17

The table gives the average time t , in minutes, it takes Carly to travel a certain distance d , in kilometers. Which equation could represent this linear relationship?

- A. $t = 4d$
- B. $t = \frac{1}{25}d$
- C. $t = 25d$
- D. $t = \frac{1}{4}d$

ID: af711d1b Answer

Correct Answer:

C

Rationale

Choice C is correct. The average time t , in minutes, it takes Carly to travel a certain distance d , in kilometers, is given in the table. This linear relationship can be represented by an equation in the form $t = ad + b$, where a and b are constants. The table shows that it takes Carly an average time of 8 minutes to travel 0.32 kilometers. Substituting 8 for t and 0.32 for d in the equation $t = ad + b$ yields $8 = 0.32a + b$. Subtracting $0.32a$ from both sides of this equation yields $8 - 0.32a = b$. The table also shows that it takes Carly an average time of 14 minutes to travel 0.56 kilometers. Substituting 14 for t and 0.56 for d in the equation $t = ad + b$ yields $14 = 0.56a + b$. Subtracting $0.56a$ from both sides of this equation yields $14 - 0.56a = b$. Substituting $8 - 0.32a$ for b in this equation yields $14 - 0.56a = 8 - 0.32a$. Subtracting 8 from both sides of this equation yields $6 - 0.56a = -0.32a$. Adding $0.56a$ to both sides of this equation yields $6 = 0.24a$. Dividing both sides of this equation by 0.24 yields $25 = a$. Substituting 25 for a in the equation $8 = 0.32a + b$ yields $8 = 0.32(25) + b$, or $8 = 8 + b$. Subtracting 8 from both sides of this equation yields $0 = b$. Substituting 25 for a and 0 for b in the equation $t = ad + b$ yields $t = 25d + 0$, or $t = 25d$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 7392dfc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7392dfc1

Which of the following is equivalent to $4x + 6 = 12$?

- A. $2x + 4 = 6$
- B. $x + 3 = 3$
- C. $3x + 2 = 4$
- D. $2x + 3 = 6$

ID: 7392dfc1 Answer

Correct Answer:

D

Rationale

Choice D is correct. Dividing each side of the original equation by 2 yields $\frac{4x + 6}{2} = \frac{12}{2}$, which simplifies to $2x + 3 = 6$.

Choice A is incorrect. Dividing each side of the original equation by 2 gives $2x + 3 = 6$, which is not equivalent to $2x + 4 = 6$.

Choice B is incorrect. Dividing each side of the original equation by 4 gives $x + \frac{3}{2} = 3$, which is not equivalent to $x + 3 = 3$.

Choice C is incorrect. Dividing each side of the original equation by 3 gives $\frac{4}{3}x + 2 = 4$, which is not equivalent to $3x + 2 = 4$.

Question Difficulty:

Easy

Question ID 93954cfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 93954cfa

One pound of grapes costs \$2. At this rate, how many dollars will c pounds of grapes cost?

A. $2c$

B. $2+c$

C. $\frac{2}{c}$

D. $\frac{c}{2}$

ID: 93954cfa Answer

Correct Answer:

A

Rationale

Choice A is correct. If one pound of grapes costs \$2, two pounds of grapes will cost 2 times \$2, three pounds of grapes will cost 3 times \$2, and so on. Therefore, c pounds of grapes will cost c times \$2, which is $2c$ dollars.

Choice B is incorrect and may result from incorrectly adding instead of multiplying. Choice C is incorrect and may result from assuming that c pounds cost \$2, and then finding the cost per pound. Choice D is incorrect and could result from incorrectly assuming that 2 pounds cost \$ c , and then finding the cost per pound.

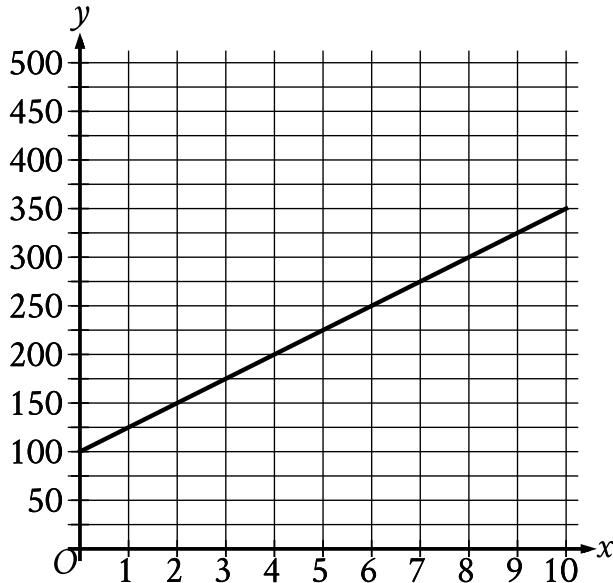
Question Difficulty:

Easy

Question ID 5cf1bbc9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5cf1bbc9



The graph of the function f , where $y = f(x)$, gives the total cost y , in dollars, for a certain video game system and x games. What is the best interpretation of the slope of the graph in this context?

- A. Each game costs \$25.
- B. The video game system costs \$100.
- C. The video game system costs \$25.
- D. Each game costs \$100.

ID: 5cf1bbc9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given graph is a line, and the slope of a line is defined as the change in the value of y for each increase in the value of x by 1. It's given that y represents the total cost, in dollars, and that x represents the number of games. Therefore, the change in the value of y for each increase in the value of x by 1 represents the change in total cost, in dollars, for each increase in the number of games by 1. In other words, the slope represents the cost, in dollars, per game. The graph shows that when the value of x increases from 0 to 1, the value of y increases from 100 to 125. It follows that the slope is 25, or the cost per game is \$ 25. Thus, the best interpretation of the slope of the graph is that each game costs \$ 25.

Choice B is incorrect. This is an interpretation of the y -intercept of the graph rather than the slope of the graph.

Choice C is incorrect. The slope of the graph is the cost per game, not the cost of the video game system.

Choice D is incorrect. Each game costs \$ 25, not \$ 100.

Question Difficulty:

Medium

Question ID 9c7741c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9c7741c6

On a 210-mile trip, Cameron drove at an average speed of 60 miles per hour for the first x hours. He then completed the trip, driving at an average speed of 50 miles per hour for the remaining y hours. If $x = 1$, what is the value of y ?

ID: 9c7741c6 Answer

Rationale

The correct answer is 3. It's given that Cameron drove 60 miles per hour for x hours; therefore, the distance driven at this speed can be represented by $60x$. He then drove 50 miles per hour for y hours; therefore, the distance driven at this speed can be represented by $50y$. Since Cameron drove 210 total miles, the equation $60x + 50y = 210$ represents this situation. If $x = 1$, substitution yields $60(1) + 50y = 210$, or $60 + 50y = 210$. Subtracting 60 from both sides of this equation yields $50y = 150$. Dividing both sides of this equation by 50 yields $y = 3$.

Question Difficulty:

Medium

Question ID 8abed0fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8abed0fb

$$y = 2x + 3$$

$$x = 1$$

What is the solution (x, y) to the given system of equations?

- A. $(1, 2)$
- B. $(1, 5)$
- C. $(2, 3)$
- D. $(2, 7)$

ID: 8abed0fb Answer

Correct Answer:

B

Rationale

Choice B is correct. Since it's given that $x = 1$, substituting 1 for x in the first equation yields $y = 2(1) + 3$. Simplifying the right-hand side of this equation yields $y = 2 + 3$, or $y = 5$. Therefore, the ordered pair $(1, 5)$ is a solution to the given system of equations.

Choice A is incorrect and may result from a calculation error when substituting 1 for x in the first equation. Choices C and D are incorrect. Because it's given that $x = 1$, x cannot equal 2 as stated in these ordered pairs.

Question Difficulty:

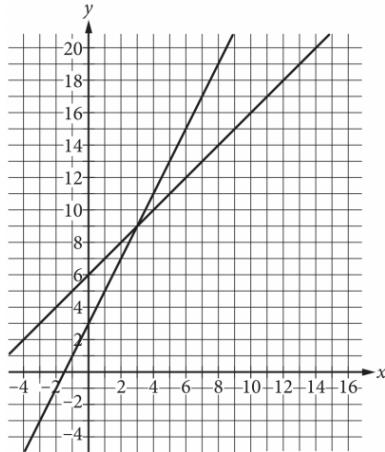
Easy

Question ID e1259a5a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e1259a5a

A system of two linear equations is graphed in the xy -plane below.



Which of the following points is the solution to the system of equations?

- A. (3,9)
- B. (6,15)
- C. (8,10)
- D. (12,18)

ID: e1259a5a Answer

Correct Answer:

A

Rationale

Choice A is correct. The solution to this system of linear equations is the point that lies on both lines graphed, or the point of intersection of the two lines. According to the graphs, the point of intersection occurs when $x = 3$ and $y = 9$, or at the point (3,9).

Choices B and D are incorrect. Each of these points lies on one line, but not on both lines in the xy -plane. Choice C is incorrect. This point doesn't lie on either of the lines graphed in the xy -plane.

Question Difficulty:

Easy

Question ID 018a2704

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 018a2704

If $46 = 16 + 2(x - 8)$, what is the value of $2(x - 8)$?

- A. 16
- B. 23
- C. 30
- D. 38

ID: 018a2704 Answer

Correct Answer:

C

Rationale

Choice C is correct. Subtracting 16 from both sides of the given equation yields $30 = 2(x - 8)$. Therefore, the value of $2(x - 8)$ is 30.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID b988eeec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b988eeec

The functions f and g are defined as $f(x) = \frac{1}{4}x - 9$ and $g(x) = \frac{3}{4}x + 21$. If the function h is defined as $h(x) = f(x) + g(x)$, what is the x -coordinate of the x -intercept of the graph of $y = h(x)$ in the xy -plane?

ID: b988eeec Answer

Correct Answer:

-12

Rationale

The correct answer is -12. It's given that the functions f and g are defined as $f(x) = \frac{1}{4}x - 9$ and $g(x) = \frac{3}{4}x + 21$. If the function h is defined as $h(x) = f(x) + g(x)$, then substituting $\frac{1}{4}x - 9$ for $f(x)$ and $\frac{3}{4}x + 21$ for $g(x)$ in this function yields $h(x) = \frac{1}{4}x - 9 + \frac{3}{4}x + 21$. This can be rewritten as $h(x) = \frac{4}{4}x + 12$, or $h(x) = x + 12$. The x -intercept of a graph in the xy -plane is the point on the graph where $y = 0$. The equation representing the graph of $y = h(x)$ is $y = x + 12$. Substituting 0 for y in this equation yields $0 = x + 12$. Subtracting 12 from both sides of this equation yields $-12 = x$, or $x = -12$. Therefore, the x -coordinate of the x -intercept of the graph of $y = h(x)$ in the xy -plane is -12.

Question Difficulty:

Hard

Question ID 3d04de9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3d04de9c

A principal used a total of **25** flags that were either blue or yellow for field day. The principal used **20** blue flags. How many yellow flags were used?

- A. **5**
- B. **20**
- C. **25**
- D. **30**

ID: 3d04de9c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a principal used a total of 25 blue flags and yellow flags. It's also given that of the 25 flags used, 20 flags were blue. Subtracting the number of blue flags used from the total number of flags used results in the number of yellow flags used. It follows that the number of yellow flags used is $25 - 20$, or 5.

Choice B is incorrect. This is the number of blue flags used.

Choice C is incorrect. This is the total number of flags used.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 70feb725

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 70feb725

During a month, Morgan ran r miles at 5 miles per hour and biked b miles at 10 miles per hour. She ran and biked a total of 200 miles that month, and she biked for twice as many hours as she ran. What is the total number of miles that Morgan biked during the month?

- A. 80
- B. 100
- C. 120
- D. 160

ID: 70feb725 Answer

Correct Answer:

D

Rationale

Choice D is correct. The number of hours Morgan spent running or biking can be calculated by dividing the distance she traveled during that activity by her speed, in miles per hour, for that activity. So the number of hours she ran can be represented by the expression $\frac{r}{5}$, and the number of hours she biked can be represented by the expression $\frac{b}{10}$. It's given that she biked for twice as many hours as she ran, so this can be represented by the equation $\frac{b}{10} = 2\left(\frac{r}{5}\right)$, which can be rewritten as $b = 4r$. It's also given that she ran r miles and biked b miles, and that she ran and biked a total of 200 miles. This can be represented by the equation $r + b = 200$. Substituting $4r$ for b in this equation yields $r + 4r = 200$, or $5r = 200$. Solving for r yields $r = 40$. Determining the number of miles she biked, b , can be found by substituting 40 for r in $r + b = 200$, which yields $40 + b = 200$. Solving for b yields $b = 160$.

Choices A, B, and C are incorrect because they don't satisfy that Morgan biked for twice as many hours as she ran. In choice A, if she biked 80 miles, then she ran 120 miles, which means she biked for 8 hours and ran for 24 hours. In choice B, if she biked 100 miles, then she ran 100 miles, which means she biked for 10 hours and ran for 20 hours. In choice C, if she biked 120 miles, then she ran for 80 miles, which means she biked for 12 hours and ran for 16 hours.

Question Difficulty:

Hard

Question ID 60f71697

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 60f71697

$$8x = 88$$

What value of x is the solution to the given equation?

- A. 11
- B. 80
- C. 96
- D. 704

ID: 60f71697 Answer

Correct Answer:

A

Rationale

Choice A is correct. Dividing both sides of the given equation by 8 yields $x = 11$. Therefore, 11 is the solution to the given equation.

Choice B is incorrect. This is the solution to the equation $x + 8 = 88$.

Choice C is incorrect. This is the solution to the equation $x - 8 = 88$.

Choice D is incorrect. This is the solution to the equation $\frac{x}{8} = 88$.

Question Difficulty:

Easy

Question ID ed92fb68

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: ed92fb68

$$4x + 5y = 100$$

$$5x + 4y = 62$$

If the system of equations above has solution (x, y) ,

what is the value of $x + y$?

A. 0

B. 9

C. 18

D. 38

ID: ed92fb68 Answer

Correct Answer:

C

Rationale

Choice C is correct. Adding the given equations yields $9x + 9y = 162$. Dividing each side of the equation $9x + 9y = 162$ by 9 gives $x + y = 18$.

Choice A is incorrect and may result from incorrectly adding the equations. Choice B is incorrect and may result from conceptual or computational errors. Choice D is incorrect. This value is equivalent to $y - x$.

Question Difficulty:

Medium

Question ID 606cdce7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 606cdce7

x	y
-6	65
-3	56
3	38
6	29

The table shows four values of x and their corresponding values of y . There is a linear relationship between x and y . Which of the following equations represents this relationship?

- A. $9x + 3y = 141$
- B. $9x + 3y = 3$
- C. $3x + 9y = 141$
- D. $3x + 9y = 3$

ID: 606cdce7 Answer

Correct Answer:

A

Rationale

Choice A is correct. An equation representing the linear relationship between x and y can be written in slope-intercept form $y = mx + b$, where m is the slope of the graph of the equation in the xy -plane and $(0, b)$ is the y -intercept. The slope, m , can be calculated using two ordered pairs, x_1, y_1 and x_2, y_2 , and the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the ordered pairs $(-6, 65)$ and $(6, 29)$ from the table for x_1, y_1 and x_2, y_2 , respectively, in this formula yields $m = \frac{29 - 65}{6 - (-6)}$, which is equivalent to $m = \frac{-36}{12}$, or $m = -3$. Substituting -3 for m in the formula $y = mx + b$ yields $y = -3x + b$. Substituting the point $(-6, 65)$ into this equation yields $65 = -3(-6) + b$, or $65 = 18 + b$. Subtracting 18 from both sides of this equation yields $47 = b$. Substituting 47 for b in the equation $y = -3x + b$ yields $y = -3x + 47$. Adding $3x$ to both sides of this equation yields $3x + y = 47$. Multiplying both sides of this equation by 3 yields $9x + 3y = 141$.

Choice B is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $9(-6) + 3(65) = 3$, or $141 = 3$, which is false.

Choice C is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $3(-6) + 9(65) = 141$, or $567 = 141$, which is false.

Choice D is incorrect. Substituting the point $(-6, 65)$ from the table into this equation yields $3(-6) + 9(65) = 3$, or $567 = 3$, which is false.

Question Difficulty:

Medium

Question ID 1a621af4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%;"><div style="width: 100%; height: 10px; background-color: #005a9f;"></div></div>

ID: 1a621af4

A number x is at most 2 less than 3 times the value of y . If the value of y is -4 , what is the greatest possible value of x ?

ID: 1a621af4 Answer

Correct Answer:

-14

Rationale

The correct answer is -14. It's given that a number x is at most 2 less than 3 times the value of y . Therefore, x is less than or equal to 2 less than 3 times the value of y . The expression $3y$ represents 3 times the value of y . The expression $3y - 2$ represents 2 less than 3 times the value of y . Therefore, x is less than or equal to $3y - 2$. This can be shown by the inequality $x \leq 3y - 2$. Substituting -4 for y in this inequality yields $x \leq 3(-4) - 2$ or, $x \leq -14$. Therefore, if the value of y is -4, the greatest possible value of x is -14.

Question Difficulty:

Hard

Question ID af2ba762

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: af2ba762

According to data provided by the US Department of Energy, the average price per gallon of regular gasoline in the United States from September 1, 2014, to December 1, 2014, is modeled by the function F defined below, where $F(x)$ is the average price per gallon x months after September 1.

$$F(x) = 2.74 - 0.19(x - 3)$$

The constant 2.74 in this function estimates which of the following?

- A. The average monthly decrease in the price per gallon
- B. The difference in the average price per gallon from September 1, 2014, to December 1, 2014
- C. The average price per gallon on September 1, 2014
- D. The average price per gallon on December 1, 2014

ID: af2ba762 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since 2.74 is a constant term, it represents an actual price of gas rather than a measure of change in gas price. To determine what gas price it represents, find x such that $F(x) = 2.74$, or $2.74 = 2.74 - 0.19(x - 3)$. Subtracting 2.74 from both sides gives $0 = -0.19(x - 3)$. Dividing both sides by -0.19 results in $0 = x - 3$, or $x = 3$. Therefore, the average price of gas is \$2.74 per gallon 3 months after September 1, 2014, which is December 1, 2014.

Choice A is incorrect. Since 2.74 is a constant, not a multiple of x , it cannot represent a rate of change in price. Choice B is incorrect. The difference in the average price from September 1, 2014, to December 1, 2014, is $F(3) - F(0) = 2.74 - 0.19(3 - 3) - (2.74 - 0.19(0 - 3)) = 2.74 - (2.74 + 0.57) = -0.57$, which is not 2.74. Choice C is incorrect. The average price per gallon on September 1, 2014, is $F(0) = 2.74 - 0.19(0 - 3) = 2.74 + 0.57 = 3.31$, which is not 2.74.

Question Difficulty:

Hard

Question ID 19fdf387

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 19fdf387

In the xy -plane, the graph of $y = x + 3$ intersects the graph of $y = 2x - 6$ at the point (a, b) . What is the value of a ?

- A. 3
- B. 6
- C. 9
- D. 12

ID: 19fdf387 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since the graph of $y = x + 3$ intersects the graph of $y = 2x - 6$ at the point (a, b) , the ordered pair (a, b) is the solution to the system of linear equations consisting of $y = x + 3$ and $y = 2x - 6$, and the value of a is the value of x in the solution of this system. Since both $x + 3$ and $2x - 6$ are equal to y , it follows that $x + 3 = 2x - 6$. Subtracting x from and adding 6 to both sides of the equation yields $9 = x$. Therefore, the value of a is 9.

Choices A and B are incorrect and may result from a calculation or conceptual error in solving the system of equations consisting of $y = x + 3$ and $y = 2x - 6$. Choice D is incorrect. This is the value of b , not a .

Question Difficulty:

Medium

Question ID a775af14

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a775af14

In the xy -plane, the graph of the linear function f contains the points $(0, 2)$ and $(8, 34)$. Which equation defines f , where $y = f(x)$?

- A. $f(x) = 2x + 42$
- B. $f(x) = 32x + 36$
- C. $f(x) = 4x + 2$
- D. $f(x) = 8x + 2$

ID: a775af14 Answer

Correct Answer:

C

Rationale

Choice C is correct. In the xy -plane, the graph of a linear function can be written in the form $fx = mx + b$, where m represents the slope and $0, b$ represents the y -intercept of the graph of $y = fx$. It's given that the graph of the linear function f , where $y = fx$, in the xy -plane contains the point $0, 2$. Thus, $b = 2$. The slope of the graph of a line containing any two points x_1, y_1 and x_2, y_2 can be found using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Since it's given that the graph of the linear function f contains the points $0, 2$ and $8, 34$, it follows that the slope of the graph of the line containing these points is $m = \frac{34 - 2}{8 - 0}$, or $m = 4$. Substituting 4 for m and 2 for b in $fx = mx + b$ yields $fx = 4x + 2$.

Choice A is incorrect. This function represents a graph with a slope of 2 and a y -intercept of 0, 42.

Choice B is incorrect. This function represents a graph with a slope of 32 and a y -intercept of 0, 36.

Choice D is incorrect. This function represents a graph with a slope of 8 and a y -intercept of 0, 2.

Question Difficulty:

Medium

Question ID b9835972

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b9835972

In the xy -plane, line ℓ passes through the point $(0, 0)$ and is parallel to the line represented by the equation $y = 8x + 2$. If line ℓ also passes through the point $(3, d)$, what is the value of d ?

ID: b9835972 Answer

Correct Answer:

24

Rationale

The correct answer is 24. A line in the xy -plane can be defined by the equation $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It's given that line ℓ passes through the point $0, 0$. Therefore, the y -coordinate of the y -intercept of line ℓ is 0. It's given that line ℓ is parallel to the line represented by the equation $y = 8x + 2$. Since parallel lines have the same slope, it follows that the slope of line ℓ is 8. Therefore, line ℓ can be defined by an equation in the form $y = mx + b$, where $m = 8$ and $b = 0$. Substituting 8 for m and 0 for b in $y = mx + b$ yields the equation $y = 8x + 0$, or $y = 8x$. If line ℓ passes through the point $3, d$, then when $x = 3$, $y = d$ for the equation $y = 8x$. Substituting 3 for x and d for y in the equation $y = 8x$ yields $d = 83$, or $d = 24$.

Question Difficulty:

Hard

Question ID df32b09c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: df32b09c

Tom scored 85, 78, and 98 on his first three exams in history class. Solving which inequality gives the score, G , on Tom's fourth exam that will result in a mean score on all four exams of at least 90?

A. $90 - (85 + 78 + 98) \leq 4G$

B. $4G + 85 + 78 + 98 \geq 360$

C. $\frac{(G + 85 + 78 + 98)}{4} \geq 90$

D. $\frac{(85 + 78 + 98)}{4} \geq 90 - 4G$

ID: df32b09c Answer

Correct Answer:

C

Rationale

Choice C is correct. The mean of the four scores (G , 85, 78, and 98) can be expressed as $\frac{G + 85 + 78 + 98}{4}$. The inequality that expresses the condition that the mean score is at least 90 can therefore be written as $\frac{G + 85 + 78 + 98}{4} \geq 90$.

Choice A is incorrect. The sum of the scores (G , 85, 78, and 98) isn't divided by 4 to express the mean. Choice B is incorrect and may be the result of an algebraic error when multiplying both sides of the inequality by 4. Choice D is incorrect because it doesn't include G in the mean with the other three scores.

Question Difficulty:

Easy

Question ID e1248a5c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: e1248a5c

In the system of equations below, a and c are constants.

$$\frac{1}{2}x + \frac{1}{3}y = \frac{1}{6}$$

$$ax + y = c$$

If the system of equations has an infinite number of solutions (x, y) , what is the value of a ?

A. $-\frac{1}{2}$

B. 0

C. $\frac{1}{2}$

D. $\frac{3}{2}$

ID: e1248a5c Answer

Correct Answer:

D

Rationale

Choice D is correct. A system of two linear equations has infinitely many solutions if one equation is equivalent to the other. This means that when the two equations are written in the same form, each coefficient or constant in one equation is equal to the corresponding coefficient or constant in the other equation multiplied by the same number. The equations in the given system of equations are written in the same form, with x and y on the left-hand side and a constant on the right-hand side of the equation. The coefficient of y in the second equation is equal to the coefficient of y in the first equation multiplied by 3. Therefore, a , the coefficient of x in the second equation, must be equal to 3 times the coefficient of x in the first equation: $a = (\frac{1}{2})(3)$, or $a = \frac{3}{2}$.

Choices A, B, and C are incorrect. When $a = -\frac{1}{2}$, $a = 0$, or $a = \frac{1}{2}$, the given system of equations has one solution.

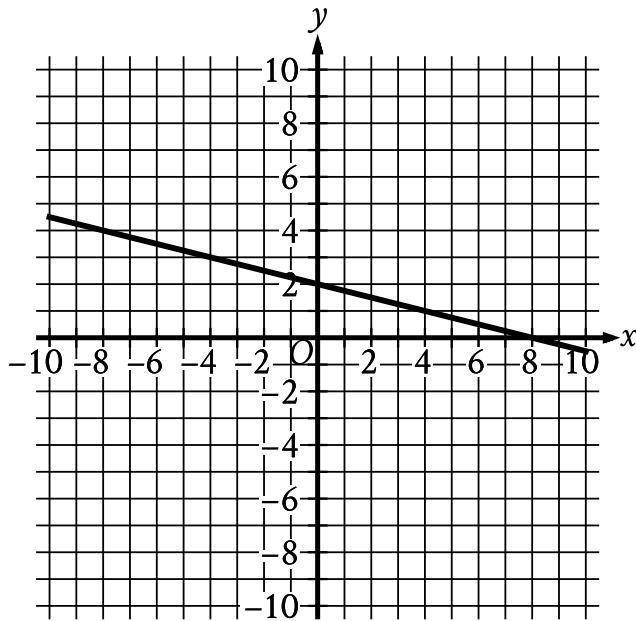
Question Difficulty:

Hard

Question ID 05bb1af9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: 05bb1af9



The graph of $y = f(x) + 14$ is shown. Which equation defines function f ?

- A. $f(x) = -\frac{1}{4}x - 12$
- B. $f(x) = -\frac{1}{4}x + 16$
- C. $f(x) = -\frac{1}{4}x + 2$
- D. $f(x) = -\frac{1}{4}x - 14$

ID: 05bb1af9 Answer

Correct Answer:

A

Rationale

Choice A is correct. An equation for the graph shown can be written in slope-intercept form $y = mx + b$, where m is the slope of the graph and its y -intercept is $0, b$. Since the y -intercept of the graph shown is $0, 2$, the value of b is 2 . Since the graph also passes through the point $4, 1$, the slope can be calculated as $\frac{1-2}{4-0}$, or $-\frac{1}{4}$. Therefore, the value of m is $-\frac{1}{4}$. Substituting $-\frac{1}{4}$ for m and 2 for b in the equation $y = mx + b$ yields $y = -\frac{1}{4}x + 2$. It's given that an equation for the graph shown is $y = fx + 14$. Substituting $fx + 14$ for y in the equation $y = -\frac{1}{4}x + 2$ yields $fx + 14 = -\frac{1}{4}x + 2$. Subtracting 14 from both sides of this equation yields $fx = -\frac{1}{4}x - 12$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID dae126d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dae126d7

The boiling point of water at sea level is 212 degrees Fahrenheit ($^{\circ}\text{F}$). For every 550 feet above sea level, the boiling point of water is lowered by about 1°F . Which of the following equations can be used to find the boiling point B of water, in $^{\circ}\text{F}$, x feet above sea level?

A. $B = 550 + \frac{x}{212}$

B. $B = 550 - \frac{x}{212}$

C. $B = 212 + \frac{x}{550}$

D. $B = 212 - \frac{x}{550}$

ID: dae126d7 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the boiling point of water at sea level is 212°F and that for every 550 feet above sea level, the boiling point of water is lowered by about 1°F . Therefore, the change in the boiling point of water x feet above sea level is represented by the expression $-\frac{x}{550}$. Adding this expression to the boiling point of water at sea level gives the equation for the boiling point B of water, in $^{\circ}\text{F}$, x feet above sea level: $B = -\frac{x}{550} + 212$, or $B = 212 - \frac{x}{550}$.

Choices A and B are incorrect and may result from using the boiling point of water at sea level as the rate of change and the rate of change as the initial boiling point of water at sea level. Choice C is incorrect and may result from representing the change in the boiling point of water as an increase rather than a decrease.

Question Difficulty:

Medium

Question ID bf5f80c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: bf5f80c6

$$y < -4x + 4$$

Which point (x, y) is a solution to the given inequality in the xy -plane?

- A. $(-4, 0)$
- B. $(0, 5)$
- C. $(2, 1)$
- D. $(2, -1)$

ID: bf5f80c6 Answer

Correct Answer:

A

Rationale

Choice D is correct. For a point x, y to be a solution to the given inequality in the xy -plane, the value of the point's y -coordinate must be less than the value of $-4x + 4$, where x is the value of the x -coordinate of the point. This is true of the point $-4, 0$ because $0 < -4 \cdot -4 + 4$, or $0 < 20$. Therefore, the point $-4, 0$ is a solution to the given inequality.

Choices A, B, and C are incorrect. None of these points are a solution to the given inequality because each point's y -coordinate is greater than the value of $-4x + 4$ for the point's x -coordinate.

Question Difficulty:

Medium

Question ID 12983c1e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 12983c1e

x	f(x)
1	5
3	13
5	21

Some values of the linear function f are shown in the table above.

Which of the following defines f ?

- A. $f(x) = 2x + 3$
- B. $f(x) = 3x + 2$
- C. $f(x) = 4x + 1$
- D. $f(x) = 5x$

ID: 12983c1e Answer

Correct Answer:

C

Rationale

Choice C is correct. Because f is a linear function of x , the equation $f(x) = mx + b$, where m and b are constants, can be used to define the relationship between x and $f(x)$. In this equation, m represents the increase in the value of $f(x)$ for every increase in the value of x by 1. From the table, it can be determined that the value of $f(x)$ increases by 8 for every increase in the value of x by 2. In other words, for the function f the value of m is $\frac{8}{2}$, or 4. The value of b can be found by substituting the values of x and $f(x)$ from any row of the table and the value of m into the equation $f(x) = mx + b$ and solving for b . For example, using $x = 1$, $f(x) = 5$, and $m = 4$ yields $5 = 4(1) + b$. Solving for b yields $b = 1$. Therefore, the equation defining the function f can be written in the form $f(x) = 4x + 1$.

Choices A, B, and D are incorrect. Any equation defining the linear function f must give values of $f(x)$ for corresponding values of x , as shown in each row of the table. According to the table, if $x = 3$, $f(x) = 13$. However, substituting $x = 3$ into the equation given in choice A gives $f(3) = 2(3) + 3$, or $f(3) = 9$, not 13. Similarly, substituting $x = 3$ into the equation given in choice B gives $f(3) = 3(3) + 2$, or $f(3) = 11$, not 13.

Lastly, substituting $x = 3$ into the equation given in choice D gives $f(3) = 5(3)$, or $f(3) = 15$, not 13. Therefore, the equations in choices A, B, and D cannot define f .

Question Difficulty:

Easy

Question ID 52cb8ea4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 52cb8ea4

$$7x - 5y = 4$$

$$4x - 8y = 9$$

If (x, y) is the solution to the system of equations above,

what is the value of $3x + 3y$?

- A. -13
- B. -5
- C. 5
- D. 13

ID: 52cb8ea4 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting the second equation, $4x - 8y = 9$, from the first equation, $7x - 5y = 4$, results in $(7x - 5y) - (4x - 8y) = 4 - 9$, or $7x - 5y - 4x + 8y = 5$. Combining like terms on the left-hand side of this equation yields $3x + 3y = -5$.

Choice A is incorrect and may result from miscalculating $4 - 9$ as -13 . Choice C is incorrect and may result from miscalculating $4 - 9$ as 5 . Choice D is incorrect and may result from adding 9 to 4 instead of subtracting 9 from 4 .

Question Difficulty:

Hard

Question ID 8adf1335

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8adf1335

A city's total expense budget for one year was x million dollars. The city budgeted y million dollars for departmental expenses and 201 million dollars for all other expenses. Which of the following represents the relationship between x and y in this context?

- A. $x + y = 201$
- B. $x - y = 201$
- C. $2x - y = 201$
- D. $y - x = 201$

ID: 8adf1335 Answer

Correct Answer:

B

Rationale

Choice B is correct. Of the city's total expense budget for one year, the city budgeted y million dollars for departmental expenses and 201 million dollars for all other expenses. This means that the expression $y + 201$ represents the total expense budget, in millions of dollars, for one year. It's given that the total expense budget for one year is x million dollars. It follows then that the expression $y + 201$ is equivalent to x , or $y + 201 = x$. Subtracting y from both sides of this equation yields $201 = x - y$. By the symmetric property of equality, this is the same as $x - y = 201$.

Choices A and C are incorrect. Because it's given that the total expense budget for one year, x million dollars, is comprised of the departmental expenses, y million dollars, and all other expenses, 201 million dollars, the expressions $x + y$ and $2x - y$ both must be equivalent to a value greater than 201 million dollars. Therefore, the equations $x + y = 201$ and $2x - y = 201$ aren't true. Choice D is incorrect. The value of x must be greater than the value of y . Therefore, $y - x = 201$ can't represent this relationship.

Question Difficulty:

Easy

Question ID 80da233d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 80da233d

A certain elephant weighs 200 pounds at birth and gains more than 2 but less than 3 pounds per day during its first year. Which of the following inequalities represents all possible weights w , in pounds, for the elephant 365 days after birth?

- A. $400 < w < 600$
- B. $565 < w < 930$
- C. $730 < w < 1,095$
- D. $930 < w < 1,295$

ID: 80da233d Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the elephant weighs 200 pounds at birth and gains more than 2 pounds but less than 3 pounds per day during its first year. The inequality $200 + 2d < w < 200 + 3d$ represents this situation, where d is the number of days after birth. Substituting 365 for d in the inequality gives $200 + 2(365) < w < 200 + 3(365)$, or $930 < w < 1,295$.

Choice A is incorrect and may result from solving the inequality $200(2) < w < 200(3)$. Choice B is incorrect and may result from solving the inequality for a weight range of more than 1 pound but less than 2 pounds: $200 + 1(365) < w < 200 + 2(365)$. Choice C is incorrect and may result from calculating the possible weight gained by the elephant during the first year without adding the 200 pounds the elephant weighed at birth.

Question Difficulty:

Medium

Question ID 271f7e3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #cccccc;"></div>

ID: 271f7e3f

$$f(x) = \frac{(x + 7)}{4}$$

For the function f defined above, what is the value of $f(9) - f(1)$?

A. 1

B. 2

C. $\frac{1}{4}$

D. $\frac{9}{4}$

ID: 271f7e3f Answer

Correct Answer:

B

Rationale

Choice B is correct. The value of $f(9) - f(1)$ can be calculated by finding the values of $f(9)$ and $f(1)$. The value of $f(9)$ can be

found by substituting 9 for x in the given function: $f(9) = \frac{(9 + 7)}{4}$. This equation can be rewritten as $f(9) = \frac{16}{4}$, or 4. Then, the

value of $f(1)$ can be found by substituting 1 for x in the given function: $f(1) = \frac{(1 + 7)}{4}$. This equation can be rewritten as

$f(1) = \frac{8}{4}$, or 2. Therefore, $f(9) - f(1) = 4 - 2$, which is equivalent to 2.

Choices A, C, and D are incorrect and may result from incorrectly substituting values of x in the given function or making computational errors.

Question Difficulty:

Medium

Question ID 70e29454

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70e29454

$$a(3-x) - b = -1 - 2x$$

In the equation above, a and b are constants. If the equation has infinitely many solutions, what are the values of a and b ?

- A. $a = 2$ and $b = 1$
- B. $a = 2$ and $b = 7$
- C. $a = -2$ and $b = 5$
- D. $a = -2$ and $b = -5$

ID: 70e29454 Answer

Correct Answer:

B

Rationale

Choice B is correct. Distributing the a on the left-hand side of the equation gives $3a - b - ax = -1 - 2x$. Rearranging the terms in each side of the equation yields $-ax + 3a - b = -2x - 1$. Since the equation has infinitely many solutions, it follows that the coefficients of x and the free terms on both sides must be equal. That is, $-a = -2$, or $a = 2$, and $3a - b = -1$. Substituting 2 for a in the equation $3a - b = -1$ gives $3(2) - b = -1$, so $b = 7$.

Choice A is incorrect and may be the result of a conceptual error when finding the value of b . Choices C and D are incorrect and may result from making a sign error when simplifying.

Question Difficulty:

Medium

Question ID 0b46bad5

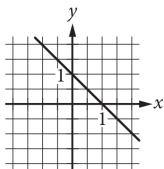
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 0b46bad5

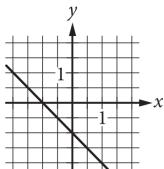
$$ax + by = b$$

In the equation above, a and b are constants and $0 < a < b$. Which of the following could represent the graph of the equation in the xy -plane?

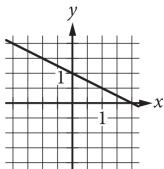
A.



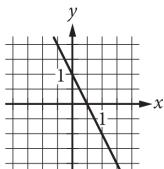
B.



C.



D.



ID: 0b46bad5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The given equation $ax + by = b$ can be rewritten in slope-intercept form, $y = mx + k$, where m represents the slope of the line represented by the equation, and k represents the y -coordinate of the y -intercept of the line. Subtracting ax from

both sides of the equation yields $by = -ax + b$, and dividing both sides of this equation by b yields $y = -\frac{a}{b}x + \frac{b}{b}$, or $y = -\frac{a}{b}x + 1$. With the equation now in slope-intercept form, it shows that $k = 1$, which means the y-coordinate of the y-intercept is 1. It's given that a and b are both greater than 0 (positive) and that $a < b$. Since $m = -\frac{a}{b}$, the slope of the line must be a value between -1 and 0. Choice C is the only graph of a line that has a y-value of the y-intercept that is 1 and a slope that is between -1 and 0.

Choices A, B, and D are incorrect because the slopes of the lines in these graphs aren't between -1 and 0.

Question Difficulty:

Hard

Question ID b31c3117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b31c3117

$$H = 120p + 60$$

The Karvonen formula above shows the relationship between Alice's target heart rate H , in beats per minute (bpm), and the intensity level p of different activities. When $p = 0$, Alice has a resting heart rate. When $p = 1$, Alice has her maximum heart rate. It is recommended that p be between 0.5 and 0.85 for Alice when she trains. Which of the following inequalities describes Alice's target training heart rate?

- A. $120 \leq H \leq 162$
- B. $102 \leq H \leq 120$
- C. $60 \leq H \leq 162$
- D. $60 \leq H \leq 102$

ID: b31c3117 Answer

Correct Answer:

A

Rationale

Choice A is correct. When Alice trains, it's recommended that p be between 0.5 and 0.85. Therefore, her target training heart rate is represented by the values of H corresponding to $0.5 \leq p \leq 0.85$. When $p = 0.5$, $H = 120(0.5) + 60$, or $H = 120$. When $p = 0.85$, $H = 120(0.85) + 60$, or $H = 162$. Therefore, the inequality that describes Alice's target training heart rate is $120 \leq H \leq 162$.

Choice B is incorrect. This inequality describes Alice's target heart rate for $0.35 \leq p \leq 0.5$. Choice C is incorrect. This inequality describes her target heart rate for $0 \leq p \leq 0.85$. Choice D is incorrect. This inequality describes her target heart rate for $0 \leq p \leq 0.35$.

Question Difficulty:

Medium

Question ID f09097b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f09097b1

An agricultural scientist studying the growth of corn plants recorded the height of a corn plant at the beginning of a study and the height of the plant each day for the next 12 days. The scientist found that the height of the plant increased by an average of 1.20 centimeters per day for the 12 days. If the height of the plant on the last day of the study was 36.8 centimeters, what was the height, in centimeters, of the corn plant at the beginning of the study?

ID: f09097b1 Answer

Rationale

The correct answer is 22.4. If the height of the plant increased by an average of 1.20 centimeters per day for 12 days, then its total growth over the 12 days was $(1.20)(12) = 14.4$ centimeters. The plant was 36.8 centimeters tall after 12 days, so at the beginning of the study its height was $36.8 - 14.4 = 22.4$ centimeters. Note that 22.4 and $112/5$ are examples of ways to enter a correct answer.

Alternate approach: The equation $36.8 = 12(1.20) + h$ can be used to represent this situation, where h is the height of the plant, in centimeters, at the beginning of the study. Solving this equation for h yields 22.4 centimeters.

Question Difficulty:

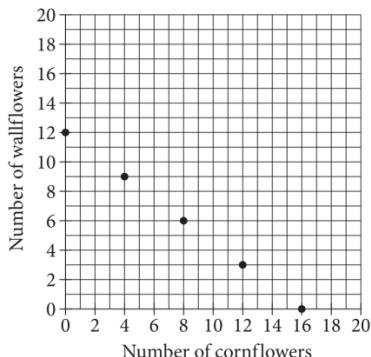
Medium

Question ID c362c210

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c362c210

Number of Cornflowers and Wallflowers at Garden Store



The points plotted in the coordinate plane above represent the possible numbers of wallflowers and cornflowers that someone can buy at the Garden Store in order to spend exactly \$24.00 total on the two types of flowers. The price of each wallflower is the same and the price of each cornflower is the same. What is the price, in dollars, of 1 cornflower?

ID: c362c210 Answer

Rationale

The correct answer is 1.5. The point $(16, 0)$ corresponds to the situation where 16 cornflowers and 0 wallflowers are purchased. Since the total spent on the two types of flowers is \$24.00, it follows that the price of 16 cornflowers is \$24.00, and the price of one cornflower is \$1.50. Note that 1.5 and $\frac{3}{2}$ are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 94b48cbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 94b48cbf

The graph of $7x + 2y = -31$ in the xy -plane has an x -intercept at $(a, 0)$ and a y -intercept at $(0, b)$, where a and b are constants. What is the value of $\frac{b}{a}$?

- A. $-\frac{7}{2}$
- B. $-\frac{2}{7}$
- C. $\frac{2}{7}$
- D. $\frac{7}{2}$

ID: 94b48cbf Answer

Correct Answer:

D

Rationale

Choice D is correct. The x -coordinate a of the x -intercept $a, 0$ can be found by substituting 0 for y in the given equation, which gives $7x + 20 = -31$, or $7x = -31$. Dividing both sides of this equation by 7 yields $x = -\frac{31}{7}$. Therefore, the value of a is $-\frac{31}{7}$. The y -coordinate b of the y -intercept $0, b$ can be found by substituting 0 for x in the given equation, which gives $70 + 2y = -31$, or $2y = -31$. Dividing both sides of this equation by 2 yields $y = -\frac{31}{2}$. Therefore, the value of b is $-\frac{31}{2}$. It follows that the value of $\frac{b}{a}$ is $\frac{-\frac{31}{2}}{-\frac{31}{7}} = \frac{31}{2} \cdot \frac{7}{31} = \frac{7}{2}$, which is equivalent to $\frac{31}{2} \cdot \frac{7}{31}$, or $\frac{7}{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID c5082ce3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c5082ce3

The score on a trivia game is obtained by subtracting the number of incorrect answers from twice the number of correct answers. If a player answered 40 questions and obtained a score of 50, how many questions did the player answer correctly?

ID: c5082ce3 Answer

Rationale

The correct answer is 30. Let x represent the number of correct answers from the player and y represent the number of incorrect answers from the player. Since the player answered 40 questions in total, the equation $x + y = 40$ represents this situation. Also, since the score is found by subtracting the number of incorrect answers from twice the number of correct answers and the player received a score of 50, the equation $2x - y = 50$ represents this situation. Adding the equations in the system of two equations together yields $(x + y) + (2x - y) = 40 + 50$. This can be rewritten as $3x = 90$. Finally, solving for x by dividing both sides of the equation by 3 yields $x = 30$.

Question Difficulty:

Medium

Question ID dd797fe2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd797fe2

$$4x + 3y = 24$$

Mario purchased 4 binders that cost x dollars each and 3 notebooks that cost y dollars each. If the given equation represents this situation, which of the following is the best interpretation of 24 in this context?

- A. The total cost, in dollars, for all binders purchased
- B. The total cost, in dollars, for all notebooks purchased
- C. The total cost, in dollars, for all binders and notebooks purchased
- D. The difference in the total cost, in dollars, between the number of binders and notebooks purchased

ID: dd797fe2 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since Mario purchased 4 binders that cost x dollars each, the expression $4x$ represents the total cost, in dollars, of the 4 binders he purchased. Since Mario purchased 3 notebooks that cost y dollars each, the expression $3y$ represents the total cost, in dollars, of the 3 notebooks he purchased. Therefore, the expression $4x + 3y$ represents the total cost, in dollars, for all binders and notebooks he purchased. In the given equation, the expression $4x + 3y$ is equal to 24. Therefore, it follows that 24 is the total cost, in dollars, for all binders and notebooks purchased.

Choice A is incorrect. This is represented by the expression $4x$ in the given equation. Choice B is incorrect. This is represented by the expression $3y$ in the given equation. Choice D is incorrect. This is represented by the expression $|4x - 3y|$.

Question Difficulty:

Easy

Question ID 550b352c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 550b352c

$$10 = 2x + 4$$

How many solutions exist to the equation shown above?

- A. None
- B. Exactly 1
- C. Exactly 3
- D. Infinitely many

ID: 550b352c Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting 4 from each side of the given equation yields $6 = 2x$, or $x = 3$, so the equation has a unique solution of $x = 3$.

Choice A is incorrect. Since 3 is a value of x that satisfies the given equation, the equation has at least 1 solution. Choice C is incorrect. Linear equations can have 0, 1, or infinitely many solutions; no linear equation has exactly 3 solutions. Choice D is incorrect. If a linear equation has infinitely many solutions, it can be reduced to $0 = 0$. This equation reduces to $x = 3$, so there is only 1 solution.

Question Difficulty:

Easy

Question ID a396ed75

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a396ed75

For a training program, Juan rides his bike at an average rate of 5.7 minutes per mile. Which function m models the number of minutes it will take Juan to ride x miles at this rate?

- A. $m(x) = \frac{x}{5.7}$
- B. $m(x) = x + 5.7$
- C. $m(x) = x - 5.7$
- D. $m(x) = 5.7x$

ID: a396ed75 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that Juan rides his bike at an average rate of 5.7 minutes per mile. The number of minutes it will take Juan to ride x miles can be determined by multiplying his average rate by the number of miles, x , which yields $5.7x$. Therefore, the function $mx = 5.7x$ models the number of minutes it will take Juan to ride x miles.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 50f4cb9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 50f4cb9c

x	$f(x)$
1	-64
2	0
3	64

For the linear function f , the table shows three values of x and their corresponding values of $f(x)$. Function f is defined by $f(x) = ax + b$, where a and b are constants. What is the value of $a - b$?

- A. -64
- B. 62
- C. 128
- D. 192

ID: 50f4cb9c Answer

Correct Answer:

D

Rationale

Choice D is correct. The table gives that $f(x) = 0$ when $x = 2$. Substituting 0 for $f(x)$ and 2 for x into the equation $f(x) = ax + b$ yields $0 = 2a + b$. Subtracting $2a$ from both sides of this equation yields $b = -2a$. The table gives that $f(x) = -64$ when $x = 1$. Substituting $-2a$ for b , -64 for $f(x)$, and 1 for x into the equation $f(x) = ax + b$ yields $-64 = a + -2a$. Combining like terms yields $-64 = -a$, or $a = 64$. Since $b = -2a$, substituting 64 for a into this equation gives $b = -128$, which yields $b = -128$. Thus, the value of $a - b$ can be written as $64 - (-128)$, which is 192.

Choice A is incorrect. This is the value of $a + b$, not $a - b$.

Choice B is incorrect. This is the value of $a - 2$, not $a - b$.

Choice C is incorrect. This is the value of $2a$, not $a - b$.

Question Difficulty:

Hard

Question ID 87071893

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 87071893

$$x + 40 = 95$$

What value of x is the solution to the given equation?

ID: 87071893 Answer

Correct Answer:

55

Rationale

The correct answer is 55. Subtracting 40 from both sides of the given equation yields $x = 55$. Therefore, the value of x is 55.

Question Difficulty:

Easy

Question ID 16889ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 16889ef3

Oil and gas production in a certain area dropped from 4 million barrels in 2000 to 1.9 million barrels in 2013. Assuming that the oil and gas production decreased at a constant rate, which of the following linear functions f best models the production, in millions of barrels, t years after the year 2000?

A. $f(t) = \frac{21}{130}t + 4$

B. $f(t) = \frac{19}{130}t + 4$

C. $f(t) = -\frac{21}{130}t + 4$

D. $f(t) = -\frac{19}{130}t + 4$

ID: 16889ef3 Answer

Correct Answer:

C

Rationale

Choice C is correct. It is assumed that the oil and gas production decreased at a constant rate. Therefore, the function f that best models the production t years after the year 2000 can be written as a linear function, $f(t) = mt + b$, where m is the rate of change of the oil and gas production and b is the oil and gas production, in millions of barrels, in the year 2000. Since there were 4 million barrels of oil and gas produced in 2000, $b = 4$. The rate of change, m , can be calculated as $\frac{4 - 1.9}{0 - 13} = -\frac{2.1}{13}$, which is equivalent to $-\frac{21}{130}$, the rate of change in choice C.

Choices A and B are incorrect because each of these functions has a positive rate of change. Since the oil and gas production decreased over time, the rate of change must be negative. Choice D is incorrect. This model may result from misinterpreting 1.9 million barrels as the amount by which the production decreased.

Question Difficulty:

Hard

Question ID c651cc56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: c651cc56

x	f(x)
0	-2
2	4
6	16

Some values of the linear function f are shown in the table above. What is the value of $f(3)$?

- A. 6
- B. 7
- C. 8
- D. 9

ID: c651cc56 Answer

Correct Answer:

B

Rationale

Choice B is correct. A linear function has a constant rate of change, and any two rows of the table shown can be used to calculate this rate. From the first row to the second, the value of x is increased by 2 and the value of $f(x)$ is increased by $4 - (-2) = 6$. So the values of $f(x)$ increase by 3 for every increase by 1 in the value of x . Since $f(2) = 4$, it follows that $f(2+1) = 4 + 3 = 7$. Therefore, $f(3) = 7$.

Choice A is incorrect. This is the third x -value in the table, not $f(3)$. Choices C and D are incorrect and may result from errors when calculating the function's rate of change.

Question Difficulty:

Medium

Question ID c22b5f25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: c22b5f25

In the xy -plane, the points $(-2, 3)$ and $(4, -5)$ lie on the graph of which of the following linear functions?

- A. $f(x) = x + 5$
- B. $f(x) = \frac{1}{2}x + 4$
- C. $f(x) = -\frac{4}{3}x + \frac{1}{3}$
- D. $f(x) = -\frac{3}{2}x + 1$

ID: c22b5f25 Answer

Correct Answer:

C

Rationale

Choice C is correct. A linear function can be written in the form $f(x) = mx + b$, where m is the slope and b is the y -coordinate of

the y -intercept of the line. The slope of the graph can be found using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the values of the given points into this formula yields $m = \frac{-5 - 3}{4 - (-2)}$ or $m = \frac{-8}{6}$, which simplifies to $m = -\frac{4}{3}$. Only choice C shows an equation with this slope.

Choices A, B, and D are incorrect and may result from computation errors or misinterpreting the given information.

Question Difficulty:

Medium

Question ID 6cb9bf45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 6cb9bf45

$$y > 7x - 4$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	13
5	27
8	48

B.

x	y
3	17
5	31
8	52

C.

x	y
3	21
5	27
8	52

D.

x	y
3	21
5	35
8	56

ID: 6cb9bf45 Answer

Correct Answer:

D

Rationale

Choice D is correct. A solution (x, y) to the given inequality is a value of x and the corresponding value of y such that the value of y is greater than the value of $7x - 4$. All the tables in the choices have the same three values of x , so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y > 7(3) - 4$, or $y > 17$. Substituting 5 for x in the given inequality yields $y > 7(5) - 4$, or $y > 31$.

. Substituting 8 for x in the given inequality yields $y > 7(8) - 4$, or $y > 52$. Therefore, when $x = 3$, $x = 5$, and $x = 8$, the corresponding values of y must be greater than 17, greater than 31, and greater than 52, respectively. In the table in choice D, when $x = 3$, the corresponding value of y is 21, which is greater than 17; when $x = 5$, the corresponding value of y is 35, which is greater than 31; when $x = 8$, the corresponding value of y is 56, which is greater than 52. Of the given choices, only choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID d7bf55e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d7bf55e1

A movie theater sells two types of tickets, adult tickets for \$12 and child tickets for \$8.

If the theater sold 30 tickets for a total of \$300, how much, in dollars, was spent on adult tickets? (Disregard the \$ sign when gridding your answer.)

ID: d7bf55e1 Answer

Rationale

The correct answer is 180. Let a be the number of adult tickets sold and c be the number of child tickets sold. Since the theater sold a total of 30 tickets, $a + c = 30$. The price per adult ticket is \$12, and the price per child ticket is \$8. Since the theater received a total of \$300 for the 30 tickets sold, it follows that $12a + 8c = 300$. To eliminate c , the first equation can be multiplied by 8 and then subtracted from the second equation:

$$\begin{array}{r} 12a + 8c = 300 \\ -8a - 8c = -240 \\ \hline 4a + 0c = 60 \end{array}$$

Because the question asks for the amount spent on adult tickets, which is $12a$ dollars, the resulting equation can be multiplied by 3 to give $3(4a) = 3(60) = 180$. Therefore, \$180 was spent on adult tickets.

Alternate approach: If all the 30 tickets sold were child tickets, their total price would be $30(\$8) = \240 . Since the actual total price of the 30 tickets was \$300, the extra \$60 indicates that a certain number of adult tickets, a , were sold. Since the price of each adult ticket is \$4 more than each child ticket, $4a = 60$, and it follows that $12a = 180$.

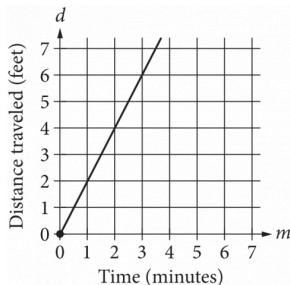
Question Difficulty:

Hard

Question ID 11e1ab81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 11e1ab81



The graph above shows the distance traveled d , in feet, by a product on a conveyor belt m minutes after the product is placed on the belt. Which of the following equations correctly relates d and m ?

- A. $d = 2m$
- B. $d = \frac{1}{2}m$
- C. $d = m + 2$
- D. $d = 2m + 2$

ID: 11e1ab81 Answer

Correct Answer:

A

Rationale

Choice A is correct. The line passes through the origin. Therefore, this is a relationship of the form $d = km$, where k is a constant representing the slope of the graph. To find the value of k , choose a point (m, d) on the graph of the line other than the origin and substitute the values of m and d into the equation. For example, if the point $(2, 4)$ is chosen, then $4 = k(2)$, and $k = 2$. Therefore, the equation of the line is $d = 2m$.

Choice B is incorrect and may result from calculating the slope of the line as the change in time over the change in distance traveled instead of the change in distance traveled over the change in time. Choices C and D are incorrect because each of these equations represents a line with a d -intercept of 2. However, the graph shows a line with a d -intercept of 0.

Question Difficulty:

Medium

Question ID 771bd0ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 771bd0ca

$$5(t + 3) - 7(t + 3) = 38$$

What value of t is the solution to the given equation?

ID: 771bd0ca Answer

Correct Answer:

-22

Rationale

The correct answer is -22. The given equation can be rewritten as $-2t + 3 = 38$. Dividing both sides of this equation by -2 yields $t + 3 = -19$. Subtracting 3 from both sides of this equation yields $t = -22$. Therefore, -22 is the value of t that is the solution to the given equation.

Question Difficulty:

Hard

Question ID df78b361

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: df78b361

Lily made **36** cups of jam. Lily then filled x small containers and y large containers with all the jam she made. The equation $4x + 6y = 36$ represents this situation. Which is the best interpretation of $6y$ in this context?

- A. The number of large containers Lily filled
- B. The number of small containers Lily filled
- C. The total number of cups of jam in the large containers
- D. The total number of cups of jam in the small containers

ID: df78b361 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the equation $4x + 6y = 36$ represents the situation where Lily filled x small containers and y large containers with all the jam she made, which was 36 cups. Therefore, $6y$ represents the total number of cups of jam in the large containers.

Choice A is incorrect. The number of large containers Lily filled is represented by y , not $6y$.

Choice B is incorrect. The number of small containers Lily filled is represented by x , not $6y$.

Choice D is incorrect. The total number of cups of jam in the small containers is represented by $4x$, not $6y$.

Question Difficulty:

Medium

Question ID 4fe4fd7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4fe4fd7c

$$c(x) = mx + 500$$

A company's total cost $c(x)$, in dollars, to produce x shirts is given by the function above, where m is a constant and $x > 0$. The total cost to produce 100 shirts is \$800. What is the total cost, in dollars, to produce 1000 shirts? (Disregard the \$ sign when gridding your answer.)

ID: 4fe4fd7c Answer

Rationale

The correct answer is 3500. The given information includes a cost, \$800, to produce 100 shirts. Substituting $c(x) = 800$ and $x = 100$ into the given equation yields $800 = m \cdot 100 + 500$. Subtracting 500 from both sides of the equation yields $300 = m \cdot 100$. Dividing both sides of this equation by 100 yields $3 = m$. Substituting the value of m into the given equation yields $c(x) = 3x + 500$. Substituting 1000 for x in this equation and solving for $c(x)$ gives the cost of 1000 shirts: $3(1000) + 500$, or 3500.

Question Difficulty:

Medium

Question ID 789975b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 789975b7

A gardener buys two kinds of fertilizer. Fertilizer A contains 60% filler materials by weight and Fertilizer B contains 40% filler materials by weight. Together, the fertilizers bought by the gardener contain a total of 240 pounds of filler materials. Which equation models this relationship, where x is the number of pounds of Fertilizer A and y is the number of pounds of Fertilizer B?

- A. $0.4x + 0.6y = 240$
- B. $0.6x + 0.4y = 240$
- C. $40x + 60y = 240$
- D. $60x + 40y = 240$

ID: 789975b7 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since Fertilizer A contains 60% filler materials by weight, it follows that x pounds of Fertilizer A consists of $0.6x$ pounds of filler materials. Similarly, y pounds of Fertilizer B consists of $0.4y$ pounds of filler materials. When x pounds of Fertilizer A and y pounds of Fertilizer B are combined, the result is 240 pounds of filler materials. Therefore, the total amount, in pounds, of filler materials in a mixture of x pounds of Fertilizer A and y pounds of Fertilizer B can be expressed as $0.6x + 0.4y = 240$.

Choice A is incorrect. This choice transposes the percentages of filler materials for Fertilizer A and Fertilizer B. Fertilizer A consists of $0.6x$ pounds of filler materials and Fertilizer B consists of $0.4y$ pounds of filler materials. Therefore, $0.6x + 0.4y$ is equal to 240, not $0.4x + 0.6y$. Choice C is incorrect. This choice transposes the percentages of filler materials for Fertilizer A and Fertilizer B and incorrectly represents how to take the percentage of a value mathematically. Choice D is incorrect. This choice incorrectly represents how to take the percentage of a value mathematically. Fertilizer A consists of $0.6x$ pounds of filler materials, not $60x$ pounds of filler materials, and Fertilizer B consists of $0.4y$ pounds of filler materials, not $40y$ pounds of filler materials.

Question Difficulty:

Easy

Question ID a309803e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a309803e

One gallon of paint will cover **220** square feet of a surface. A room has a total wall area of w square feet. Which equation represents the total amount of paint P , in gallons, needed to paint the walls of the room twice?

- A. $P = \frac{w}{110}$
- B. $P = 440w$
- C. $P = \frac{w}{220}$
- D. $P = 220w$

ID: a309803e Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that w represents the total wall area, in square feet. Since the walls of the room will be painted twice, the amount of paint, in gallons, needs to cover $2w$ square feet. It's also given that one gallon of paint will cover 220 square feet. Dividing the total area, in square feet, of the surface to be painted by the number of square feet covered by one gallon of paint gives the number of gallons of paint that will be needed. Dividing $2w$ by 220 yields $\frac{2w}{220}$, or $\frac{w}{110}$. Therefore, the equation that represents the total amount of paint P , in gallons, needed to paint the walls of the room twice is $P = \frac{w}{110}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from finding the amount of paint needed to paint the walls once rather than twice.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 55ea82f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 55ea82f3

A team hosting an event to raise money for new uniforms plans to sell at least 140 tickets before this event and at least 220 tickets during this event to raise a total of at least \$5,820 from all tickets sold. The price of a ticket during this event is \$3 less than the price of a ticket before this event. Which inequality represents this situation, where x is the price, in dollars, of a ticket sold during this event?

- A. $140(x + 3) + 220x \leq 5,820$
- B. $140(x + 3) + 220x \geq 5,820$
- C. $140(x - 3) + 220x \leq 5,820$
- D. $140(x - 3) + 220x \geq 5,820$

ID: 55ea82f3 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a team plans to sell at least 140 tickets before an event and at least 220 tickets during the event to raise a total of at least \$5,820 from all tickets sold. It's also given that the price of a ticket during the event is \$3 less than the price of a ticket before the event and that x represents the price, in dollars, of a ticket sold during the event. It follows that $x + 3$ represents the price, in dollars, of a ticket sold before the event. The expression $140(x + 3)$ represents the planned revenue, in dollars, from the tickets sold before the event, and the expression $220x$ represents the planned revenue, in dollars, from the tickets sold during the event. Thus, the expression $140(x + 3) + 220x$ represents the planned revenue, in dollars, from all tickets sold. Since the team plans to raise a total of at least \$5,820 from all tickets sold, the total revenue must be at least \$5,820. Therefore, the inequality $140(x + 3) + 220x \geq 5,820$ represents this situation.

Choice A is incorrect. This inequality represents a situation in which the team raises a total of at most \$5,820 from all tickets sold.

Choice C is incorrect. This inequality represents a situation in which the price of a ticket before the event is \$3 less, rather than \$3 more, than the price of a ticket during the event and the team raises a total of at most \$5,820 from all tickets sold.

Choice D is incorrect. This inequality represents a situation in which the price of a ticket before the event is \$3 less, rather than \$3 more, than the price of a ticket during the event.

Question Difficulty:

Hard

Question ID cea27ab2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: cea27ab2

$$7x - 4y = -84$$

For the given equation, which table gives three values of x and their corresponding values of y ?

A.

x	0	4	8
y	21	28	35

B.

x	0	4	8
y	35	28	21

C.

x	21	28	35
y	0	4	8

D.

x	21	28	35
y	8	4	0

ID: cea27ab2 Answer

Correct Answer:

A

Rationale

Choice A is correct. To verify which table represents this linear relationship, the values in each table can be checked by substituting them into the given equation. The table in choice A shows that when $x = 0$, $y = 21$. Substituting these values into the given equation yields $7(0) - 4(21) = -84$, or $-84 = -84$, which is true. Additionally, the table in choice A shows that when $x = 4$, $y = 28$. Substituting these values into the given equation yields $7(4) - 4(28) = -84$, or $-84 = -84$, which is true. Finally, the table in choice A shows that when $x = 8$, $y = 35$. Substituting these values into the given equation yields $7(8) - 4(35) = -84$, or $-84 = -84$, which is true. Therefore, the table in choice A gives three values of x and their corresponding values of y .

Choice B is incorrect. The table in choice B shows that when $x = 0$, $y = 35$. Substituting these values into the given equation yields $7(0) - 4(35) = -84$, or $-140 = -84$, which is not true.

Choice C is incorrect. The table in choice C shows that when $x = 21$, $y = 0$. Substituting these values into the given equation yields $7(21) - 4(0) = -84$, or $147 = -84$, which is not true.

Choice D is incorrect. The table in choice D shows that when $x = 21$, $y = 8$. Substituting these values into the given equation yields $7(21) - 4(8) = -84$, or $115 = -84$, which is not true.

Question Difficulty:

Easy

Question ID 0d1b1e35

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0d1b1e35

A batch of banana milkshakes consists of **4** cups of ice cream and **2** bananas and has **1,114 milligrams (mg)** of calcium. There is **276 mg** of calcium in **1** cup of the ice cream used to make this batch of milkshakes. How much calcium, **in mg**, is in **1** banana?

- A. 5
- B. 10
- C. 419
- D. 1,104

ID: 0d1b1e35 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a batch of banana milkshakes consists of 4 cups of ice cream and 2 bananas and has 1,114 mg of calcium. It's also given that there is 276 mg of calcium in 1 cup of the ice cream used to make this batch of milkshakes. It follows that the total amount of calcium in 4 cups of ice cream is $4(276)$, or 1,104 mg. Let x represent the amount of calcium, in mg, in 1 banana. It follows that the total amount of calcium in 2 bananas is $2x$ mg. Since the batch of banana milkshakes has 1,114 mg of calcium, the equation $1,104 + 2x = 1,114$ represents this situation. Subtracting 1,104 from both sides of this equation yields $2x = 10$. Dividing both sides of this equation by 2 yields $x = 5$. Therefore, the amount of calcium in 1 banana is 5 mg.

Choice B is incorrect. This is the amount of calcium, in mg, in 2 bananas, not in 1 banana.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the amount of calcium, in mg, in 4 cups of ice cream, not in 1 banana.

Question Difficulty:

Medium

Question ID 2554b413

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2554b413

In the xy -plane, a line has a slope of 6 and passes through the point $(0, 8)$. Which of the following is an equation of this line?

- A. $y = 6x + 8$
- B. $y = 6x + 48$
- C. $y = 8x + 6$
- D. $y = 8x + 48$

ID: 2554b413 Answer

Correct Answer:

A

Rationale

Choice A is correct. The slope-intercept form of an equation for a line is $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It's given that the slope is 6, so $m = 6$. It's also given that the line passes through the point $(0, 8)$ on the y -axis, so $b = 8$. Substituting $m = 6$ and $b = 8$ into the equation $y = mx + b$ gives $y = 6x + 8$.

Choices B, C, and D are incorrect and may result from misinterpreting the slope-intercept form of an equation of a line.

Question Difficulty:

Easy

Question ID 620abf36

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 620abf36

If $5(x + 4) = 4(x + 4) + 29$, what is the value of $x + 4$?

- A. -4
- B. 25
- C. 29
- D. 33

ID: 620abf36 Answer

Correct Answer:

C

Rationale

Choice C is correct. Subtracting $4x + 4$ from both sides of the given equation yields $1x + 4 = 29$, or $x + 4 = 29$. Therefore, the value of $x + 4$ is 29.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of x , not $x + 4$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID d62ad380

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d62ad380

An artist paints and sells square tiles. The selling price P , in dollars, of a painted tile is a linear function of the side length of the tile s , in inches, as shown in the table below.

Side length, s (inches)	Price, P (dollars)
3	8.00
6	18.00
9	28.00

Which of the following could define the relationship between s and P ?

A. $P = 3s + 10$

B. $P = \frac{10}{3}s + 8$

C. $P = \frac{10}{3}s - 2$

D. $P = \frac{3}{10}s - \frac{1}{10}$

ID: d62ad380 Answer

Correct Answer:

C

Rationale

Choice C is correct. The relationship between s and P can be modeled by a linear equation of the form $P = ks + a$, where k and a are constants. The table shows that P increases by 10 when s increases by 3, so $k = \frac{10}{3}$. To solve for a , substitute one of the given pairs of values for s and P : when $s = 3$, $P = 8$, so

$$8 = \frac{10}{3}(3) + a$$

which yields $a = -2$. The solution is therefore

$$P = \frac{10}{3}s - 2$$

Choice A is incorrect. When $s = 3$, $P = 8$, but $3(3) + 10 = 19 \neq 8$. Choice B is incorrect. This may result from using the first number given for P in the table as the constant term a in the linear equation $P = ks + a$, which is true only when $s = 0$. Choice D is incorrect and may result from using the reciprocal of the slope of the line.

Question Difficulty:

Medium

Question ID ed18c4f7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: ed18c4f7

Cathy has n CDs. Gerry has 3 more than twice the number of CDs that Cathy has. In terms of n , how many CDs does Gerry have?

- A. $3n - 2$
- B. $3n + 2$
- C. $2n - 3$
- D. $2n + 3$

ID: ed18c4f7 Answer

Correct Answer:

D

Rationale

Choice D is correct. The term $2n$ represents twice the number of CDs that Cathy has, and adding 3 represents 3 more than that amount.

Choices A and B are incorrect. The expression $3n$ represents three times the number of CDs that Cathy has. Choice C is incorrect. Subtracting 3 represents 3 fewer than twice the number of CDs that Cathy has.

Question Difficulty:

Easy

Question ID 3462d850

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3462d850

Marisol drove 3 hours from City A to City B. The equation below estimates the distance d , in miles, Marisol traveled after driving for t hours.

$$d = 45t$$

Which of the following does 45 represent in the equation?

- A. Marisol took 45 trips from City A to City B.
- B. The distance between City A and City B is 45 miles.
- C. Marisol drove at an average speed of about 45 miles per hour.
- D. It took Marisol 45 hours to drive from City A to City B.

ID: 3462d850 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that d is the distance, in miles, Marisol traveled after driving for t hours. Therefore, 45 represents the distance in miles traveled per hour, which is the speed she drove in miles per hour.

Choice A is incorrect and may result from misidentifying speed as the number of trips. Choice B is incorrect and may result from misidentifying speed as the total distance. Choice D is incorrect and may result from misidentifying the speed as the time, in hours.

Question Difficulty:

Easy

Question ID d9d83c02

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d9d83c02

For what value of w does

$$w - 10 = 2(w + 5)$$
?

- A. 5
- B. 0
- C. -15
- D. -20

ID: d9d83c02 Answer

Correct Answer:

D

Rationale

Choice D is correct. To solve the equation, use the distributive property to multiply on the right-hand side of the equation which gives $w - 10 = 2w + 10$. Subtract w from both sides of the equation, which gives $-10 = w + 10$. Finally, subtract 10 from both sides of the equation, which gives $-20 = w$.

Choices A and B are incorrect and may result from making sign errors. Choice C is incorrect and may result from incompletely distributing the 2 in the expression $2(w + 5)$.

Question Difficulty:

Easy

Question ID 23dedddd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 23dedddd

In the linear function f , $f(0) = 8$ and $f(1) = 12$. Which equation defines f ?

- A. $f(x) = 12x + 8$
- B. $f(x) = 4x$
- C. $f(x) = 4x + 12$
- D. $f(x) = 4x + 8$

ID: 23dedddd Answer

Correct Answer:

D

Rationale

Choice D is correct. Since f is a linear function, it can be defined by an equation of the form $fx = ax + b$, where a and b are constants. It's given that $f0 = 8$. Substituting 0 for x and 8 for fx in the equation $fx = ax + b$ yields $8 = a0 + b$, or $8 = b$. Substituting 8 for b in the equation $fx = ax + b$ yields $fx = ax + 8$. It's given that $f1 = 12$. Substituting 1 for x and 12 for fx in the equation $fx = ax + 8$ yields $12 = a1 + 8$, or $12 = a + 8$. Subtracting 8 from both sides of this equation yields $a = 4$. Substituting 4 for a in the equation $fx = ax + 8$ yields $fx = 4x + 8$. Therefore, an equation that defines f is $fx = 4x + 8$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID a91a2b75

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a91a2b75

The function f is defined by $f(x) = -9x + 9$. What is the y -coordinate of the y -intercept of the graph of $y = f(x)$ in the xy -plane?

ID: a91a2b75 Answer

Correct Answer:

9

Rationale

The correct answer is 9. The y -intercept of the graph of $y = f(x)$ in the xy -plane is the point where the graph of $y = f(x)$ crosses the y -axis, which occurs at $x = 0$. It's given that the function f is defined by $f(x) = -9x + 9$. Substituting 0 for x and y for $f(x)$ in this equation yields $y = -9(0) + 9$, or $y = 9$. It follows that $y = 9$ when $x = 0$ and that the y -intercept of the graph of $y = f(x)$ in the xy -plane is $(0, 9)$. Therefore, the y -coordinate of the y -intercept of the graph of $y = f(x)$ in the xy -plane is 9.

Question Difficulty:

Medium

Question ID 98d3393a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 98d3393a

Line ℓ in the xy -plane is perpendicular to the line with equation

$x = 2$. What is the slope of line ℓ ?

- A. 0
- B. $-\frac{1}{2}$
- C. -2
- D. The slope of line ℓ is undefined.

ID: 98d3393a Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that line ℓ is perpendicular to a line whose equation is $x = 2$. A line whose equation is a constant value of x is vertical, so ℓ must therefore be horizontal. Horizontal lines have a slope of 0, so ℓ has a slope of 0.

Choice B is incorrect. A line with slope $-\frac{1}{2}$ is perpendicular to a line with slope 2. However, the line with equation $x = 2$ is vertical

and has undefined slope (not slope of 2). Choice C is incorrect. A line with slope -2 is perpendicular to a line with slope $\frac{1}{2}$.

However, the line with equation $x = 2$ has undefined slope (not slope of $\frac{1}{2}$). Choice D is incorrect; this is the slope of the line $x = 2$ itself, not the slope of a line perpendicular to it.

Question Difficulty:

Hard

Question ID 4f669597

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4f669597

$$2(p + 1) + 8(p - 1) = 5p$$

What value of p is the solution of the equation above?

ID: 4f669597 Answer

Rationale

The correct answer is 1.2. One way to solve the equation $2(p + 1) + 8(p - 1) = 5p$ is to first distribute the terms outside the parentheses to the terms inside the parentheses: $2p + 2 + 8p - 8 = 5p$. Next, combine like terms on the left side of the equal sign: $10p - 6 = 5p$. Subtracting $10p$ from both sides yields $-6 = -5p$. Finally, dividing both sides by -5 gives $p = \frac{6}{5}$, which is equivalent to $p = 1.2$. Note that 1.2 and $6/5$ are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 3c4ce699

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 3c4ce699

If $6 + x = 9$, what is the value of $18 + 3x$?

ID: 3c4ce699 Answer

Correct Answer:

27

Rationale

The correct answer is 27. Multiplying both sides of the given equation by 3 yields $36 + x = 39$, or $18 + 3x = 27$. Therefore, the value of $18 + 3x$ is 27.

Question Difficulty:

Easy

Question ID 0b0fa68b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0b0fa68b

For the function f , $f(cx) = x - 8$ for all values of x , where c is a positive constant. If $f(2) = 35$, what is the value of c ?

ID: 0b0fa68b Answer

Correct Answer:

.0465, 2/43

Rationale

The correct answer is $\frac{2}{43}$. It's given that $f(cx) = x - 8$ for all values of x , where c is a positive constant, and $f(2) = 35$. Therefore, for the given function f , $cx = 2$. Dividing both sides of this equation by c yields $x = \frac{2}{c}$. Substituting $\frac{2}{c}$ for x in the equation $f(cx) = x - 8$ yields $f\left(\frac{2c}{c}\right) = \frac{2}{c} - 8$, or $f(2) = \frac{2}{c} - 8$. Since it's given that $f(2) = 35$, substituting 35 for $f(2)$ yields $35 = \frac{2}{c} - 8$. Adding 8 to both sides of this equation yields $43 = \frac{2}{c}$. Multiplying both sides of this equation by c yields $43c = 2$. Dividing both sides of this equation by 43 yields $c = \frac{2}{43}$. Note that 2/43, .0465, 0.046, and 0.047 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 6989c80a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 6989c80a

$$F(x) = \frac{9}{5}(x - 273.15) + 32$$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 2.10 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

- A. 3.78
- B. 35.78
- C. 487.89
- D. 519.89

ID: 6989c80a Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function $F(x) = \frac{9}{5}x - 273.15 + 32$ gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. A temperature that increased by 2.10 kelvins means that the value of x increased by 2.10 kelvins. It follows that an increase in x by 2.10 increases $F(x)$ by $\frac{9}{5}2.10$, or 3.78. Therefore, if a temperature increased by 2.10 kelvins, the temperature increased by 3.78 degrees Fahrenheit.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 9d9fe1e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 9d9fe1e6

In science class, Diego conducted an experiment to learn about evaporation. Diego measured the height of fluid in a beaker over a period of time. The function $f(x) = 39 - 0.18x$ gives the estimated height, in centimeters (cm), of the fluid in the beaker x days after the start of the experiment. Which of the following is the best interpretation of 39 in this context?

- A. The estimated height, in cm, of the fluid at the start of the experiment
- B. The estimated height, in cm, of the fluid at the end of the experiment
- C. The estimated change in the height, in cm, of the fluid each day
- D. The estimated number of days for all the fluid to evaporate

ID: 9d9fe1e6 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function $f(x) = 39 - 0.18x$ gives the estimated height, in centimeters (cm), of the fluid in the beaker x days after the start of the experiment. For a function defined by an equation of the form $f(x) = b + mx$, where m and b are constants, b represents the value of $f(x)$ when $x = 0$. It follows that in the given function, 39 represents the value of $f(x)$ when $x = 0$. Since $x = 0$ represents the start of the experiment, then the best interpretation of 39 in this context is that the estimated height, in cm, of the fluid was 39 at the start of the experiment.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. The estimated change in the height, in cm, of the fluid each day is 0.18, not 39.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 255996a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 255996a6

$$T = 1,000 + 18h$$

In the equation above, T represents Brittany's total take-home pay, in dollars, for her first week of work, where h represents the number of hours she worked that week and 1,000 represents a sign-on bonus. If Brittany's total take-home pay was \$1,576, for how many hours was Brittany paid for her first week of work?

- A. 16
- B. 32
- C. 55
- D. 88

ID: 255996a6 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since Brittany's total take-home pay was \$1,576, the value 1,576 can be substituted for T in the given equation $T = 1,000 + 18h$ to give $1,576 = 1,000 + 18h$. Subtracting 1,000 from both sides of this equation gives $576 = 18h$. Dividing both sides of this equation by 18 gives $32 = h$. Therefore, Brittany was paid for 32 hours for her first week of work.

Choice A is incorrect. This is half the number of hours Brittany was paid for. Choice C is incorrect and may result from dividing 1,000 by 18. Choice D is incorrect and may result from dividing 1,576 by 18.

Question Difficulty:

Easy

Question ID a1696f3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: a1696f3e

The function g is defined as $g(x) = 5x + a$, where a is a constant. If $g(4) = 31$, what is the value of a ?

- A. 30
- B. 22
- C. 11
- D. -23

ID: a1696f3e Answer

Correct Answer:

C

Rationale

Choice C is correct. Substituting 4 for x in $g(x) = 5x + a$ gives $g(4) = 5(4) + a$. Since $g(4) = 31$, the equation $g(4) = 5(4) + a$ simplifies to $31 = 20 + a$. It follows that $a = 11$.

Choices A, B, and D are incorrect and may result from arithmetic errors.

Question Difficulty:

Easy

Question ID dfa45424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dfa45424

Tony spends \$80 per month on public transportation. A 10-ride pass costs \$12.50, and a single-ride pass costs \$1.50. If g represents the number of 10-ride passes Tony buys in a month and t represents the number of single-ride passes Tony buys in a month, which of the following equations best represents the relationship between g and t ?

- A. $g + t = 80$
- B. $g + t = 1.50 + 12.50$
- C. $1.50g + 12.50t = 80$
- D. $12.50g + 1.50t = 80$

ID: dfa45424 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since a 10-ride pass costs \$12.50 and g is the number of 10-ride passes Tony buys in a month, the expression $12.50g$ represents the amount Tony spends on 10-ride passes in a month. Since a single-ride pass costs \$1.50 and t is the number of single-ride passes Tony buys in a month, the expression $1.50t$ represents the amount Tony spends on single-ride passes in a month. Therefore, the sum $12.50g + 1.50t$ represents the amount he spends on the two types of passes in a month. Since Tony spends a total of \$80 on passes in a month, this expression can be set equal to 80, producing $12.50g + 1.50t = 80$.

Choices A and B are incorrect. The expression $g + t$ represents the total number of the two types of passes Tony buys in a month, not the amount Tony spends, which is equal to 80, nor the cost of one of each pass, which is equal to $1.50 + 12.50$. Choice C is incorrect and may result from reversing the cost for each type of pass Tony buys in a month.

Question Difficulty:

Easy

Question ID 431c3038

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 431c3038

In an article about exercise, it is estimated that a 160-pound adult uses 200 calories for every 30 minutes of hiking and 150 calories for every 30 minutes of bicycling. An adult who weighs 160 pounds has completed 1 hour of bicycling. Based on the article, how many hours should the adult hike to use a total of 1,900 calories from bicycling and hiking?

- A. 9.5
- B. 8.75
- C. 6
- D. 4

ID: 431c3038 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since a 160-pound adult uses 200 calories for every 30 minutes of hiking, then the same adult uses $200h$ calories after hiking for h 30-minute periods. Similarly, the same adult uses $150b$ calories after bicycling for b 30-minute periods. Therefore, the equation $200h + 150b = 1,900$ represents the situation where a 160-pound adult uses a total of 1,900 calories from hiking for h 30-minute periods and bicycling for b 30-minute periods. It's given that the adult completes 1 hour, or 2 30-minute periods, of bicycling. Substituting 2 for b in the equation $200h + 150b = 1,900$ yields $200h + 150(2) = 1,900$, or $200h + 300 = 1,900$. Subtracting 300 from both sides of this equation yields $200h = 1,600$. Dividing both sides by 200 yields $h = 8$. Since h represents the number of 30-minute periods spent hiking and there are 2 30-minute periods in every hour, it follows

that the adult will need to hike for $\frac{8}{2}$, or 4 hours to use a total of 1,900 calories from bicycling and hiking.

Choice A is incorrect and may result from solving the equation $200h = 1,900$. This represents 0 30-minute periods bicycling instead of 2. Choice B is incorrect and may result from solving the equation $200h + 150 = 1,900$. This represents 1 30-minute period of bicycling instead of 2. Choice C is incorrect. This may result from determining that the number of 30-minute periods the adult should hike is 8, but then subtracting 2 from 8, rather than dividing 8 by 2, to find the number of hours the adult should hike.

Question Difficulty:

Medium

Question ID bd45df49

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: bd45df49

$$y = 3x + 9$$

$$3y = 8x - 6$$

The solution to the given system of equations is (x, y) . What is the value of $x - y$?

- A. -123
- B. -33
- C. 3
- D. 57

ID: bd45df49 Answer

Correct Answer:

D

Rationale

Choice D is correct. The first equation in the given system of equations defines y as $3x + 9$. Substituting $3x + 9$ for y in the second equation in the given system of equations yields $3(3x + 9) = 8x - 6$. Applying the distributive property on the left-hand side of this equation yields $9x + 27 = 8x - 6$. Subtracting $8x$ from both sides of this equation yields $x + 27 = -6$. Subtracting 27 from both sides of this equation yields $x = -33$. Substituting -33 for x in the first equation of the given system of equations yields $y = 3(-33) + 9$, or $y = -90$. Substituting -33 for x and -90 for y into the expression $x - y$ yields $-33 - (-90)$, or 57.

Choice A is incorrect. This is the value of $x + y$, not $x - y$.

Choice B is incorrect. This is the value of x , not $x - y$.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 868fc236

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 868fc236

Energy per Gram of Typical Macronutrients

Macronutrient	Food calories	Kilojoules
Protein	4.0	16.7
Fat	9.0	37.7
Carbohydrate	4.0	16.7

The table above gives the typical amounts of energy per gram, expressed in both food calories and kilojoules, of the three macronutrients in food. If x food calories is equivalent to k kilojoules, of the following, which best represents the relationship between x and k ?

- A. $k = 0.24x$
- B. $k = 4.2x$
- C. $x = 4.2k$
- D. $xk = 4.2$

ID: 868fc236 Answer

Correct Answer:

B

Rationale

Choice B is correct. The relationship between x food calories and k kilojoules can be modeled as a proportional relationship. Let (x_1, k_1) and (x_2, k_2) represent the values in the first two rows in the table: $(4.0, 16.7)$ and $(9.0, 37.7)$. The rate of change, or $\frac{(k_2 - k_1)}{(x_2 - x_1)}$, is $\frac{21}{5} = 4.2$; therefore, the equation that best represents the relationship between x and k is $k = 4.2x$.

Choice A is incorrect and may be the result of calculating the rate of change using $\frac{(x_2 - x_1)}{(k_2 - k_1)}$. Choice C is incorrect because the number of kilojoules is greater than the number of food calories. Choice D is incorrect and may be the result of an error when setting up the equation.

Question Difficulty:

Medium

Question ID e8f9e117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e8f9e117

$$I = \frac{V}{R}$$

The formula above is Ohm's law for an electric circuit with current I , in amperes, potential difference V , in volts, and resistance R , in ohms. A circuit has a resistance of 500 ohms, and its potential difference will be generated by n six-volt batteries that produce a total potential difference of $6n$ volts. If the circuit is to have a current of no more than 0.25 ampere, what is the greatest number, n , of six-volt batteries that can be used?

ID: e8f9e117 Answer

Rationale

The correct answer is 20. For the given circuit, the resistance R is 500 ohms, and the total potential difference V generated by n batteries is $6n$ volts. It's also given that the circuit is to have a current of no more than 0.25 ampere, which can be expressed as

$I < 0.25$. Since Ohm's law says that $I = \frac{V}{R}$, the given values for V and R can be substituted for I in this inequality, which yields $\frac{6n}{500} < 0.25$. Multiplying both sides of this inequality by 500 yields $6n < 125$, and dividing both sides of this inequality by 6 yields $n < 20.833$. Since the number of batteries must be a whole number less than 20.833, the greatest number of batteries that can be used in this circuit is 20.

Question Difficulty:

Hard

Question ID ce314070

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ce314070

If $4x - \frac{1}{2} = -5$, what is the value of $8x - 1$?

A. 2

B. $-\frac{9}{8}$

C. $-\frac{5}{2}$

D. -10

ID: ce314070 Answer

Correct Answer:

D

Rationale

Choice D is correct. Multiplying the given equation by 2 on each side yields $2\left(4x - \frac{1}{2}\right) = 2(-5)$. Applying the distributive property, this equation can be rewritten as $2(4x) - 2\left(\frac{1}{2}\right) = 2(-5)$, or $8x - 1 = -10$.

Choices A, B, and C are incorrect and may result from calculation errors in solving the given equation for x and then substituting that value of x in the expression $8x - 1$.

Question Difficulty:

Medium

Question ID a7e2859a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a7e2859a

The cost of renting a large canopy tent for up to 10 days is \$430 for the first day and \$215 for each additional day. Which of the following equations gives the cost y , in dollars, of renting the tent for x days, where x is a positive integer and $x \leq 10$?

- A. $y = 215x + 215$
- B. $y = 430x - 215$
- C. $y = 430x + 215$
- D. $y = 215x + 430$

ID: a7e2859a Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the cost of renting a large canopy tent is \$430 for the first day and \$215 for each additional day for up to 10 days. For x days of renting the tent, the cost includes \$430 for the first day and \$215 for each of the $(x - 1)$ additional days. It follows that the cost y , in dollars, of renting the tent can be expressed as $y = 430 + 215(x - 1)$, which is equivalent to $y = 430 + 215x - 215$, or $y = 215x + 215$. Therefore, the equation $y = 215x + 215$ gives the cost of renting the tent for x days, where x is a positive integer and $x \leq 10$.

Choice B is incorrect. This equation represents a situation where the cost of renting the tent for the first day is \$215, not \$430, and the cost for each additional day is \$430, not \$215.

Choice C is incorrect. This equation represents a situation where the cost of renting the tent for the first day is \$645, not \$430, and the cost for each additional day is \$430, not \$215.

Choice D is incorrect. This equation represents a situation where the cost of renting the tent for the first day is \$645, not \$430.

Question Difficulty:

Hard

Question ID feb78194

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: feb78194

A museum rents tablets to visitors. The museum earns revenue of **\$14** for each tablet rented for the day. On Wednesday, the museum earned **\$406** in profit from renting tablets after paying daily expenses of **\$112**. How many tablets did the museum rent on Wednesday? (**profit = total revenue – total expenses**)

ID: feb78194 Answer

Correct Answer:

37

Rationale

The correct answer is 37. It's given that the museum earns revenue of \$ 14 for each tablet rented for the day. It's also given that on Wednesday, the museum earned \$ 406 in profit from renting tablets after paying daily expenses of \$ 112. Let x represent the number of tablets the museum rented on Wednesday. It follows that the total revenue can be represented by the expression $14x$. Because profit = total revenue - total expenses, the equation $406 = 14x - 112$ represents this situation. Adding 112 to both sides of this equation yields $14x = 518$. Dividing both sides of this equation by 14 yields $x = 37$. Therefore, the museum rented 37 tablets on Wednesday.

Question Difficulty:

Medium

Question ID f718c9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: f718c9cf

$$5x + 14y = 45$$

$$10x + 7y = 27$$

The solution to the given system of equations is (x, y) . What is the value of xy ?

ID: f718c9cf Answer

Correct Answer:

1.8, 9/5

Rationale

The correct answer is $\frac{9}{5}$. Multiplying the first equation in the given system by 2 yields $10x + 28y = 90$. Subtracting the second equation in the given system, $10x + 7y = 27$, from $10x + 28y = 90$ yields $10x + 28y - 10x - 7y = 90 - 27$, which is equivalent to $10x + 28y - 10x - 7y = 63$, or $21y = 63$. Dividing both sides of this equation by 21 yields $y = 3$. The value of x can be found by substituting 3 for y in either of the two given equations. Substituting 3 for y in the equation $10x + 7y = 27$ yields $10x + 21 = 27$, or $10x + 21 - 21 = 6$. Dividing both sides of this equation by 10 yields $x = \frac{6}{10}$, or $x = \frac{3}{5}$. Therefore, the value of xy is $\frac{3}{5} \cdot 3$, or $\frac{9}{5}$. Note that $9/5$ and 1.8 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 6e50ce28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e50ce28

The sum of a number x and 7 is twice as large as a number y . The number y is 3 less than the number x . Which system of equations describes this situation?

A. $x + 7 = 2y$

$y = x - 3$

B. $x + 7 = 2y$

$y = 3 - x$

C. $2(x + 7) = y$

$y = x - 3$

D. $2(x + 7) = y$

$y = 3 - x$

ID: 6e50ce28 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the sum of a number x and 7 is twice as large as a number y . This can be described by the equation $x + 7 = 2y$. It's also given that the number y is 3 less than the number x . This can be described by the equation $y = x - 3$. Therefore, the system consisting of the equations $x + 7 = 2y$ and $y = x - 3$ describes this situation.

Choice B is incorrect. The equation $y = 3 - x$ describes a situation where the number y is x less than 3.

Choice C is incorrect. The equation $2x + 7 = y$ describes a situation where the number y is twice the sum of a number x and 7.

Choice D is incorrect. The equation $2x + 7 = y$ describes a situation where the number y is twice the sum of a number x and 7, and the equation $y = 3 - x$ describes a situation where a number y is x less than 3.

Question Difficulty:

Medium

Question ID 915463e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 915463e0

Normal body temperature for an adult is between 97.8°F and 99°F , inclusive. If Kevin, an adult male, has a body temperature that is considered to be normal, which of the following could be his body temperature?

- A. 96.7°F
- B. 97.6°F
- C. 97.9°F
- D. 99.7°F

ID: 915463e0 Answer

Correct Answer:

C

Rationale

Choice C is correct. Normal body temperature must be greater than or equal to 97.8°F but less than or equal to 99°F . Of the given choices, 97.9°F is the only temperature that fits these restrictions.

Choices A and B are incorrect. These temperatures are less than 97.8°F , so they don't fit the given restrictions. Choice D is incorrect. This temperature is greater than 99°F , so it doesn't fit the given restrictions.

Question Difficulty:

Easy

Question ID 89541f9b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 89541f9b

Which of the following ordered pairs (x, y) satisfies the inequality $5x - 3y < 4$?

1. $(1, 1)$
2. $(2, 5)$
3. $(3, 2)$

- A. I only
B. II only
C. I and II only
D. I and III only

ID: 89541f9b Answer

Correct Answer:

C

Rationale

Choice C is correct. Substituting $(1, 1)$ into the inequality gives $5(1) - 3(1) < 4$, or $2 < 4$, which is a true statement. Substituting $(2, 5)$ into the inequality gives $5(2) - 3(5) < 4$, or $-5 < 4$, which is a true statement. Substituting $(3, 2)$ into the inequality gives $5(3) - 3(2) < 4$, or $9 < 4$, which is not a true statement. Therefore, $(1, 1)$ and $(2, 5)$ are the only ordered pairs shown that satisfy the given inequality.

Choice A is incorrect because the ordered pair $(2, 5)$ also satisfies the inequality. Choice B is incorrect because the ordered pair $(1, 1)$ also satisfies the inequality. Choice D is incorrect because the ordered pair $(3, 2)$ does not satisfy the inequality.

Question Difficulty:

Easy

Question ID 2875ba81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 2875ba81

$$6x + 7y = 28$$

$$2x + 2y = 10$$

The solution to the given system of equations is (x, y) . What is the value of y ?

- A. -2
- B. 7
- C. 14
- D. 18

ID: 2875ba81 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given system of linear equations can be solved by the elimination method. Multiplying each side of the second equation in the given system by 3 yields $2x + 2y(3) = 10(3)$, or $6x + 6y = 30$. Subtracting this equation from the first equation in the given system yields $6x + 7y - 6x - 6y = 28 - 30$, which is equivalent to $6x - 6x + 7y - 6y = 28 - 30$, or $y = -2$.

Choice B is incorrect. This is the value of x , not the value of y .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 0ef4a7b6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0ef4a7b6

A particular botanist classifies a species of plant as tall if its typical height when fully grown is more than 100 centimeters. Each of the following inequalities represents the possible heights h , in centimeters, for a specific plant species when fully grown. Which inequality represents the possible heights h , in centimeters, for a tall plant species?

- A. $106 < h < 158$
- B. $80 < h < 100$
- C. $42 < h < 87$
- D. $17 < h < 85$

ID: 0ef4a7b6 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a particular botanist classifies a species of plant as tall if its typical height when fully grown is more than 100 centimeters. The inequality $106 < h < 158$ represents possible heights h , in centimeters, for a plant species when fully grown where h is between 106 and 158 centimeters. Since all values of h in this inequality are greater than 100 centimeters, this inequality represents the possible heights for a tall plant species.

Choice B is incorrect. This inequality represents possible heights h , in centimeters, for a plant species when fully grown where h is between 80 and 100 centimeters, not more than 100 centimeters.

Choice C is incorrect. This inequality represents possible heights h , in centimeters, for a plant species when fully grown where h is between 42 and 87 centimeters, not more than 100 centimeters.

Choice D is incorrect. This inequality represents possible heights h , in centimeters, for a plant species when fully grown where h is between 17 and 85 centimeters, not more than 100 centimeters.

Question Difficulty:

Medium

Question ID ee031767

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: ee031767

A dance teacher ordered outfits for students for a dance recital. Outfits for boys cost \$26, and outfits for girls cost \$35. The dance teacher ordered a total of 28 outfits and spent \$881. If b represents the number of outfits the dance teacher ordered for boys and g represents the number of outfits the dance teacher ordered for girls, which of the following systems of equations can be solved to find b and g ?

$$26b + 35g = 28$$

A. $b + g = 881$

$$26b + 35g = 881$$

B. $b + g = 28$

$$26g + 35b = 28$$

C. $b + g = 881$

$$26g + 35b = 881$$

D. $b + g = 28$

ID: ee031767 Answer

Correct Answer:

B

Rationale

Choice B is correct. Outfits for boys cost \$26 each and the teacher ordered b outfits for boys, so the teacher spent $26b$ dollars on outfits for boys. Similarly, outfits for girls cost \$35 each and the teacher ordered g outfits for girls, so the teacher spent $35g$ dollars on outfits for girls. Since the teacher spent a total of \$881 on outfits for boys and girls, the equation $26b + 35g = 881$ must be true. And since the teacher ordered a total of 28 outfits, the equation $b + g = 28$ must also be true.

Choice A is incorrect and may result from switching the constraint on the total number of outfits with the constraint on the cost of the outfits. Choice C is incorrect and may result from switching the constraint on the total number of outfits with the constraint on the cost of the outfits, as well as switching the cost of the outfits for boys with the cost of the outfits for girls. Choice D is incorrect and may result from switching the cost of the outfits for boys with the cost of the outfits for girls.

Question Difficulty:

Easy

Question ID dcc4886a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dcc4886a

$$y = \frac{2}{7}x + 3$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. If the second equation in the system is $y = mx + b$, where m and b are constants, what is the value of b ?

- A. -3
- B. $-\frac{1}{3}$
- C. $\frac{1}{3}$
- D. 3

ID: dcc4886a Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the system has infinitely many solutions. The graphs of two lines in the xy -plane represented by equations in slope-intercept form, $y = mx + b$, where m and b are constants, have infinitely many solutions if their slopes, m , are the same and if their y -coordinates of the y -intercepts, b , are also the same. The first equation in the given system is $y = \frac{2}{7}x + 3$. For this equation, the slope is $\frac{2}{7}$ and the y -coordinate of the y -intercept is 3. If the second equation is in the form $y = mx + b$, then for the two equations to be equivalent, the values of m and b in the second equation must equal the corresponding values in the first equation. Therefore, the second equation must have a slope, m , of $\frac{2}{7}$, and a y -coordinate of the y -intercept, b , of 3. Thus, the value of b is 3.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 466b87e3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 466b87e3

$$y = \frac{1}{2}x + 8$$

$$y = cx + 10$$

In the system of equations above, c is a constant. If the system has no solution, what is the value of c ?

ID: 466b87e3 Answer

Rationale

$$\frac{1}{2}$$

The correct answer is $\frac{1}{2}$. A system of two linear equations has no solution when the graphs of the equations have the same slope and different y-intercepts. Each of the given linear equations is written in the slope-intercept form, $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept of the graph of the equation. For these two linear equations, the y-intercepts are (0,8) and (0,10). Thus, if the system of equations has no solution, the slopes of the graphs of the two linear equations must

$$\frac{1}{2}$$

be the same. The slope of the graph of the first linear equation is $\frac{1}{2}$. Therefore, for the system of equations to have no solution,

$$\frac{1}{2}$$

the value of c must be $\frac{1}{2}$. Note that 1/2 and .5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID ce6b52d8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ce6b52d8

If $2(3t - 10) + t = 40 + 4t$, what is the value of $3t$?

ID: ce6b52d8 Answer

Correct Answer:

60

Rationale

The correct answer is 60. Subtracting t from both sides of the given equation yields $2(3t - 10) = 40 + 3t$. Applying the distributive property to the left-hand side of this equation yields $6t - 20 = 40 + 3t$. Adding 20 to both sides of this equation yields $6t = 60 + 3t$. Subtracting $3t$ from both sides of this equation yields $3t = 60$. Therefore, the value of $3t$ is 60.

Question Difficulty:

Medium

Question ID aee9fd2d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: aee9fd2d

If $\frac{x+6}{3} = \frac{x+6}{13}$, the value of $x + 6$ is between which of the following pairs of values?

- A. -7 and -3
- B. -2 and 2
- C. 2 and 7
- D. 8 and 13

ID: aee9fd2d Answer

Correct Answer:

B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 313, or 39, yields $39\frac{x+6}{3} = 39\frac{x+6}{13}$, or $13x + 6 = 3x + 6$. Subtracting $3x + 6$ from both sides of this equation yields $10x + 6 = 0$. Dividing both sides of this equation by 10 yields $x + 6 = 0$. Therefore, if $\frac{x+6}{3} = \frac{x+6}{13}$, then the value of $x + 6$ is 0. It follows that of the given choices, the value of $x + 6$ is between -2 and 2.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6daf8d70

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6daf8d70

A city employee will plant two types of bushes, azaleas and boxwoods, in a park. There will be no more than **164** total bushes planted, and the number of azaleas planted will be at most three times the number of boxwoods planted. Which of the following systems of inequalities best represents this situation, where a is the number of azaleas that will be planted, and b is the number of boxwoods that will be planted?

A. $a + b \geq 164$

$3a \geq b$

B. $a + b \geq 164$

$a \leq 3b$

C. $a + b \leq 164$

$3a \geq b$

D. $a + b \leq 164$

$a \leq 3b$

ID: 6daf8d70 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that a city employee will plant azaleas and boxwoods in a park, where a is the number of azaleas that will be planted and b is the number of boxwoods that will be planted. It's also given that there will be no more than 164 total bushes planted, which can be represented by the inequality $a + b \leq 164$. It's also given that the number of azaleas planted will be at most three times the number of boxwoods planted, which can be represented by the inequality $a \leq 3b$. Therefore, the system of inequalities containing $a + b \leq 164$ and $a \leq 3b$ best represents this situation.

Choice A is incorrect. The inequality $a + b \geq 164$ represents a situation where at least 164 total bushes will be planted, not that there will be no more than 164 total bushes planted. Also, the inequality $3a \geq b$ represents a situation where the number of boxwoods that will be planted is at most three times the number of azaleas that will be planted, not that the number of azaleas planted will be at most three times the number of boxwoods planted.

Choice B is incorrect. The inequality $a + b \geq 164$ represents a situation where at least 164 total bushes will be planted, not that there will be no more than 164 total bushes planted.

Choice C is incorrect. The inequality $3a \geq b$ represents a situation where the number of boxwoods that will be planted is at most three times the number of azaleas that will be planted, not that the number of azaleas planted will be at most three times the number of boxwoods planted.

Question Difficulty:

Medium

Question ID 84d0d07e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 84d0d07e

A clothing store is having a sale on shirts and pants. During the sale, the cost of each shirt is \$15 and the cost of each pair of pants is \$25. Geoff can spend at most \$120 at the store. If Geoff buys s shirts and p pairs of pants, which of the following must be true?

- A. $15s + 25p \leq 120$
- B. $15s + 25p \geq 120$
- C. $25s + 15p \leq 120$
- D. $25s + 15p \geq 120$

ID: 84d0d07e Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the cost of each shirt is \$15 and Geoff buys s shirts, the expression $15s$ represents the amount Geoff spends on shirts. Since the cost of each pair of pants is \$25 and Geoff buys p pairs of pants, the expression $25p$ represents the amount Geoff spends on pants. Therefore, the sum $15s + 25p$ represents the total amount Geoff spends at the store. Since Geoff can spend at most \$120 at the store, the total amount he spends must be less than or equal to 120. Thus, $15s + 25p \leq 120$.

Choice B is incorrect. This represents the situation in which Geoff spends at least, rather than at most, \$120 at the store. Choice C is incorrect and may result from reversing the cost of a shirt and that of a pair of paints. Choice D is incorrect and may result from both reversing the cost of a shirt and that of a pair of pants and from representing a situation in which Geoff spends at least, rather than at most, \$120 at the store.

Question Difficulty:

Easy

Question ID 7a987ae4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7a987ae4

If $\frac{2n}{5} = 10$, what is the value of $2n - 1$?

- A. 24
- B. 49
- C. 50
- D. 99

ID: 7a987ae4 Answer

Correct Answer:

B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 5 yields $2n = 50$. Substituting 50 for $2n$ in the expression $2n - 1$ yields $50 - 1 = 49$.

Alternate approach: Dividing both sides of $2n = 50$ by 2 yields $n = 25$. Evaluating the expression $2n - 1$ for $n = 25$ yields $2(25) - 1 = 49$.

Choice A is incorrect and may result from finding the value of $n - 1$ instead of $2n - 1$. Choice C is incorrect and may result from finding the value of $2n$ instead of $2n - 1$. Choice D is incorrect and may result from finding the value of $4n - 1$ instead of $2n - 1$.

Question Difficulty:

Easy

Question ID 0366d965

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0366d965

x	y
3	7
k	11
12	n

The table above shows the coordinates of three points on a line in the xy -plane, where k and n are constants. If the slope of the line is 2, what is the value of $k+n$?

ID: 0366d965 Answer

Rationale

The correct answer is 30. The slope of a line can be found by using the slope formula, $\frac{y_2 - y_1}{x_2 - x_1}$. It's given that the slope of the line is 2; therefore, $\frac{y_2 - y_1}{x_2 - x_1} = 2$. According to the table, the points $(3, 7)$ and $(k, 11)$ lie on the line. Substituting the coordinates of these points into the equation gives $\frac{11 - 7}{k - 3} = 2$. Multiplying both sides of this equation by $k - 3$ gives $11 - 7 = 2(k - 3)$, or $11 - 7 = 2k - 6$. Solving for k gives $k = 5$. According to the table, the points $(3, 7)$ and $(12, n)$ also lie on the line. Substituting the coordinates of these points into $\frac{y_2 - y_1}{x_2 - x_1} = 2$ gives $\frac{n - 7}{12 - 3} = 2$. Solving for n gives $n = 25$. Therefore, $k + n = 5 + 25$, or 30.

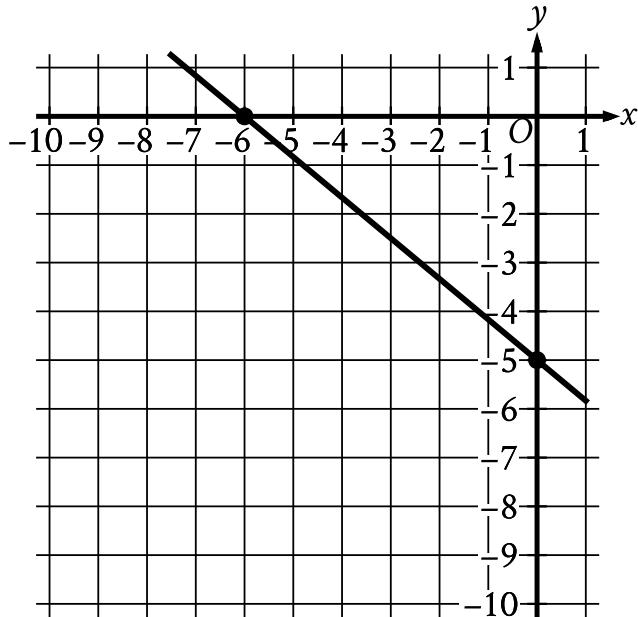
Question Difficulty:

Hard

Question ID 6d8ad460

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 30%; height: 10px; background-color: #0056b3;"></div> <div style="width: 30%; height: 10px; background-color: #0056b3;"></div> <div style="width: 30%; height: 10px; background-color: #0056b3;"></div>

ID: 6d8ad460



Line k is shown in the xy -plane. Line j (not shown) is perpendicular to line k . What is the slope of line j ?

ID: 6d8ad460 Answer

Correct Answer:

1.2, 6/5

Rationale

The correct answer is $\frac{6}{5}$. It's given that line j is perpendicular to line k in the xy -plane. This means that the slope of line j is the opposite reciprocal of the slope of line k . For a line that passes through the points x_1, y_1 and x_2, y_2 in the xy -plane, the slope of the line can be calculated as $\frac{y_2 - y_1}{x_2 - x_1}$. It's shown that line k passes through the points $(-6, 0)$ and $(0, -5)$ in the xy -plane. Substituting -6 for x_1 , 0 for y_1 , 0 for x_2 , and -5 for y_2 in $\frac{y_2 - y_1}{x_2 - x_1}$ yields $\frac{-5 - 0}{0 - (-6)}$, or $\frac{5}{6}$. The opposite reciprocal of $\frac{5}{6}$ is $\frac{6}{5}$. Therefore, the slope of line j is $\frac{6}{5}$. Note that $6/5$ and 1.2 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 963da34c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 963da34c

A shipping service restricts the dimensions of the boxes it will ship for a certain type of service. The restriction states that for boxes shaped like rectangular prisms, the sum of the perimeter of the base of the box and the height of the box cannot exceed 130 inches. The perimeter of the base is determined using the width and length of the box. If a box has a height of 60 inches and its length is 2.5 times the width, which inequality shows the allowable width x , in inches, of the box?

A. $0 < x \leq 10$

B. $0 < x \leq 11\frac{2}{3}$

C. $0 < x \leq 17\frac{1}{2}$

D. $0 < x \leq 20$

ID: 963da34c Answer

Correct Answer:

A

Rationale

Choice A is correct. If x is the width, in inches, of the box, then the length of the box is $2.5x$ inches. It follows that the perimeter of the base is $2(2.5x + x)$, or $7x$ inches. The height of the box is given to be 60 inches. According to the restriction, the sum of the perimeter of the base and the height of the box should not exceed 130 inches. Algebraically, this can be represented by $7x + 60 \leq 130$, or $7x \leq 70$. Dividing both sides of the inequality by 7 gives $x \leq 10$. Since x represents the width of the box, x must also be a positive number. Therefore, the inequality $0 < x \leq 10$ represents all the allowable values of x that satisfy the given conditions.

Choices B, C, and D are incorrect and may result from calculation errors or misreading the given information.

Question Difficulty:

Hard

Question ID 76f29fa5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 76f29fa5

The cost to rent a commercial fishing boat from a certain company is \$950 for the first 2 hours and an additional \$50 per hour for each hour after the first 2 hours. If the total cost to rent the commercial fishing boat from the company for t hours, where $t > 2$, is \$1,100, which equation represents this situation?

- A. $950(t - 2) + 50t = 1,100$
- B. $950(2t) + 50t = 1,100$
- C. $950 + 50(t - 2) = 1,100$
- D. $950 + 50(2t) = 1,100$

ID: 76f29fa5 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the cost to rent a commercial fishing boat is \$950 for the first 2 hours and an additional \$50 per hour for each hour after the first 2 hours. It's also given that t represents the total number of hours and $t > 2$. Therefore, the number of additional hours after the first 2 hours can be represented with the expression $t - 2$. The cost for these additional hours is \$50 per hour, so the cost for the additional hours can be represented by the expression $50(t - 2)$. The total cost can be calculated by adding the cost for the first 2 hours to the cost for the additional hours and can be represented by the expression $950 + 50(t - 2)$. It's also given that the total cost to rent the commercial fishing boat from the company for t hours is \$1,100. Thus, the equation that represents this situation is $950 + 50(t - 2) = 1,100$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID b2de69bd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: b2de69bd

x	y
1	5
2	7
3	9
4	11

The table above shows some pairs of x values and y values. Which of the following equations could represent the relationship between x and y ?

- A. $y = 2x + 3$
- B. $y = 3x - 2$
- C. $y = 4x - 1$
- D. $y = 5x$

ID: b2de69bd Answer

Correct Answer:

A

Rationale

Choice A is correct. Each of the choices is a linear equation in the form $y = mx + b$, where m and b are constants. In this equation, m represents the change in y for each increase in x by 1. From the table, it can be determined that the value of y increases by 2 for each increase in x by 1. In other words, for the pairs of x and y in the given table, $m = 2$. The value of b can be found by substituting the values of x and y from any row of the table and substituting the value of m into the equation $y = mx + b$ and then solving for b . For example, using $x = 1$, $y = 5$, and $m = 2$ yields $5 = 2(1) + b$. Solving for b yields $b = 3$. Therefore, the equation $y = 2x + 3$ could represent the relationship between x and y in the given table.

Alternatively, if an equation represents the relationship between x and y , then when each pair of x and y from the table is substituted into the equation, the result will be a true statement. Of the equations given, the equation $y = 2x + 3$ in choice A is the only equation that results in a true statement when each of the pairs of x and y are substituted into the equation.

Choices B, C, and D are incorrect because when at least one pair of x and y from the table is substituted into the equations given in these choices, the result is a false statement. For example, when the pair $x = 4$ and $y = 11$ is substituted into the equation in choice B, the result is $11 = 3(4) - 2$, or $11 = 10$, which is false.

Question Difficulty:

Easy

Question ID 042aa429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 042aa429

If $f(x) = x + 7$ and $g(x) = 7x$, what is the value of $4f(2) - g(2)$?

- A. **-5**
- B. **1**
- C. **22**
- D. **28**

ID: 042aa429 Answer

Correct Answer:

C

Rationale

Choice C is correct. The value of $f(2)$ can be found by substituting 2 for x in the given equation $f(x) = x + 7$, which yields $f(2) = 2 + 7$, or $f(2) = 9$. The value of $g(2)$ can be found by substituting 2 for x in the given equation $g(x) = 7x$, which yields $g(2) = 7 \cdot 2$, or $g(2) = 14$. The value of the expression $4f(2) - g(2)$ can be found by substituting the corresponding values into the expression, which gives $4(9) - 14$. This expression is equivalent to $36 - 14$, or 22.

Choice A is incorrect. This is the value of $f(2) - g(2)$, not $4f(2) - g(2)$.

Choice B is incorrect and may result from calculating $4f(2)$ as $4(2) + 7$, rather than $4(2 + 7)$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID cd33b015

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: cd33b015

$$x + y = 20$$

$$2(x + y) + 3y = 85$$

If (x, y) is the solution to the given system of equations, what is the value of y ?

- A. 10
- B. 15
- C. 60
- D. 65

ID: cd33b015 Answer

Correct Answer:

B

Rationale

Choice B is correct. Substituting 20 for $x + y$ in the second equation in the system yields $2(20) + 3y = 85$, or $40 + 3y = 85$. Subtracting 40 from both sides of this equation yields $3y = 45$. Dividing both sides of this equation by 3 yields $y = 15$.

Choice A is incorrect. If $y = 10$, then $x = 10$ since $x + y = 20$. However, substituting 10 for both x and y in the second equation yields $70 = 85$, which is a false statement. Choice C is incorrect. If $y = 60$, then $x = -40$ since $x + y = 20$. However, substituting these values for x and y in the second equation yields $220 = 85$, which is a false statement. Choice D is incorrect. If $y = 65$, then $x = -45$ since $x + y = 20$. However, substituting these values for x and y in the second equation yields $235 = 85$, which is a false statement.

Question Difficulty:

Easy

Question ID e2e3942f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e2e3942f

$$y = 2x + 1$$

$$y = ax - 8$$

In the system of equations above, a is a constant. If the system of equations has no solution, what is the value of a ?

A. $-\frac{1}{2}$

B. 0

C. 1

D. 2

ID: e2e3942f Answer

Correct Answer:

D

Rationale

Choice D is correct. A system of two linear equations has no solution when the graphs of the equations have the same slope and different y-coordinates of the y-intercepts. Each of the given equations is written in the slope-intercept form of a linear equation, $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept of the graph of the equation. For these two linear equations, the y-coordinates of the y-intercepts are different: 1 and -8. Thus, if the system of equations has no solution, the slopes of the two linear equations must be the same. The slope of the first linear equation is 2. Therefore, for the system of equations to have no solution, the value of a must be 2.

Choices A, B, and C are incorrect and may result from conceptual and computational errors.

Question Difficulty:

Hard

Question ID de6fe450

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: de6fe450

On January 1, 2015, a city's minimum hourly wage was \$9.25. It will increase by \$0.50 on the first day of the year for the next 5 years. Which of the following functions best models the minimum hourly wage, in dollars, x years after January 1, 2015, where $x = 1, 2, 3, 4, 5$?

- A. $f(x) = 9.25 - 0.50x$
- B. $f(x) = 9.25x - 0.50$
- C. $f(x) = 9.25 + 0.50x$
- D. $f(x) = 9.25x + 0.50$

ID: de6fe450 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the city's minimum hourly wage will increase by \$0.50 on the first day of the year for the 5 years after January 1, 2015. Therefore, the total increase, in dollars, in the minimum hourly wage x years after January 1, 2015, is represented by $0.50x$. Since the minimum hourly wage on January 1, 2015, was \$9.25, it follows that the minimum hourly wage, in dollars, x years after January 1, 2015, is represented by $9.25 + 0.50x$. Therefore, the function $f(x) = 9.25 + 0.50x$ best models this situation.

Choices A, B, and D are incorrect. In choice A, the function models a situation where the minimum hourly wage is \$9.25 on January 1, 2015, but decreases by \$0.50 on the first day of the year for the next 5 years. The functions in choices B and D both model a situation where the minimum hourly wage is increasing by \$9.25 on the first day of the year for the 5 years after January 1, 2015.

Question Difficulty:

Easy

Question ID 4f8bd093

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4f8bd093

What value of x is the solution to the equation $16x + 24 = 24x$?

- A. -4
- B. $\frac{3}{10}$
- C. $\frac{1}{3}$
- D. 3

ID: 4f8bd093 Answer

Correct Answer:

D

Rationale

Choice D is correct. Subtracting $16x$ from both sides of the given equation yields $24 = 8x$. Dividing both sides of this equation by 8 yields $3 = x$. Therefore, the solution to the given equation is 3.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 2d54c272

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 2d54c272

$$5G + 45R = 380$$

At a school fair, students can win colored tokens that are worth a different number of points depending on the color. One student won G green tokens and R red tokens worth a total of 380 points. The given equation represents this situation. How many more points is a red token worth than a green token?

ID: 2d54c272 Answer

Correct Answer:

40

Rationale

The correct answer is 40. It's given that $5G + 45R = 380$, where G is the number of green tokens and R is the number of red tokens won by one student and these tokens are worth a total of 380 points. Since the equation represents the situation where the student won points with green tokens and red tokens for a total of 380 points, each term on the left-hand side of the equation represents the number of points won for one of the colors. Since the coefficient of G in the given equation is 5, a green token must be worth 5 points. Similarly, since the coefficient of R in the given equation is 45, a red token must be worth 45 points. Therefore, a red token is worth $45 - 5$ points, or 40 points, more than a green token.

Question Difficulty:

Hard

Question ID 4fb8adf7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 4fb8adf7

$$\begin{aligned}4x - 3y &= 5 \\x &= 8\end{aligned}$$

What is the solution (x, y) to the given system of equations?

- A. $(8, 9)$
- B. $(8, -24)$
- C. $(8, -9)$
- D. $(8, 24)$

ID: 4fb8adf7 Answer

Correct Answer:

A

Rationale

Choice A is correct. The second equation in the given system is $x = 8$. Substituting 8 for x in the first equation in the given system yields $4(8) - 3y = 5$, or $32 - 3y = 5$. Subtracting 32 from both sides of this equation yields $-3y = -27$. Dividing both sides of this equation by -3 yields $y = 9$. Therefore, the solution (x, y) to the given system of equations is $(8, 9)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 1e0a46e4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1e0a46e4

Which system of linear equations has no solution?

A. $-2x + 3y = -9$

$2x - 3y = 9$

B. $2x - 3y = 9$

$3x + 4y = 10$

C. $2x - 3y = 9$

$-6x + 9y = -27$

D. $-2x + 3y = 9$

$4x - 6y = 18$

ID: 1e0a46e4 Answer

Correct Answer:

D

Rationale

Choice D is correct. A system of linear equations can be solved by the elimination method. Multiplying the equation $-2x + 3y = 9$ by 2 yields $-4x + 6y = 18$. Adding this equation to the equation $4x - 6y = 18$ yields $0 = 36$, which has no solution. It follows that the system of linear equations consisting of $-2x + 3y = 9$ and $4x - 6y = 18$ has no solution.

Choice A is incorrect. This system of linear equations has infinitely many solutions, rather than no solution.

Choice B is incorrect. This system of linear equations has one solution, rather than no solution.

Choice C is incorrect. This system of linear equations has infinitely many solutions, rather than no solution.

Question Difficulty:

Hard

Question ID 1e11190a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1e11190a

Store A sells raspberries for \$5.50 per pint and blackberries for \$3.00 per pint. Store B sells raspberries for \$6.50 per pint and blackberries for \$8.00 per pint. A certain purchase of raspberries and blackberries would cost \$37.00 at Store A or \$66.00 at Store B. How many pints of blackberries are in this purchase?

- A. 4
- B. 5
- C. 8
- D. 12

ID: 1e11190a Answer

Correct Answer:

B

Rationale

Choice C is correct. It's given that store A sells raspberries for \$5.50 per pint and blackberries for \$3.00 per pint, and a certain purchase of raspberries and blackberries at store A would cost \$37.00. It's also given that store B sells raspberries for \$6.50 per pint and blackberries for \$8.00 per pint, and this purchase of raspberries and blackberries at store B would cost \$66.00. Let r represent the number of pints of raspberries and b represent the number of pints of blackberries in this purchase. The equation $5.50r + 3.00b = 37.00$ represents this purchase of raspberries and blackberries from store A and the equation $6.50r + 8.00b = 66.00$ represents this purchase of raspberries and blackberries from store B. Solving the system of equations by elimination gives the value of r and the value of b that make the system of equations true. Multiplying both sides of the equation for store A by 6.5 yields $5.50r \cdot 6.5 + 3.00b \cdot 6.5 = 37.00 \cdot 6.5$, or $35.75r + 19.5b = 240.5$. Multiplying both sides of the equation for store B by 5.5 yields $6.50r \cdot 5.5 + 8.00b \cdot 5.5 = 66.00 \cdot 5.5$, or $35.75r + 44b = 363$. Subtracting both sides of the equation for store A, $35.75r + 19.5b = 240.5$, from the corresponding sides of the equation for store B, $35.75r + 44b = 363$, yields $35.75r - 35.75r + 44b - 19.5b = 363 - 240.5$, or $24.5b = 122.5$. Dividing both sides of this equation by 24.5 yields $b = 5$. Thus, 5 pints of blackberries are in this purchase.

Choices A and B are incorrect and may result from conceptual or calculation errors. Choice D is incorrect. This is the number of pints of raspberries, not blackberries, in the purchase.

Question Difficulty:

Hard

Question ID c39dbbdf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c39dbbdf

Line r is defined by the equation $4x - 9y = 3$. Line s is parallel to line r in the xy -plane. What is the slope of line s ?

- A. $\frac{9}{4}$
- B. $\frac{4}{9}$
- C. -4
- D. -9

ID: c39dbbdf Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that line s is parallel to line r in the xy -plane. This means that the slope of line r is equal to the slope of line s . Line r is defined by the equation $4x - 9y = 3$. This equation can be written in slope-intercept form $y = mx + b$, where m represents the slope of the line and b represents the y -coordinate of the y -intercept of the line. Subtracting $4x$ from both sides of the equation $4x - 9y = 3$ yields $-9y = -4x + 3$. Dividing both sides of this equation by -9 yields $y = \frac{4}{9}x - \frac{1}{3}$. Therefore, the slope of line r is $\frac{4}{9}$. Since parallel lines have equal slopes, the slope of line s is also $\frac{4}{9}$.

Choice A is incorrect. This is the reciprocal of the slope of line s , not the slope of line s .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 78391fcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 78391fcc

x	-11	-10	-9	-8
$f(x)$	21	18	15	12

The table above shows some values of x and their corresponding values $f(x)$ for the linear function f . What is the x -intercept of the graph of $y = f(x)$ in the xy -plane?

- A. (-3,0)
- B. (-4,0)
- C. (-9,0)
- D. (-12,0)

ID: 78391fcc Answer

Correct Answer:

B

Rationale

Choice B is correct. The equation of a linear function can be written in the form $y = mx + b$, where $y = f(x)$, m is the slope of the graph of $y = f(x)$, and b is the y -coordinate of the y -intercept of the graph. The value of m can be found using the slope formula,

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

According to the table, the points (-11, 21) and (-10, 18) lie on the graph of $y = f(x)$. Using these two points in the slope formula yields $m = \frac{18 - 21}{-10 + 11}$, or -3. Substituting -3 for m in the slope-intercept form of the equation yields $y = -3x + b$. The value of b can be found by substituting values from the table and solving; for example, substituting the coordinates of the point (-11, 21) into the equation $y = -3x + b$ gives $21 = -3(-11) + b$, which yields $b = -12$. This means the function given by the table can be represented by the equation $y = -3x - 12$. The value of the x -intercept of the graph of $y = f(x)$ can be determined by finding the value of x when $y = 0$. Substituting $y = 0$ into $y = -3x - 12$ yields $0 = -3x - 12$, or $x = -4$. This corresponds to the point (-4, 0).

Choice A is incorrect and may result from substituting the value of the slope for the x -coordinate of the x -intercept. Choice C is incorrect and may result from a calculation error. Choice D is incorrect and may result from substituting the y -coordinate of the y -intercept for the x -coordinate of the x -intercept.

Question Difficulty:

Hard

Question ID 9ff10b3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ff10b3b

If $\frac{1}{2}x - \frac{1}{6}x = 1$, what is the value of x ?

A. -4

B. $\frac{1}{3}$

C. 3

D. 6

ID: 9ff10b3b Answer

Correct Answer:

C

Rationale

Choice C is correct. To make it easier to add like terms on the left-hand side of the given equation, both sides of the equation can be multiplied by 6, which is the lowest common denominator of $\frac{1}{2}$ and $\frac{1}{6}$. This yields $3x - x = 6$, which can be rewritten as $2x = 6$. Dividing both sides of this equation by 2 yields $x = 3$.

Choice A is incorrect and may result from subtracting the denominators instead of numerators with common denominators to get $-\frac{1}{4}x$, rather than $\frac{1}{3}x$, on the left-hand side of the equation. Choice B is incorrect and may result from rewriting the given equation as $\frac{1}{2}x = \frac{1}{6}$ instead of $2x = 6$. Choice D is incorrect and may result from conceptual or computational errors.

Question Difficulty:

Easy

Question ID e77a76ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e77a76ce

Which of the following systems of linear equations has no solution?

A. $y = 6x + 3$
 $y = 6x + 9$

B. $y = 10$
 $y = 10x + 10$

C. $y = 14x + 14$
 $y = 10x + 14$

D. $x = 3$
 $y = 10$

ID: e77a76ce Answer

Correct Answer:

A

Rationale

Choice A is correct. A system of two linear equations in two variables, x and y , has no solution if the graphs of the lines represented by the equations in the xy -plane are distinct and parallel. The graphs of two lines in the xy -plane represented by equations in slope-intercept form, $y = mx + b$, where m and b are constants, are parallel if their slopes, m , are the same and are distinct if their y -coordinates of the y -intercepts, b , are different. In the equations $y = 6x + 3$ and $y = 6x + 9$, the values of m are each 6, and the values of b are 3 and 9, respectively. Since the slopes of these lines are the same and the y -coordinates of the y -intercepts are different, it follows that the system of linear equations in choice A has no solution.

Choice B is incorrect. The two lines represented by these equations are a horizontal line and a line with a slope of 10 that have the same y -coordinate of the y -intercept. Therefore, this system has a solution, 0, 10, rather than no solution.

Choice C is incorrect. The two lines represented by these equations have different slopes and the same y -coordinate of the y -intercept. Therefore, this system has a solution, 0, 14, rather than no solution.

Choice D is incorrect. The two lines represented by these equations are a vertical line and a horizontal line. Therefore, this system has a solution, 3, 10, rather than no solution.

Question Difficulty:

Medium

Question ID b2fe7ab6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: b2fe7ab6

x	$g(x)$
1	54
2	51
3	48
4	45

For the linear function g , the table shows four values of x and their corresponding values of $g(x)$. The function can be written as $g(x) = mx + b$, where m and b are constants. What is the value of b ?

- A. 3
- B. 27
- C. 54
- D. 57

ID: b2fe7ab6 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that for the linear function g , the table shows four values of x and their corresponding values of $g(x)$. It's also given that the function can be written as $g(x) = mx + b$, where m and b are constants. The table shows that when the value of x is 1, the corresponding value of $g(x)$ is 54. Substituting 1 for x and 54 for $g(x)$ in $g(x) = mx + b$ yields $54 = m(1) + b$ or $54 = m + b$. Subtracting b from both sides of this equation yields $54 - b = m$. The table also shows that when the value of x is 2, the corresponding value of $g(x)$ is 51. Substituting 2 for x and 51 for $g(x)$ in $g(x) = mx + b$ yields $51 = m(2) + b$, or $51 = 2m + b$. Substituting $54 - b$ for m in this equation yields $51 = 2(54 - b) + b$. Applying the distributive property to the right-hand side of this equation yields $51 = 108 - 2b + b$, or $51 = 108 - b$. Subtracting 108 from both sides of this equation yields $-57 = -b$. Dividing both sides of this equation by -1 yields $57 = b$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 68c5c81a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 68c5c81a

$$11x + 14y \leq 115$$

Anthony will spend at most \$115 to purchase x small cheese pizzas and y large cheese pizzas for a team dinner. The given inequality represents this situation. Which of the following is the best interpretation of $14y$ in this context?

- A. The amount, in dollars, Anthony will spend on each large cheese pizza
- B. The amount, in dollars, Anthony will spend on each small cheese pizza
- C. The total amount, in dollars, Anthony will spend on large cheese pizzas
- D. The total amount, in dollars, Anthony will spend on small cheese pizzas

ID: 68c5c81a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that Anthony will spend at most \$115 to purchase x small cheese pizzas and y large cheese pizzas. In the inequality $11x + 14y \leq 115$, y represents the number of large cheese pizzas that Anthony will purchase. This means the coefficient 14 represents the amount, in dollars, Anthony will spend on each large cheese pizza. Therefore, the best interpretation of $14y$ in this context is the total amount, in dollars, Anthony will spend on large cheese pizzas.

Choice A is incorrect. This is the best interpretation of 14, not $14y$.

Choice B is incorrect. This is the best interpretation of 11, not $14y$.

Choice D is incorrect. This is the best interpretation of $11x$, not $14y$.

Question Difficulty:

Hard

Question ID b8e73b5b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b8e73b5b

Ken is working this summer as part of a crew on a farm. He earned \$8 per hour for the first 10 hours he worked this week. Because of his performance, his crew leader raised his salary to \$10 per hour for the rest of the week. Ken saves 90% of his earnings from each week. What is the least number of hours he must work the rest of the week to save at least \$270 for the week?

- A. 38
- B. 33
- C. 22
- D. 16

ID: b8e73b5b Answer

Correct Answer:

C

Rationale

Choice C is correct. Ken earned \$8 per hour for the first 10 hours he worked, so he earned a total of \$80 for the first 10 hours he worked. For the rest of the week, Ken was paid at the rate of \$10 per hour. Let x be the number of hours he will work for the rest of the week. The total of Ken's earnings, in dollars, for the week will be $10x + 80$. He saves 90% of his earnings each week, so this week he will save $0.9(10x + 80)$ dollars. The inequality $0.9(10x + 80) \geq 270$ represents the condition that he will save at least \$270 for the week. Factoring 10 out of the expression $10x + 80$ gives $10(x + 8)$. The product of 10 and 0.9 is 9, so the inequality can be rewritten as $9(x + 8) \geq 270$. Dividing both sides of this inequality by 9 yields $x + 8 \geq 30$, so $x \geq 22$. Therefore, the least number of hours Ken must work the rest of the week to save at least \$270 for the week is 22.

Choices A and B are incorrect because Ken can save \$270 by working fewer hours than 38 or 33 for the rest of the week. Choice D is incorrect. If Ken worked 16 hours for the rest of the week, his total earnings for the week will be $\$80 + \$160 = \$240$, which is less than \$270. Since he saves only 90% of his earnings each week, he would save even less than \$240 for the week.

Question Difficulty:

Hard

Question ID 830120b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%;"><div style="display: flex; justify-content: space-around;"><div style="width: 25%; height: 10px; background-color: #0056b3;"></div><div style="width: 25%; height: 10px; background-color: #0056b3;"></div><div style="width: 25%; height: 10px; background-color: #0056b3;"></div></div></div>

ID: 830120b0

$$y > 2x - 1$$

$$2x > 5$$

Which of the following consists of the y -coordinates of all the points that satisfy the system of inequalities above?

A. $y > 6$

B. $y > 4$

C. $y > \frac{5}{2}$

D. $y > \frac{3}{2}$

ID: 830120b0 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting the same number from each side of an inequality gives an equivalent inequality. Hence, subtracting 1 from each side of the inequality $2x > 5$ gives $2x - 1 > 4$. So the given system of inequalities is equivalent to the system of inequalities $y > 2x - 1$ and $2x - 1 > 4$, which can be rewritten as $y > 2x - 1 > 4$. Using the transitive property of inequalities, it follows that $y > 4$.

Choice A is incorrect because there are points with a y -coordinate less than 6 that satisfy the given system of inequalities. For example, $(3, 5.5)$ satisfies both inequalities. Choice C is incorrect. This may result from solving the inequality $2x > 5$ for x , then replacing x with y . Choice D is incorrect because this inequality allows y -values that are not the y -coordinate of any point that satisfies both inequalities. For example, $y = 2$ is contained in the set $y > \frac{3}{2}$; however, if 2 is substituted into the first inequality for y , the result is $x < \frac{3}{2}$. This cannot be true because the second inequality gives $x > \frac{5}{2}$.

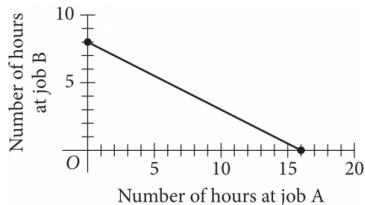
Question Difficulty:

Hard

Question ID c4ea43ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: c4ea43ef



To earn money for college, Avery works two part-time jobs: A and B. She earns \$10 per hour working at job A and \$20 per hour working at job B. In one week, Avery earned a total of s dollars for working at the two part-time jobs. The graph above represents all possible combinations of numbers of hours Avery could have worked at the two jobs to earn s dollars. What is the value of s ?

- A. 128
- B. 160
- C. 200
- D. 320

ID: c4ea43ef Answer

Correct Answer:

B

Rationale

Choice B is correct. Avery earns \$10 per hour working at job A. Therefore, if she works a hours at job A, she will earn $10a$ dollars. Avery earns \$20 per hour working at job B. Therefore, if she works b hours at job B, she will earn $20b$ dollars. The graph shown represents all possible combinations of the number of hours Avery could have worked at the two jobs to earn s dollars. Therefore, if she worked a hours at job A, worked b hours at job B, and earned s dollars from both jobs, the following equation represents the graph: $10a + 20b = s$, where s is a constant. Identifying any point (a,b) from the graph and substituting the values of the coordinates for a and b , respectively, in this equation yield the value of s . For example, the point $(16,0)$, where $a = 16$ and $b = 0$, lies on the graph. Substituting 16 for a and 0 for b in the equation $10a + 20b = s$ yields $10(16) + 20(0) = s$, or $160 = s$. Similarly, the point $(0,8)$, where $a = 0$ and $b = 8$, lies on the graph. Substituting 0 for a and 8 for b in the equation $10a + 20b = s$ yields $10(0) + 20(8) = s$, or $160 = s$.

Choices A, C, and D are incorrect. If the value of s is 128, 200, or 320, then no points (a,b) on the graph will satisfy this equation. For example, if the value of s is 128 (choice A), then the equation $10a + 20b = s$ becomes $10a + 20b = 128$. The point $(16,0)$, where $a = 16$ and $b = 0$, lies on the graph. However, substituting 16 for a and 0 for b in $10a + 20b = s$ yields $10(16) + 20(0) = 128$, or $160 = 128$, which is false. Therefore, $(16,0)$ doesn't satisfy the equation, and so the value of s can't be

128. Similarly, if $s = 200$ (choice C) or $s = 320$ (choice D), then substituting 16 for a and 0 for b yields $160 = 200$ and $160 = 320$, respectively, which are both false.

Question Difficulty:

Hard

Question ID fb5e7f59

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fb5e7f59

$$-x - wy = -337$$

$$2x - wy = 47$$

In the given system of equations, w is a constant. In the xy -plane, the graphs of these equations intersect at the point $(q, 19)$, where q is a constant. What is the value of w ?

ID: fb5e7f59 Answer

Correct Answer:

11

Rationale

The correct answer is 11. It's given that the graphs of the equations in the given system intersect at the point $(q, 19)$, where q is a constant. Therefore, the coordinates of this point must satisfy both equations. Substituting the point $(q, 19)$ into the first equation, $-x - wy = -337$, yields $-q - w(19) = -337$. Adding $19w$ to both sides of this equation yields $-q = -337 + 19w$, which is equivalent to $q = 337 - 19w$. Substituting the point $(q, 19)$ into the second equation yields $2q - w(19) = 47$. Substituting $337 - 19w$ in place of q in the equation $2q - w(19) = 47$ yields $2(337 - 19w) - 19w = 47$. Applying the distributive property to the left-hand side of this equation yields $674 - 38w - 19w = 47$. Combining like terms on the left-hand side of this equation yields $674 - 57w = 47$. Subtracting 674 from both sides of this equation yields $-57w = -627$. Dividing both sides of this equation by -57 yields $w = 11$.

Question Difficulty:

Hard

Question ID 2869fe95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2869fe95

For a 3-week period in a town in Illinois, the lowest recorded temperature was 31 degrees Fahrenheit ($^{\circ}\text{F}$) and the highest recorded temperature was 67°F . Which inequality is true for any recorded temperature t , in $^{\circ}\text{F}$, in this town for this 3-week period?

- A. $t \geq 98$
- B. $t \geq 67$
- C. $31 \leq t \leq 67$
- D. $t \leq 31$

ID: 2869fe95 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that for a 3-week period in a town in Illinois, the lowest recorded temperature was 31°F and the highest recorded temperature was 67°F . It follows that the inequality $31 \leq t \leq 67$ is true for any recorded temperature t , in $^{\circ}\text{F}$, in this town for this 3-week period.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 113b938e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 113b938e

$$y = 18 - 5x$$

The equation above represents the speed y , in feet per second, of Sheila's bicycle x seconds after she applied the brakes at the end of a ride. If the equation is graphed in the xy -plane, which of the following is the best interpretation of the x -coordinate of the line's x -intercept in the context of the problem?

- A. The speed of Sheila's bicycle, in feet per second, before Sheila applied the brakes
- B. The number of feet per second the speed of Sheila's bicycle decreased each second after Sheila applied the brakes
- C. The number of seconds it took from the time Sheila began applying the brakes until the bicycle came to a complete stop
- D. The number of feet Sheila's bicycle traveled from the time she began applying the brakes until the bicycle came to a complete stop

ID: 113b938e Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that for each point (x, y) on the graph of the given equation, the x -coordinate represents the number of seconds after Sheila applied the brakes, and the y -coordinate represents the speed of Sheila's bicycle at that moment in time. For the graph of the equation, the y -coordinate of the x -intercept is 0. Therefore, the x -coordinate of the x -intercept of the graph of the given equation represents the number of seconds it took from the time Sheila began applying the brakes until the bicycle came to a complete stop.

Choice A is incorrect. The speed of Sheila's bicycle before she applied the brakes is represented by the y -coordinate of the y -intercept of the graph of the given equation, not the x -coordinate of the x -intercept. Choice B is incorrect. The number of feet per second the speed of Sheila's bicycle decreased each second after Sheila applied the brakes is represented by the slope of the graph of the given equation, not the x -coordinate of the x -intercept. Choice D is incorrect and may result from misinterpreting x as the distance, in feet, traveled after applying the brakes, rather than the time, in seconds, after applying the brakes.

Question Difficulty:

Medium

Question ID 029c2dc2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 029c2dc2

A teacher is creating an assignment worth **70** points. The assignment will consist of questions worth **1** point and questions worth **3** points. Which equation represents this situation, where x represents the number of 1-point questions and y represents the number of 3-point questions?

- A. $4xy = 70$
- B. $4(x + y) = 70$
- C. $3x + y = 70$
- D. $x + 3y = 70$

ID: 029c2dc2 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since x represents the number of 1-point questions and y represents the number of 3-point questions, the assignment is worth a total of $1 \cdot x + 3 \cdot y$, or $x + 3y$, points. Since the assignment is worth 70 points, the equation $x + 3y = 70$ represents this situation.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 2e1a7f66

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 2e1a7f66

Figure A and figure B are both regular polygons. The sum of the perimeter of figure A and the perimeter of figure B is **63** inches. The equation $3x + 6y = 63$ represents this situation, where x is the number of sides of figure A and y is the number of sides of figure B. Which statement is the best interpretation of **6** in this context?

- A. Each side of figure B has a length of **6** inches.
- B. The number of sides of figure B is **6**.
- C. Each side of figure A has a length of **6** inches.
- D. The number of sides of figure A is **6**.

ID: 2e1a7f66 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that figure A and figure B (not shown) are both regular polygons and the sum of the perimeters of the two figures is 63 inches. It's also given that x is the number of sides of figure A and y is the number of sides of figure B, and that the equation $3x + 6y = 63$ represents this situation. Thus, $3x$ and $6y$ represent the perimeters, in inches, of figure A and figure B, respectively. Since $6y$ represents the perimeter, in inches, of figure B and y is the number of sides of figure B, it follows that each side of figure B has a length of 6 inches.

Choice B is incorrect. The number of sides of figure B is y , not 6.

Choice C is incorrect. Since the perimeter, in inches, of figure A is represented by $3x$, each side of figure A has a length of 3 inches, not 6 inches.

Choice D is incorrect. The number of sides of figure A is x , not 6.

Question Difficulty:

Medium

Question ID 5e422ff9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 5e422ff9

$$y = 2x - 3$$

$$3y = 5x$$

In the solution to the system of equations above, what is the value of y ?

- A. -15
- B. -9
- C. 9
- D. 15

ID: 5e422ff9 Answer

Correct Answer:

D

Rationale

Choice D is correct. Multiplying both sides of $y = 2x - 3$ by 5 results in $5y = 10x - 15$. Multiplying both sides of $3y = 5x$ by 2 results in $6y = 10x$. Subtracting the resulting equations yields $5y - 6y = (10x - 15) - (10x)$, which simplifies to $-y = -15$. Dividing both sides of $-y = -15$ by -1 results in $y = 15$.

Choices A and B are incorrect and may result from incorrectly subtracting the transformed equation. Choice C is incorrect and may result from finding the value of x instead of the value of y .

Question Difficulty:

Medium

Question ID e744499e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e744499e

An elementary school teacher is ordering x workbooks and y sets of flash cards for a math class. The teacher must order at least 20 items, but the total cost of the order must not be over \$80. If the workbooks cost \$3 each and the flash cards cost \$4 per set, which of the following systems of inequalities models this situation?

A. $x + y \geq 20$
 $3x + 4y \leq 80$

B. $x + y \geq 20$
 $3x + 4y \geq 80$

C. $3x + 4y \leq 20$
 $x + y \geq 80$

D. $x + y \leq 20$
 $3x + 4y \geq 80$

ID: e744499e Answer

Correct Answer:

A

Rationale

Choice A is correct. The total number of workbooks and sets of flash cards ordered is represented by $x + y$. Since the teacher must order at least 20 items, it must be true that $x + y \geq 20$. Each workbook costs \$3; therefore, $3x$ represents the cost, in dollars, of x workbooks. Each set of flashcards costs \$4; therefore, $4y$ represents the cost, in dollars, of y sets of flashcards. It follows that the total cost for x workbooks and y sets of flashcards is $3x + 4y$. Since the total cost of the order must not be over \$80, it must also be true that $3x + 4y \leq 80$. Of the choices given, these inequalities are shown only in choice A.

Choice B is incorrect. The second inequality says that the total cost must be greater, not less than or equal to \$80. Choice C incorrectly limits the cost by the minimum number of items and the number of items with the maximum cost. Choice D is incorrect. The first inequality incorrectly says that at most 20 items must be ordered, and the second inequality says that the total cost of the order must be at least, not at most, \$80.

Question Difficulty:

Easy

Question ID f01ef454

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f01ef454

A geologist estimates that the volume of a slab of granite is greater than **12.7** cubic feet but less than **15.7** cubic feet. The geologist also estimates that the slab of granite weighs **165** pounds per cubic foot of volume. Which inequality represents this situation, where x represents the estimated total weight, in pounds, of the slab of granite?

- A. $165 - 15.7 < x < 165 - 12.7$
- B. $165 + 12.7 < x < 165 + 15.7$
- C. $165(12.7) < x < 165(15.7)$
- D. $\frac{165}{15.7} < x < \frac{165}{12.7}$

ID: f01ef454 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the estimated volume of the slab of granite is greater than 12.7 cubic feet but less than 15.7 cubic feet. It's also given that the estimated weight per cubic foot of volume of that slab is 165 pounds. The estimated total weight of the slab of granite, in pounds, can be calculated by multiplying the estimated volume by the estimated weight per cubic foot. Therefore, if the estimated volume of the slab of granite is 12.7 cubic feet, its estimated total weight is $165(12.7)$ pounds, and if the estimated volume of the slab of granite is 15.7 cubic feet, its estimated total weight is $165(15.7)$ pounds. Since the estimated volume of the slab of granite is greater than 12.7 cubic feet but less than 15.7 cubic feet, the estimated total weight x , in pounds, must be greater than $165(12.7)$ pounds and less than $165(15.7)$ pounds. This situation can be represented by the inequality $165(12.7) < x < 165(15.7)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 6efcc0a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6efcc0a3

In the linear function h , $h(0) = 41$ and $h(1) = 40$. Which equation defines h ?

- A. $h(x) = -x + 41$
- B. $h(x) = -x$
- C. $h(x) = -41x$
- D. $h(x) = -41$

ID: 6efcc0a3 Answer

Correct Answer:

A

Rationale

Choice A is correct. An equation defining a linear function can be written in the form $hx = ax + b$, where a and b are constants. It's given that $h0 = 41$. Substituting 0 for x and 41 for hx in the equation $hx = ax + b$ yields $41 = a0 + b$, or $b = 41$. Substituting 41 for b in the equation $hx = ax + b$ yields $hx = ax + 41$. It's also given that $h1 = 40$. Substituting 1 for x and 40 for hx in the equation $hx = ax + 41$ yields $40 = a1 + 41$, or $40 = a + 41$. Subtracting 41 from the left- and right-hand sides of this equation yields $-1 = a$. Substituting -1 for a in the equation $hx = ax + 41$ yields $hx = -1x + 41$, or $hx = -x + 41$.

Choice B is incorrect. Substituting 0 for x and 41 for hx in this equation yields $41 = -0$, which isn't a true statement.

Choice C is incorrect. Substituting 0 for x and 41 for hx in this equation yields $41 = -410$, or $41 = 0$, which isn't a true statement.

Choice D is incorrect. Substituting 41 for hx in this equation yields $41 = -41$, which isn't a true statement.

Question Difficulty:

Easy

Question ID 74c98c82

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 74c98c82

An event planner is planning a party. It costs the event planner a onetime fee of **\$35** to rent the venue and **\$10.25** per attendee. The event planner has a budget of **\$200**. What is the greatest number of attendees possible without exceeding the budget?

ID: 74c98c82 Answer

Correct Answer:

16

Rationale

The correct answer is 16. The total cost of the party is found by adding the onetime fee of the venue to the cost per attendee times the number of attendees. Let x be the number of attendees. The expression $35 + 10.25x$ thus represents the total cost of the party. It's given that the budget is \$ 200, so this situation can be represented by the inequality $35 + 10.25x \leq 200$. The greatest number of attendees can be found by solving this inequality for x . Subtracting 35 from both sides of this inequality gives $10.25x \leq 165$. Dividing both sides of this inequality by 10.25 results in approximately $x \leq 16.098$. Since the question is stated in terms of attendees, rounding x down to the nearest whole number, 16, gives the greatest number of attendees possible.

Question Difficulty:

Medium

Question ID 36ab4122

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 36ab4122

Megan's regular wage at her job is p dollars per hour for the first 8 hours of work in a day plus 1.5 times her regular hourly wage for work in excess of 8 hours that day. On a given day, Megan worked for 10 hours, and her total earnings for that day were \$137.50. What is Megan's regular hourly wage?

- A. \$11.75
- B. \$12.50
- C. \$13.25
- D. \$13.75

ID: 36ab4122 Answer

Rationale

Choice B is correct. Since p represents Megan's regular pay per hour, $1.5p$ represents the pay per hour in excess of 8 hours. Since Megan worked for 10 hours, she must have been paid p dollars per hour for 8 of the hours plus $1.5p$ dollars per hour for the remaining 2 hours. Therefore, since Megan earned \$137.50 for the 10 hours, the situation can be represented by the equation $137.5 = 8p + 2(1.5)p$. Distributing the 2 in the equation gives $137.5 = 8p + 3p$, and combining like terms gives $137.5 = 11p$. Dividing both sides by 11 gives $p = 12.5$. Therefore, Megan's regular wage is \$12.50.

Choices A and C are incorrect and may be the result of calculation errors. Choice D is incorrect and may result from finding the average hourly wage that Megan earned for the 10 hours of work.

Question Difficulty:

Medium

Question ID 1efd8202

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1efd8202

$$y = 70x + 8$$

Which table gives three values of x and their corresponding values of y for the given equation?

A.

x	y
0	8
2	148
4	288

B.

x	y
0	70
2	78
4	86

C.

x	y
0	70
2	140
4	280

D.

x	y
0	8
2	132
4	272

ID: 1efd8202 Answer

Correct Answer:

A

Rationale

Choice A is correct. Each of the given choices gives three values of x : 0, 2, and 4. Substituting 0 for x in the given equation yields $y = 70(0) + 8$, or $y = 8$. Therefore, when $x = 0$, the corresponding value of y for the given equation is 8. Substituting 2 for x in the given equation yields $y = 70(2) + 8$, or $y = 148$. Therefore, when $x = 2$, the corresponding value of y for the given equation is 148. Substituting 4 for x in the given equation yields $y = 70(4) + 8$, or $y = 288$. Therefore, when $x = 4$, the corresponding value of y for

the given equation is 288. Thus, if the three values of x are 0, 2, and 4, then their corresponding values of y are 8, 148, and 288, respectively, for the given equation.

Choice B is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = 4x + 70$.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 4f7981a0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4f7981a0

If $3x + 2 = 8$, what is the value of $9x + 6$?

ID: 4f7981a0 Answer

Rationale

The correct answer is 24. Multiplying both sides of the given equation by 3 yields $3(3x + 2) = 24$. Using the distributive property to rewrite the left-hand side of this equation yields $9x + 6 = 24$.

Question Difficulty:

Easy

Question ID e9ef0e6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: e9ef0e6b

A model estimates that whales from the genus *Eschrichtius* travel **72** to **77** miles in the ocean each day during their migration. Based on this model, which inequality represents the estimated total number of miles, x , a whale from the genus *Eschrichtius* could travel in **16** days of its migration?

- A. $72 + 16 \leq x \leq 77 + 16$
- B. $(72)(16) \leq x \leq (77)(16)$
- C. $72 \leq 16 + x \leq 77$
- D. $72 \leq 16x \leq 77$

ID: e9ef0e6b Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the model estimates that whales from the genus *Eschrichtius* travel 72 to 77 miles in the ocean each day during their migration. If one of these whales travels 72 miles each day for 16 days, then the whale travels 7216 miles total. If one of these whales travels 77 miles each day for 16 days, then the whale travels 7716 miles total. Therefore, the model estimates that in 16 days of its migration, a whale from the genus *Eschrichtius* could travel at least 7216 and at most 7716 miles total. Thus, the inequality $7216 \leq x \leq 7716$ represents the estimated total number of miles, x , a whale from the genus *Eschrichtius* could travel in 16 days of its migration.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID cb58833c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: cb58833c

The line with the equation $\frac{4}{5}x + \frac{1}{3}y = 1$ is graphed in the xy -plane. What is the x -coordinate of the x -intercept of the line?

ID: cb58833c Answer

Rationale

The correct answer is 1.25. The y -coordinate of the x -intercept is 0, so 0 can be substituted for y , giving $\frac{4}{5}x + \frac{1}{3}(0) = 1$. This simplifies to $\frac{4}{5}x = 1$. Multiplying both sides of $\frac{4}{5}x = 1$ by 5 gives $4x = 5$. Dividing both sides of $4x = 5$ by 4 gives $x = \frac{5}{4}$, which is equivalent to 1.25. Note that 1.25 and $5/4$ are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 97eab129

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #cccccc; height: 10px;"></div> <div style="width: 30%; background-color: #cccccc; height: 10px;"></div>

ID: 97eab129

Area (square feet)	Water (gallons)
2,520	4,536
3,780	6,804
5,040	9,072

The buildings of a shopping center are designed to allow water to drain from the roof into gutters on the sides of the buildings. The table shows the relationship between the area x , in square feet, of a roof and the amount of water $f(x)$, in gallons, drained from the roof into the gutters over a certain period of time. Which equation could define f ?

- A. $f(x) = 0.6x$
- B. $f(x) = 1.8x$
- C. $f(x) = 2,268x$
- D. $f(x) = 4,536x$

ID: 97eab129 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the table represents the relationship between the area x , in square feet, of the roof of a shopping center and the amount of water $f(x)$, in gallons, drained from the roof into the gutters. Every choice represents this relationship with an equation defining f in the form $f(x) = mx$, where m is a constant rate of change. The value of m can be determined by dividing both sides of the equation by x . Each of three pairs of x and $f(x)$ in the table yield $m = 1.8$, since $\frac{4,536}{2,520} = 1.8$, $\frac{6,804}{3,780} = 1.8$, and $\frac{9,072}{5,040} = 1.8$. Therefore, the equation $f(x) = 1.8x$ could define f .

Choice A is incorrect. For the roof with an area of 2,520 square feet, this equation would yield $0.6(2,520)$, or 1,512, gallons, not the 4,536 gallons shown in the table.

Choice C is incorrect. For the roof with an area of 2,520 square feet, this equation would yield $2,268(2,520)$, or 5,715,360, gallons, not the 4,536 gallons shown in the table.

Choice D is incorrect. For the roof with an area of 2,520 square feet, this equation would yield $4,536(2,520)$, or 11,430,720, gallons, not the 4,536 gallons shown in the table.

Question Difficulty:

Easy

Question ID 567ac7ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%;"><div style="display: inline-block; width: 100%; height: 10px; background-color: #005a9f;"></div></div>

ID: 567ac7ab

One of the two equations in a linear system is $2x + 6y = 10$. The system has no solution. Which of the following could be the other equation in the system?

- A. $x + 3y = 5$
- B. $x + 3y = -20$
- C. $6x - 2y = 0$
- D. $6x + 2y = 10$

ID: 567ac7ab Answer

Correct Answer:

B

Rationale

Choice B is correct. A system of two linear equations written in standard form has no solution when the equations are distinct and the ratio of the x-coefficient to the y-coefficient for one equation is equivalent to the ratio of the x-coefficient to the y-coefficient for the other equation. This ratio for the given equation is 2 to 6, or 1 to 3. Only choice B is an equation that isn't equivalent to the given equation and whose ratio of the x-coefficient to the y-coefficient is 1 to 3.

Choice A is incorrect. Multiplying each of the terms in this equation by 2 yields an equation that is equivalent to the given equation. This system would have infinitely many solutions. Choices C and D are incorrect. The ratio of the x-coefficient to the y-coefficient in $6x - 2y = 0$ (choice C) is -6 to 2, or -3 to 1. This ratio in $6x + 2y = 10$ (choice D) is 6 to 2, or 3 to 1. Since neither of these ratios is equivalent to that for the given equation, these systems would have exactly one solution.

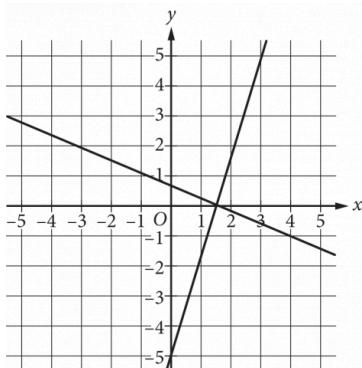
Question Difficulty:

Hard

Question ID 2704399f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2704399f



Which of the following systems of equations has the same solution as the system of equations graphed above?

A. $y = 0$
 $x = \frac{3}{2}$

B. $y = \frac{3}{2}$
 $x = 0$

C. $y = 0$
 $x = 1$

D. $y = 1$
 $x = 0$

ID: 2704399f Answer

Correct Answer:

A

Rationale

Choice A is correct. The solution to a system of equations is the coordinates of the intersection point of the graphs of the equations in the xy -plane. Based on the graph, the solution to the given system of equations is best approximated as $(\frac{3}{2}, 0)$. In the xy -plane, the graph of $y = 0$ is a horizontal line on which every y -coordinate is 0, and the graph of $x = \frac{3}{2}$ is a vertical line on which every x -coordinate is $\frac{3}{2}$. These graphs intersect at the point $(\frac{3}{2}, 0)$. Therefore, the system of equations in choice A has the same solution as the given system.

Choices B, C, and D are incorrect. If graphed in the xy-plane, these choices would intersect at the points $(0, \frac{3}{2})$, $(1, 0)$, and $(0, 1)$, respectively, not $(\frac{3}{2}, 0)$.

Question Difficulty:

Medium

Question ID daad7c32

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: daad7c32

An object hangs from a spring. The formula $\ell = 30 + 2w$ relates the length ℓ , in centimeters, of the spring to the weight w , in newtons, of the object. Which of the following describes the meaning of the 2 in this context?

- A. The length, in centimeters, of the spring with no weight attached
- B. The weight, in newtons, of an object that will stretch the spring 30 centimeters
- C. The increase in the weight, in newtons, of the object for each one-centimeter increase in the length of the spring
- D. The increase in the length, in centimeters, of the spring for each one-newton increase in the weight of the object

ID: daad7c32 Answer

Correct Answer:

D

Rationale

Choice D is correct. The value 2 is multiplied by w , the weight of the object. When the weight is 0, the length is $30 + 2(0) = 30$ centimeters. If the weight increases by w newtons, the length increases by $2w$ centimeters, or 2 centimeters for each one-newton increase in weight.

Choice A is incorrect because this describes the value 30. Choice B is incorrect because 30 represents the length of the spring before it has been stretched. Choice C is incorrect because this describes the value w .

Question Difficulty:

Hard

Question ID 3f8a701b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3f8a701b

The equation $9x + 5 = a(x + b)$, where a and b are constants, has no solutions. Which of the following must be true?

- I. $a = 9$
 - II. $b = 5$
 - III. $b \neq \frac{5}{9}$
- A. None
B. I only
C. I and II only
D. I and III only

ID: 3f8a701b Answer

Correct Answer:

D

Rationale

Choice D is correct. For a linear equation in a form $ax + b = cx + d$ to have no solutions, the x-terms must have equal coefficients and the remaining terms must not be equal. Expanding the right-hand side of the given equation yields $9x + 5 = ax + ab$.

Inspecting the x-terms, 9 must equal a , so statement I must be true. Inspecting the remaining terms, 5 can't equal ab . Dividing

both of these quantities by 9 yields that b can't equal $\frac{5}{9}$. Therefore, statement III must be true. Since b can have any value other than $\frac{5}{9}$, statement II may or may not be true.

Choice A is incorrect. For the given equation to have no solution, both $a = 9$ and $b \neq \frac{5}{9}$ must be true. Choice B is incorrect

because it must also be true that $b \neq \frac{5}{9}$. Choice C is incorrect because when $a = 9$, there are many values of b that lead to an equation having no solution. That is, b might be 5, but b isn't required to be 5.

Question Difficulty:

Hard

Question ID 0d1dca87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 0d1dca87

$$\begin{aligned}3x + y &= 29 \\x &= 2\end{aligned}$$

If (x, y) is the solution to the given system of equations, what is the value of y ?

ID: 0d1dca87 Answer

Rationale

The correct answer is 23. Since it's given that $x = 2$, the value of y can be found by substituting 2 for x in the first equation and solving for y . Substituting 2 for x yields $3(2) + y = 29$, or $6 + y = 29$. Subtracting 6 from both sides of this equation yields $y = 23$.

Question Difficulty:

Easy

Question ID b9839f9e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b9839f9e

$$F = 2.50x + 7.00y$$

In the equation above, F represents the total amount of money, in dollars, a food truck charges for x drinks and y salads. The price, in dollars, of each drink is the same, and the price, in dollars, of each salad is the same. Which of the following is the best interpretation for the number 7.00 in this context?

- A. The price, in dollars, of one drink
- B. The price, in dollars, of one salad
- C. The number of drinks bought during the day
- D. The number of salads bought during the day

ID: b9839f9e Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $2.50x + 7.00y$ is equal to the total amount of money, in dollars, a food truck charges for x drinks and y salads. Since each salad has the same price, it follows that the total charge for y salads is $7.00y$ dollars. When $y = 1$, the value of the expression $7.00y$ is 7.00×1 , or 7.00. Therefore, the price for one salad is 7.00 dollars.

Choice A is incorrect. Since each drink has the same price, it follows that the total charge for x drinks is $2.50x$ dollars. Therefore, the price, in dollars, for one drink is 2.50, not 7.00. Choices C and D are incorrect. In the given equation, F represents the total charge, in dollars, when x drinks and y salads are bought at the food truck. No information is provided about the number of drinks or the number of salads that are bought during the day. Therefore, 7.00 doesn't represent either of these quantities.

Question Difficulty:

Easy

Question ID 023c0a8d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 023c0a8d

For the function f , if $f(3x) = x - 6$ for all values of x , what is the value of $f(6)$?

A. -6

B. -4

C. 0

D. 2

ID: 023c0a8d Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $f(3x) = x - 6$ for all values of x . If $3x = 6$, then $f(3x)$ will equal $f(6)$. Dividing both sides of $3x = 6$ by 3 gives $x = 2$. Therefore, substituting 2 for x in the given equation yields $f(3 \times 2) = 2 - 6$, which can be rewritten as $f(6) = -4$.

Choice A is incorrect. This is the value of the constant in the given equation for f . Choice C is incorrect and may result from substituting $x = 6$, rather than $x = 2$, into the given equation. Choice D is incorrect. This is the value of x that yields $f(6)$ for the left-hand side of the given equation; it's not the value of $f(6)$.

Question Difficulty:

Hard

Question ID a7a14e87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a7a14e87

In the xy -plane, line k is defined by $x + y = 0$. Line j is perpendicular to line k , and the y -intercept of line j is $(0, 3)$. Which of the following is an equation of line j ?

- A. $x + y = 3$
- B. $x + y = -3$
- C. $x - y = 3$
- D. $x - y = -3$

ID: a7a14e87 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that line j is perpendicular to line k and that line k is defined by the equation $x + y = 0$. This equation can be rewritten in slope-intercept form, $y = mx + b$, where m represents the slope of the line and b represents the y -coordinate of the y -intercept of the line, by subtracting x from both sides of the equation, which yields $y = -x$. Thus, the slope of line k is -1 . Since line j and line k are perpendicular, their slopes are opposite reciprocals of each other. Thus, the slope of line j is 1 . It's given that the y -intercept of line j is $(0, 3)$. Therefore, the equation for line j in slope-intercept form is $y = x + 3$, which can be rewritten as $x - y = -3$.

Choices A, B, and C are incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 90bd9ef8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 90bd9ef8

The average annual energy cost for a certain home is \$4,334. The homeowner plans to spend \$25,000 to install a geothermal heating system. The homeowner estimates that the average annual energy cost will then be \$2,712. Which of the following inequalities can be solved to find t , the number of years after installation at which the total amount of energy cost savings will exceed the installation cost?

- A. $25,000 > (4,334 - 2,712)t$
- B. $25,000 < (4,334 - 2,712)t$
- C. $25,000 - 4,334 > 2,712t$
- D. $25,000 > \frac{4,332}{2,712}t$

ID: 90bd9ef8 Answer

Correct Answer:

B

Rationale

Choice B is correct. The savings each year from installing the geothermal heating system will be the average annual energy cost for the home before the geothermal heating system installation minus the average annual energy cost after the geothermal heating system installation, which is $(4,334 - 2,712)$ dollars. In t years, the savings will be $(4,334 - 2,712)t$ dollars. Therefore, the inequality that can be solved to find the number of years after installation at which the total amount of energy cost savings will exceed (be greater than) the installation cost, \$25,000, is $25,000 < (4,334 - 2,712)t$.

Choice A is incorrect. It gives the number of years after installation at which the total amount of energy cost savings will be less than the installation cost. Choice C is incorrect and may result from subtracting the average annual energy cost for the home from the onetime cost

of the geothermal heating system installation. To find the predicted total savings, the predicted average cost should be subtracted from the average annual energy cost before the installation, and the result should be multiplied by the number of years, t . Choice D

is incorrect and may result from misunderstanding the context. The ratio $\frac{4,332}{2,712}$ compares the average energy cost before installation and the average energy cost after installation; it does not represent the savings.

Question Difficulty:

Medium

Question ID 429fb7c0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 429fb7c0

What value of t is the solution to the equation $0.8t - 0.46 = 8(t - 0.001) + 1.9$?

ID: 429fb7c0 Answer

Correct Answer:

-3266, -3267, -49/150

Rationale

The correct answer is -.3267. Applying the distributive property to the right-hand side of the given equation yields $0.8t - 0.46 = 8t - 0.008 + 1.9$, or $0.8t - 0.46 = 8t + 1.892$. Subtracting $0.8t$ from both sides of this equation yields $-0.46 = 7.2t + 1.892$. Subtracting 1.892 from both sides of this equation yields $-2.352 = 7.2t$. Dividing both sides of this equation by 7.2 yields $\frac{-2.352}{7.2} = t$. Therefore, the value of t is approximately -0.32667. Note that -.3267, -.3266, -.326, and -.327 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 5ad9eff0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5ad9eff0

The width of a rectangular dance floor is w feet. The length of the floor is 6 feet longer than its width. Which of the following expresses the perimeter, in feet, of the dance floor in terms of w ?

- A. $2w + 6$
- B. $4w + 12$
- C. $w^2 + 6$
- D. $w^2 + 6w$

ID: 5ad9eff0 Answer

Correct Answer:

B

Rationale

Choice B is correct. It is given that the width of the dance floor is w feet. The length is 6 feet longer than the width; therefore, the length of the dance floor is $w + 6$. So the perimeter is $w + w + (w + 6) + (w + 6) = 4w + 12$.

Choice A is incorrect because it is the sum of one length and one width, which is only half the perimeter. Choice C is incorrect and may result from using the formula for the area instead of the formula for the perimeter and making a calculation error. Choice D is incorrect because this is the area, not the perimeter, of the dance floor.

Question Difficulty:

Medium

Question ID 39617468

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 39617468

$$x + y = 350$$

The given equation relates the total number of maple trees, x , and the total number of birch trees, y , planted in a 14-acre forest preserve. If 245 maple trees were planted in the forest preserve, how many birch trees were planted in the forest preserve?

- A. 14
- B. 25
- C. 105
- D. 245

ID: 39617468 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the equation $x + y = 350$ relates the total number of maple trees, x , and the total number of birch trees, y , planted in a 14-acre forest preserve. It's also given that 245 maple trees were planted in the forest preserve.

Substituting 245 for x in the given equation yields $245 + y = 350$. Subtracting 245 from both sides of this equation yields $y = 105$. Therefore, 105 birch trees were planted in the forest preserve.

Choice A is incorrect. This is the number of acres in the forest preserve, not the number of birch trees planted in the forest preserve.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the number of maple trees planted in the forest preserve, not the number of birch trees planted in the forest preserve.

Question Difficulty:

Easy

Question ID 038d87d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 038d87d7

A neighborhood consists of a 2-hectare park and a 35-hectare residential area. The total number of trees in the neighborhood is 3,934. The equation $2x + 35y = 3,934$ represents this situation. Which of the following is the best interpretation of x in this context?

- A. The average number of trees per hectare in the park
- B. The average number of trees per hectare in the residential area
- C. The total number of trees in the park
- D. The total number of trees in the residential area

ID: 038d87d7 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a neighborhood consists of a 2-hectare park and a 35-hectare residential area and that the total number of trees in the neighborhood is 3,934. It's also given that the equation $2x + 35y = 3,934$ represents this situation. Since the total number of trees for a given area can be determined by taking the number of hectares times the average number of trees per hectare, this must mean that the terms $2x$ and $35y$ correspond to the number of trees in the park and in the residential area, respectively. Since $2x$ corresponds to the number of trees in the park, and 2 is the size of the park, in hectares, x must represent the average number of trees per hectare in the park.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 46f68129

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 46f68129

A librarian has 43 books to distribute to a group of children. If he gives each child 2 books, he will have 7 books left over. How many children are in the group?

- A. 15
- B. 18
- C. 25
- D. 29

ID: 46f68129 Answer

Rationale

Choice B is correct. Subtracting the number of books left over from the total number of books results in $43 - 7 = 36$, which is the number of books distributed. Dividing the number of books distributed by the number of books given to each child results in $\frac{36}{2} = 18$.

Choice A is incorrect and results from dividing the total number of books by the number of books given to each child, $\frac{43}{2} \approx 22$, then subtracting the number of books left over from the result, $22 - 7 = 15$. Choice C is incorrect and results from adding the number of books left over to the total number of books, $43 + 7 = 50$, then dividing the result by the number of books given to each child, $\frac{50}{2} = 25$. Choice D is incorrect and results from dividing the total number of books by the number of books given to each child, $\frac{43}{2} \approx 22$, then adding the number of books left over, $22 + 7 = 29$.

Question Difficulty:

Easy

Question ID 2eef7e61

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 2eef7e61

The graph of the function f is a line in the xy -plane. If the line has slope $\frac{3}{4}$ and $f(0) = 3$, which of the following defines f ?

A. $f(x) = \frac{3}{4}x - 3$

B. $f(x) = \frac{3}{4}x + 3$

C. $f(x) = 4x - 3$

D. $f(x) = 4x + 3$

ID: 2eef7e61 Answer

Correct Answer:

B

Rationale

Choice B is correct. The equation for the function f in the xy -plane can be represented by $f(x) = mx + b$, where m is the slope and

b is the y -coordinate of the y -intercept. Since it's given that the line has a slope of $\frac{3}{4}$, it follows that $m = \frac{3}{4}$ in $f(x) = mx + b$,

which yields $y = \frac{3}{4}x + b$. It's given that $f(0) = 3$. This implies that the graph of the function f in the xy -plane passes through the

point $(0, 3)$. Thus, the y -coordinate of the y -intercept of the graph is 3, so $b = 3$ in $f(x) = \frac{3}{4}x + b$, which yields $f(x) = \frac{3}{4}x + 3$.

Therefore, the equation $f(x) = \frac{3}{4}x + 3$ defines the function f .

Choice A is incorrect and may result from a sign error for the y -intercept. Choice C is incorrect and may result from using the denominator of the given slope as m in $f(x) = mx + b$, in addition to a sign error for the y -intercept. Choice D is incorrect and may result from using the denominator of the given slope as m in $f(x) = mx + b$.

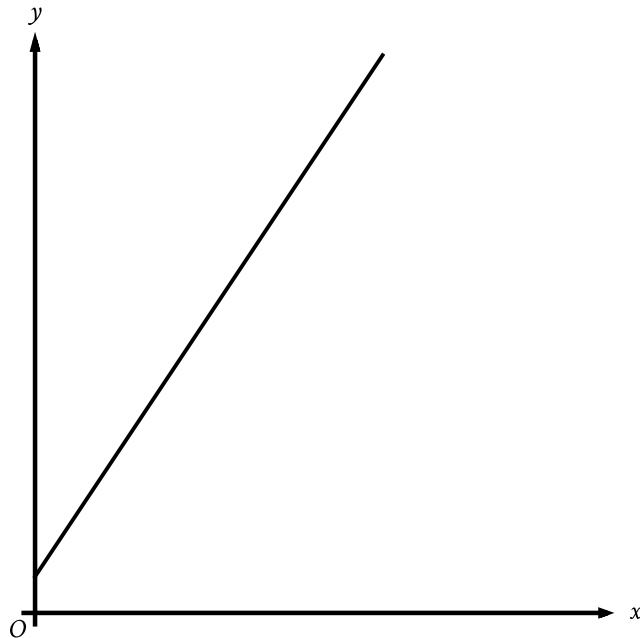
Question Difficulty:

Easy

Question ID f0773a55

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f0773a55



The graph represents the total charge, in dollars, by an electrician for x hours of work. The electrician charges a onetime fee plus an hourly rate. What is the best interpretation of the slope of the graph?

- A. The electrician's hourly rate
- B. The electrician's onetime fee
- C. The maximum amount that the electrician charges
- D. The total amount that the electrician charges

ID: f0773a55 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the electrician charges a onetime fee plus an hourly rate. It's also given that the graph represents the total charge, in dollars, for x hours of work. This graph shows a linear relationship in the xy -plane. Thus, the total charge y , in dollars, for x hours of work can be represented as $y = mx + b$, where m is the slope and $0, b$ is the y -intercept of the graph of the equation in the xy -plane. Since the given graph represents the total charge, in dollars, by an electrician for x hours of work, it follows that its slope is m , or the electrician's hourly rate.

Choice B is incorrect. The electrician's onetime fee is represented by the y -coordinate of the y -intercept, not the slope, of the graph.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 8da536c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8da536c6

In 2010, a swim club had a total of 35 swimmers, each classified as either advanced or intermediate. From 2010 to 2020, the number of advanced swimmers in the club increased by approximately 53%, and the number of intermediate swimmers in the club increased by approximately 44%. The total number of swimmers in the club increased by approximately 49%. Which equation best represents this situation, where a represents the number of advanced swimmers in the club in 2010 and b represents the number of intermediate swimmers in the club in 2010?

- A. $1.53a + 1.49b = 35(1.44)$
- B. $1.49a + 0.53b = 35(1.44)$
- C. $1.53a + 1.44b = 35(1.49)$
- D. $1.44a + 1.53b = 35(1.49)$

ID: 8da536c6 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that in 2010, a swim club had a total of 35 swimmers, each classified as either advanced or intermediate, and that a represents the number of advanced swimmers in 2010 and b represents the number of intermediate swimmers in 2010. It's also given that from 2010 to 2020, the number of advanced swimmers in the club increased by approximately 53% and the number of intermediate swimmers in the club increased by approximately 44%. Thus, in 2020, the approximate number of advanced swimmers in the club can be represented as $1.53a$ and the approximate number of intermediate swimmers in the club can be represented as $1.44b$. It's given that the total number of swimmers in the club increased by approximately 49% from 2010 to 2020. Since the club had 35 swimmers in 2010, it follows that the total number of swimmers in 2020 can be represented as $35(1.49)$. Since the sum of the number of advanced swimmers in 2020 and the number of intermediate swimmers in 2020 equals the total number of swimmers in 2020, the equation $1.53a + 1.44b = 35(1.49)$ best represents this situation.

Choice A is incorrect. This equation represents a situation where the number of intermediate swimmers in the club in 2020 increased by approximately 49%, not 44%, and the total number of swimmers in the club in 2020 increased by approximately 44%, not 49%.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect. This equation represents a situation where the number of advanced swimmers in the club in 2020 increased by approximately 44%, not 53%, and the number of intermediate swimmers in the club in 2020 increased by approximately 53%, not 44%.

Question Difficulty:

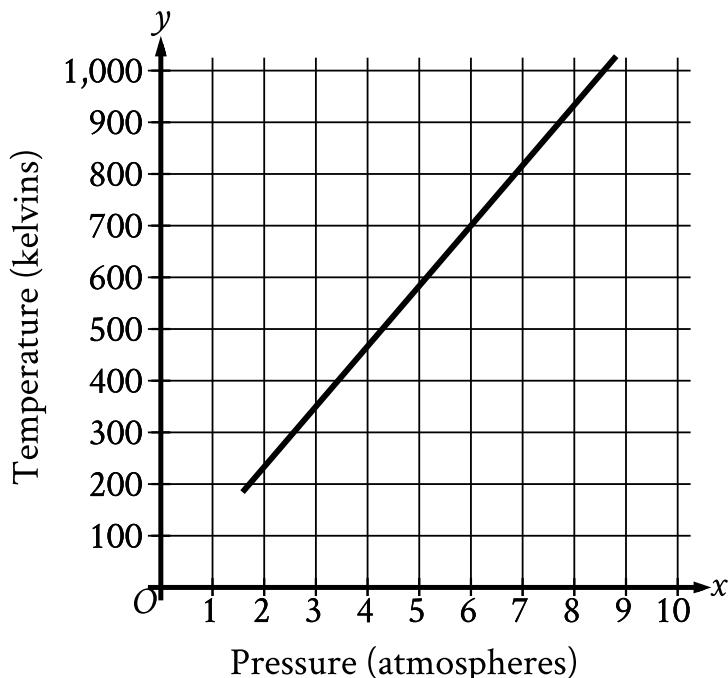
Easy

Question ID 0ea7ef01

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #002B36; height: 10px;"></div> <div style="width: 30%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 30%; background-color: #D9D9D9; height: 10px;"></div>

ID: 0ea7ef01

Oxygen gas is placed inside a tank with a constant volume. The graph shows the estimated temperature y , in kelvins, of the oxygen gas when its pressure is x atmospheres.



What is the estimated temperature, in kelvins, of the oxygen gas when its pressure is 6 atmospheres?

- A. 6
- B. 60
- C. 700
- D. 760

ID: 0ea7ef01 Answer

Correct Answer:

C

Rationale

Choice C is correct. For the graph shown, the x -axis represents pressure, in atmospheres, and the y -axis represents temperature, in kelvins. Therefore, the estimated temperature, in kelvins, of the oxygen gas when its pressure is 6 atmospheres is represented by the y -coordinate of the point on the graph that has an x -coordinate of 6. The point on the graph with an x -coordinate of 6 has a y -coordinate of approximately 700. Therefore, the estimated temperature, in kelvins, of the oxygen gas when its pressure is 6 atmospheres is 700.

Choice A is incorrect. This is the pressure, in atmospheres, not the estimated temperature, in kelvins, of the oxygen gas when its pressure is 6 atmospheres.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 0df106df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0df106df

An online bookstore sells novels and magazines. Each novel sells for \$4, and each magazine sells for \$1. If Sadie purchased a total of 11 novels and magazines that have a combined selling price of \$20, how many novels did she purchase?

- A. 2
- B. 3
- C. 4
- D. 5

ID: 0df106df Answer

Correct Answer:

B

Rationale

Choice B is correct. Let n be the number of novels and m be the number of magazines that Sadie purchased. If Sadie purchased a total of 11 novels and magazines, then $n + m = 11$. It is given that the combined price of 11 novels and magazines is \$20. Since each novel sells for \$4 and each magazine sells for \$1, it follows that $4n + m = 20$. So the system of equations below must hold.

$$\begin{aligned}4n + m &= 20 \\ n + m &= 11\end{aligned}$$

Subtracting corresponding sides of the second equation from the first equation yields $3n = 9$, so $n = 3$. Therefore, Sadie purchased 3 novels.

Choice A is incorrect. If 2 novels were purchased, then a total of \$8 was spent on novels. That leaves \$12 to be spent on magazines, which means that 12 magazines would have been purchased. However, Sadie purchased a total of 11 novels and magazines. Choices C and D are incorrect. If 4 novels were purchased, then a total of \$16 was spent on novels. That leaves \$4 to be spent on magazines, which means that 4 magazines would have been purchased. By the same logic, if Sadie purchased 5 novels, she would have no money at all (\$0) to buy magazines. However, Sadie purchased a total of 11 novels and magazines.

Question Difficulty:

Easy

Question ID e53870b6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e53870b6

$$6x + k = 6x + 5$$

In the given equation, k is a constant. If the equation has infinitely many solutions, what is the value of k ?

ID: e53870b6 Answer

Rationale

The correct answer is 5. Subtracting $6x$ from both sides of the given equation gives $k = 5$, so for any value of x , $6x + k = 6x + 5$ if and only if $k = 5$. Therefore, if the given equation has infinitely many solutions, the value of k is 5.

Question Difficulty:

Easy

Question ID f5ff91b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: f5ff91b2

If $\frac{x-5}{7} = \frac{x-5}{9}$, the value of $x - 5$ is between which of the following pairs of values?

- A. -9 and -7
- B. -3 and 3
- C. 4.5 and 5.5
- D. 6.75 and 9.25

ID: f5ff91b2 Answer

Correct Answer:

B

Rationale

Choice B is correct. Multiplying both sides of the given equation by $(7)(9)$, or 63 , yields $(63)\frac{x-5}{7} = (63)\frac{x-5}{9}$, or $9(x-5) = 7(x-5)$. Subtracting $7(x-5)$ from both sides of this equation yields $2(x-5) = 0$. Dividing both sides of this equation by 2 yields $x-5 = 0$. Therefore, if $\frac{x-5}{7} = \frac{x-5}{9}$, then the value of $x-5$ is 0 . It follows that of the given choices, the value of $x-5$ is between -3 and 3 .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID a1fd2304

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: a1fd2304

How many liters of a 25% saline solution must be added to 3 liters of a 10% saline solution to obtain a 15% saline solution?

ID: a1fd2304 Answer

Rationale

The correct answer is 1.5. The total amount, in liters, of a saline solution can be expressed as the liters of each type of saline solution multiplied by the percent concentration of the saline solution. This gives $3(0.10)$, $x(0.25)$, and $(x+3)(0.15)$, where x is the amount, in liters, of 25% saline solution and 10%, 15%, and 25% are represented as 0.10, 0.15, and 0.25, respectively. Thus, the equation $3(0.10) + 0.25x = 0.15(x+3)$ must be true. Multiplying 3 by 0.10 and distributing 0.15 to $(x+3)$ yields $0.30 + 0.25x = 0.15x + 0.45$. Subtracting $0.15x$ and 0.30 from each side of the equation gives $0.10x = 0.15$. Dividing each side of the equation by 0.10 yields $x = 1.5$. Note that 1.5 and $\frac{3}{2}$ are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID b544a348

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b544a348

$$5x + 3y = 38$$

$$x + 3y = 10$$

In the solution (x, y) to the system of equations

above, what is the value of x ?

ID: b544a348 Answer

Rationale

The correct answer is 7. Subtracting the second equation from the first equation eliminates the variable y .

$$5x + 3y = 38$$

$$-(x + 3y = 10)$$

$$4x = 28$$

Dividing both sides of the resulting equation by 4 yields $x = 7$.

Question Difficulty:

Medium

Question ID 628300a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 628300a9

A science teacher is preparing the 5 stations of a science laboratory. Each station will have either Experiment A materials or Experiment B materials, but not both.

Experiment A requires 6 teaspoons of salt, and Experiment B requires 4 teaspoons of salt. If x is the number of stations that will be set up for Experiment A and the remaining stations will be set up for Experiment B, which of the following expressions represents the total number of teaspoons of salt required?

- A. $5x$
- B. $10x$
- C. $2x + 20$
- D. $10x + 20$

ID: 628300a9 Answer

Correct Answer:

C

Rationale

Choice C is correct. It is given that x represents the number of stations that will be set up for Experiment A and that there will be 5 stations total, so it follows that $5 - x$ is the number of stations that will be set up for Experiment B. It is also given that Experiment A requires 6 teaspoons of salt and that Experiment B requires 4 teaspoons of salt, so the total number of teaspoons of salt required is $6x + 4(5 - x)$, which simplifies to $2x + 20$.

Choices A, B, and D are incorrect and may be the result of not understanding the description of the context.

Question Difficulty:

Hard

Question ID 9ed4c1a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ed4c1a2

What is the slope of the graph of $y = \frac{1}{4}(27x + 15) + 7x$ in the xy -plane?

ID: 9ed4c1a2 Answer

Correct Answer:

13.75, 55/4

Rationale

The correct answer is $\frac{55}{4}$. In the xy -plane, the graph of an equation in the form $y = mx + b$, where m and b are constants, has a slope of m and a y -intercept of $0, b$. Applying the distributive property to the right-hand side of the given equation yields $y = \frac{27}{4}x + \frac{15}{4} + 7x$. Combining like terms yields $y = \frac{55}{4}x + \frac{15}{4}$. This equation is in the form $y = mx + b$, where $m = \frac{55}{4}$ and $b = \frac{15}{4}$. It follows that the slope of the graph of $y = \frac{1}{4}27x + 15 + 7x$ in the xy -plane is $\frac{55}{4}$. Note that $55/4$ and 13.75 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 45bba652

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 45bba652

If $2(x - 5) + 3(x - 5) = 10$, what is the value of $x - 5$?

- A. 2
- B. 5
- C. 7
- D. 12

ID: 45bba652 Answer

Correct Answer:

A

Rationale

Choice A is correct. Adding the like terms on the left-hand side of the given equation yields $5(x - 5) = 10$. Dividing both sides of this equation by 5 yields $x - 5 = 2$.

Choice B is incorrect and may result from subtracting 5, not dividing by 5, on both sides of the equation $5(x - 5) = 10$. Choice C is incorrect. This is the value of x , not the value of $x - 5$. Choice D is incorrect. This is the value of $x + 5$, not the value of $x - 5$.

Question Difficulty:

Medium

Question ID 208626df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 208626df

$$2\ell + 2w \leq 27$$

A rectangle has length ℓ and width w . The inequality gives the possible values of ℓ and w for which the perimeter of this rectangle is less than or equal to 27. Which statement is the best interpretation of $(\ell, w) = (8, 3)$ in this context?

- A. If the rectangle has length 3 and width 8, its perimeter is less than or equal to 27.
- B. If the rectangle has length 8 and width 3, its perimeter is less than or equal to 27.
- C. If the rectangle has length 3 and width 8, its perimeter is greater than or equal to 27.
- D. If the rectangle has length 8 and width 3, its perimeter is greater than or equal to 27.

ID: 208626df Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a rectangle has length ℓ and width w , and the inequality $2\ell + 2w \leq 27$ gives the possible values of ℓ and w for which the perimeter of this rectangle is less than or equal to 27. To determine the best interpretation of $(\ell, w) = (8, 3)$ in this context, the values can be substituted in the given inequality. Substituting 8 for ℓ and 3 for w in this inequality yields $2(8) + 2(3) \leq 27$, which is equivalent to $16 + 6 \leq 27$, or $22 \leq 27$. Since this inequality is true, if the rectangle has length 8 and width 3, its perimeter is less than or equal to 27.

Choice A is incorrect. The interpretation of $(\ell, w) = (8, 3)$ implies that the rectangle has length 8 and width 3, not length 3 and width 8.

Choice C is incorrect. The interpretation of $(\ell, w) = (8, 3)$ implies that the rectangle has length 8 and width 3, not length 3 and width 8.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID b75f7812

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: b75f7812

Maria plans to rent a boat. The boat rental costs \$60 per hour, and she will also have to pay for a water safety course that costs \$10. Maria wants to spend no more than \$280 for the rental and the course. If the boat rental is available only for a whole number of hours, what is the maximum number of hours for which Maria can rent the boat?

ID: b75f7812 Answer

Rationale

The correct answer is 4. The equation $60h + 10 \leq 280$, where h is the number of hours the boat has been rented, can be written to represent the situation. Subtracting 10 from both sides and then dividing by 60 yields $h \leq 4.5$. Since the boat can be rented only for whole numbers of hours, the maximum number of hours for which Maria can rent the boat is 4.

Question Difficulty:

Easy

Question ID 1ecaa9c0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1ecaa9c0

Robert rented a truck to transport materials he purchased from a hardware store. He was charged an initial fee of \$20.00 plus an additional \$0.70 per mile driven. If the truck was driven 38 miles, what was the total amount Robert was charged?

- A. \$46.60
- B. \$52.90
- C. \$66.90
- D. \$86.50

ID: 1ecaa9c0 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that Robert was charged an initial fee of \$20.00 to rent the truck plus an additional \$0.70 per mile driven. Let m represent the number of miles the truck was driven. Since the rental charge is \$0.70 per mile driven, $0.70m$ represents the amount Robert was charged for m miles driven. Let c equal the total amount, in dollars, Robert was charged to rent the truck. The total amount can be represented by the equation $c = 20.00 + 0.70m$. It's given that the truck was driven 38 miles, thus $m = 38$. Substituting 38 into the equation gives $c = 20.00 + 0.70(38)$. Multiplying $0.70(38)$ gives $c = 20.00 + 26.60$. Adding these values gives $c = 46.60$, so the total amount Robert was charged is \$46.60.

Choices B, C, and D are incorrect and may result from setting up the equation incorrectly or from making calculation errors.

Question Difficulty:

Easy

Question ID fb43b85f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: fb43b85f

A line passes through the points $(4, 6)$ and $(15, 24)$ in the xy -plane. What is the slope of the line?

ID: fb43b85f Answer

Correct Answer:

1.636, 18/11

Rationale

The correct answer is $\frac{18}{11}$. For a line that passes through the points x_1, y_1 and x_2, y_2 in the xy -plane, the slope of the line can be calculated using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. It's given that a line passes through the points 4, 6 and 15, 24 in the xy -plane.

Substituting 4, 6 for x_1, y_1 and 15, 24 for x_2, y_2 in the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$, yields $m = \frac{24 - 6}{15 - 4}$, or $m = \frac{18}{11}$. Therefore, the slope of the line is $\frac{18}{11}$. Note that 18/11 and 1.636 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 7d89376f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7d89376f

A discount airline sells a certain number of tickets, x , for a flight for \$90 each. It sells the number of remaining tickets, y , for \$250 each. For a particular flight, the airline sold 120 tickets and collected a total of \$27,600 from the sale of those tickets. Which system of equations represents this relationship between x and y ?

- A. $\begin{cases} x+y=120 \\ 90x+250y=27,600 \end{cases}$
- B. $\begin{cases} x+y=120 \\ 90x+250y=120(27,600) \end{cases}$
- C. $\begin{cases} x+y=27,600 \\ 90x+250y=120(27,600) \end{cases}$
- D. $\begin{cases} 90x=250y \\ 120x+120y=27,600 \end{cases}$

ID: 7d89376f Answer

Correct Answer:

A

Rationale

Choice A is correct. The airline sold two types of tickets for this flight: x tickets at \$90 each and the remaining tickets, y , at \$250 each. Because the airline sold a total of 120 tickets for this flight, it must be true that $x + y = 120$. The amount, in dollars, collected from the sale of x tickets at \$90 each is represented by $90x$. The amount, in dollars, collected from the sale of the remaining y tickets at \$250 each is represented by $250y$. It is given that a total of \$27,600 was collected from the sale of all tickets. Therefore, it must also be true that $90x + 250y = 27,600$.

Choice B is incorrect. The total number of tickets sold is represented correctly as $x + y = 120$. The total amount, in dollars, collected from the sale of the x tickets at \$90 each and the remaining tickets, y , at \$250 has been correctly represented as $90x + 250y$. However, according to the information given, this total should be equal to 27,600, not $120(27,600)$ dollars. Choice C is incorrect. The total number of tickets sold has been correctly represented as $x + y$. However, according to the information given, this total should be equal to 120, not 27,600, as shown in choice C. The total amount, in dollars, collected from the sale of the x tickets at \$90 each and the remaining tickets, y , at \$250 has been correctly represented as $90x + 250y$. However, according to the information given, this total should be equal to 27,600, not $120(27,600)$ dollars. Choice D is incorrect. The two equations given in choice D have no meaning in this context.

Question Difficulty:

Easy

Question ID 0bd33265

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0bd33265

The equation $h = \frac{9(v-273.15)}{5} + 32$ gives the corresponding temperature h , in degrees Fahrenheit, of any substance that has a temperature of v kelvins, where $v > 0$. If a substance has a temperature of 467.33 degrees Fahrenheit, what is the corresponding temperature, in kelvins, of this substance?

ID: 0bd33265 Answer

Correct Answer:

515

Rationale

The correct answer is 515. It's given that the equation $h = \frac{9(v-273.15)}{5} + 32$ gives the corresponding temperature h , in degrees Fahrenheit, of any substance that has a temperature of v kelvins, where $v > 0$. Substituting 467.33 for h in the given equation yields $467.33 = \frac{9(v-273.15)}{5} + 32$. Subtracting 32 from both sides of this equation yields $435.33 = \frac{9(v-273.15)}{5}$. Multiplying both sides of this equation by 5 yields $2,176.65 = 9(v - 273.15)$. Dividing both sides of this equation by 9 yields $241.85 = v - 273.15$. Adding 273.15 to both sides of this equation yields $515 = v$. Therefore, if a substance has a temperature of 467.33 degrees Fahrenheit, the corresponding temperature, in kelvins, of this substance is 515.

Question Difficulty:

Hard

Question ID 17f176ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 17f176ec

A movie theater charges \$11 for each full-price ticket and \$8.25 for each reduced-price ticket. For one movie showing, the theater sold a total of 214 full-price and reduced-price tickets for \$2,145. Which of the following systems of equations could be used to determine the number of full-price tickets, f , and the number of reduced-price tickets, r , sold?

A. $f+r=2,145$
 $11f+8.25r=214$

B. $f+r=214$
 $11f+8.25r=2,145$

C. $f+r=214$
 $8.25f+11r=2,145$

D. $f+r=2,145$
 $8.25f+11r=214$

ID: 17f176ec Answer

Correct Answer:

B

Rationale

Choice B is correct. The movie theater sells f full-price tickets and r reduced-price tickets, so the total number of tickets sold is $f + r$. Since the movie theater sold a total of 214 full-price and reduced-price tickets for one movie showing, it follows that $f + r = 214$. The movie theater charges \$11 for each full-price ticket; thus, the sales for full-price tickets, in dollars, is given by $11f$. The movie theater charges \$8.25 for each reduced-price ticket; thus, the sales for reduced-price tickets, in dollars, is given by $8.25r$. Therefore, the total sales, in dollars, for the movie showing is given by $11f + 8.25r$. Since the total sales for all full-price and reduced-price tickets is \$2,145, it follows that $11f + 8.25r = 2,145$.

Choice A is incorrect. This system of equations suggests that the movie theater sold a total of 2,145 full-price and reduced-price tickets for a total of \$214. Choice C is incorrect. This system suggests that the movie theater charges \$8.25 for each full-price ticket and \$11 for each reduced-price ticket. Choice D is incorrect. This system suggests that the movie theater charges \$8.25 for each full-price ticket and \$11 for each reduced-price ticket and sold a total of 2,145 tickets for a total of \$214.

Question Difficulty:

Easy

Question ID 8a6de407

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 8a6de407

The function f is defined by $f(x) = mx + b$, where m and b are constants. If

$f(0) = 18$ and $f(1) = 20$, what is the value of m ?

ID: 8a6de407 Answer

Rationale

The correct answer is 2. The slope-intercept form of an equation for a line is $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept. Two ordered pairs, (x_1, y_1) and (x_2, y_2) , can be used to compute the slope using the formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

It's given that $f(0) = 18$ and $f(1) = 20$; therefore, the two ordered pairs for this line are $(0, 18)$ and $(1, 20)$.

Substituting these values for (x_1, y_1) and (x_2, y_2) gives $\frac{20 - 18}{1 - 0} = \frac{2}{1}$, or 2.

Question Difficulty:

Medium

Question ID 8643d906

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 8643d906

$$P(t) = 250 + 10t$$

The population of snow leopards in a certain area can be modeled by the function P defined above, where $P(t)$ is the population t years after 1990. Of the following, which is the best interpretation of the equation $P(30) = 550$?

- A. The snow leopard population in this area is predicted to be 30 in the year 2020.
- B. The snow leopard population in this area is predicted to be 30 in the year 2030.
- C. The snow leopard population in this area is predicted to be 550 in the year 2020.
- D. The snow leopard population in this area is predicted to be 550 in the year 2030.

ID: 8643d906 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that $P(t)$ represents the population of snow leopards t years after 1990. $P(30) = 550$ corresponds to $t = 30$ and $P(t) = 550$. It follows that $t = 30$ corresponds to 30 years after 1990, or 2020. Thus, the best interpretation of $P(30) = 550$ is that the snow leopard population in this area is predicted to be 550 in the year 2020.

Choices A and B are incorrect and may result from reversing the interpretations of t and $P(t)$. Choice D is incorrect and may result from determining that 30 years after 1990 is 2030, not 2020.

Question Difficulty:

Easy

Question ID bbf9e5ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bbf9e5ce

For groups of **25** or more people, a museum charges **\$21** per person for the first **25** people and **\$14** for each additional person. Which function f gives the total charge, in dollars, for a tour group with n people, where $n \geq 25$?

- A. $f(n) = 14n + 175$
- B. $f(n) = 14n + 525$
- C. $f(n) = 35n - 350$
- D. $f(n) = 14n + 21$

ID: bbf9e5ce Answer

Correct Answer:

A

Rationale

Choice A is correct. A tour group with n people, where $n \geq 25$, can be split into two subgroups: the first 25 people and the additional $n - 25$ people. Since the museum charges \$ 21 per person for the first 25 people and \$ 14 for each additional person, the charge for the first 25 people is $\$ 21(25)$ and the charge for the additional $n - 25$ people is $\$ 14(n - 25)$. Therefore, the total charge, in dollars, is given by the function $f(n) = 21(25) + 14(n - 25)$, or $f(n) = 14n + 175$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID a4d6fbec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a4d6fbec

If $y = 5x + 10$, what is the value of y when $x = 8$?

ID: a4d6fbec Answer

Correct Answer:

50

Rationale

The correct answer is 50. Substituting 8 for x in the given equation yields $y = 58 + 10$, or $y = 50$. Therefore, the value of y is 50 when $x = 8$.

Question Difficulty:

Easy

Question ID 65833256

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 65833256

$$\begin{aligned}y &= 6x + 16 \\ -7x - y &= 36\end{aligned}$$

What is the solution (x, y) to the given system of equations?

- A. $(-4, -8)$
- B. $(-\frac{20}{13}, -\frac{80}{13})$
- C. $(4, 40)$
- D. $(20, 136)$

ID: 65833256 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given system of linear equations can be solved by the substitution method. The first equation in the given system of equations defines y as $6x + 16$. Substituting $6x + 16$ for y in the second equation of the given system of equations yields $-7x - (6x + 16) = 36$. Applying the distributive property on the left-hand side of this equation yields $-7x - 6x - 16 = 36$, or $-13x - 16 = 36$. Adding 16 to both sides of this equation yields $-13x = 52$. Dividing both sides of this equation by -13 yields $x = -4$. Substituting -4 for x in the first equation of the given system of equations, $y = 6x + 16$, yields $y = 6(-4) + 16$, or $y = -8$. Therefore, the solution (x, y) to the given system of equations is $(-4, -8)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 44d65912

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 44d65912

Angela is playing a video game. In this game, players can score points only by collecting coins and stars. Each coin is worth c points, and each star is worth s points.

- The first time she played, Angela scored 700 points. She collected 20 coins and 10 stars.
- The second time she played, Angela scored 850 points. She collected 25 coins and 12 stars.

Which system of equations can be used to correctly determine the values of c and s ?

A. $10c + 20s = 700$

$12c + 25s = 850$

B. $20c + 10s = 700$

$25c + 12s = 850$

C. $20c + 700s = 10$

$25c + 850s = 12$

D. $700c + 20s = 10$

$850c + 25s = 12$

ID: 44d65912 Answer

Correct Answer:

B

Rationale

Choice B is correct. The number of coins collected can be multiplied by c to give the score from the points earned from coins. Similarly, the number of stars collected can be multiplied by s to give the score from the points earned from the stars. Therefore, the total score each time Angela played is $20c + 10s = 700$, and the total score the second time she played is $25c + 12s = 850$.

Choices A, C, and D are incorrect and may result from misidentifying the terms of the equation. Choice A switches coins and stars, choice C switches stars and points, and choice D misidentifies coins, stars, and points.

Question Difficulty:

Easy

Question ID 41fdc0b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: 41fdc0b8

Population of Greenleaf, Idaho

Year	Population
2000	862
2010	846

The table above shows the population of Greenleaf, Idaho, for the years 2000 and 2010. If the relationship between population and year is linear, which of the following functions P models the population of Greenleaf t years after 2000?

- A. $P(t) = 862 - 1.6t$
- B. $P(t) = 862 - 16t$
- C. $P(t) = 862 + 16(t - 2,000)$
- D. $P(t) = 862 - 1.6(t - 2,000)$

ID: 41fdc0b8 Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that the relationship between population and year is linear; therefore, the function that models the population t years after 2000 is of the form $P(t) = mt + b$, where m is the slope and b is the population when $t = 0$. In the year

2000, $t = 0$. Therefore, $b = 862$. The slope is given by $m = \frac{P(10) - P(0)}{10 - 0} = \frac{846 - 862}{10 - 0} = \frac{-16}{10} = -1.6$. Therefore, $P(t) = -1.6t + 862$, which is equivalent to the equation in choice A.

Choice B is incorrect and may be the result of incorrectly calculating the slope as just the change in the value of P . Choice C is incorrect and may be the result of the same error as in choice B, in addition to incorrectly using t to represent the year, instead of the number of years after 2000. Choice D is incorrect and may be the result of incorrectly using t to represent the year instead of the number of years after 2000.

Question Difficulty:

Medium

Question ID 8b2a2a63

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8b2a2a63

The y -intercept of the graph of $y = -6x - 32$ in the xy -plane is $(0, y)$. What is the value of y ?

ID: 8b2a2a63 Answer

Correct Answer:

-32

Rationale

The correct answer is -32. It's given that the y -intercept of the graph of $y = -6x - 32$ is $0, y$. Substituting 0 for x in this equation yields $y = -6(0) - 32$, or $y = -32$. Therefore, the value of y that corresponds to the y -intercept of the graph of $y = -6x - 32$ in the xy -plane is -32.

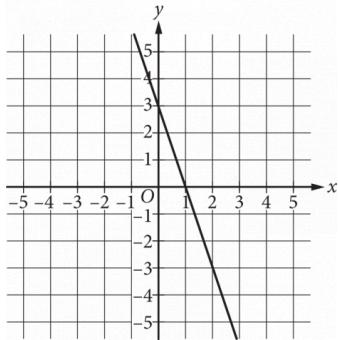
Question Difficulty:

Easy

Question ID 8a1544f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8a1544f1



What is the equation of the line shown in the xy -plane above?

- A. $y = 3x - 3$
- B. $y = -3x + 3$
- C. $y = \frac{1}{3}x - 3$
- D. $y = -\frac{1}{3}x + 3$

ID: 8a1544f1 Answer

Correct Answer:

B

Rationale

Choice B is correct. Any line in the xy -plane can be defined by an equation in the form $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. From the graph, the y -intercept of the line is $(0, 3)$. Therefore, $b = 3$. The slope of the line is the change in the value of y divided by the change in the value of x for any two points on the line. The line shown

passes through $(0, 3)$ and $(1, 0)$, so $m = \frac{3 - 0}{0 - 1}$, or $m = -3$. Therefore, the equation of the line is $y = -3x + 3$.

Choices A and C are incorrect because the equations given in these choices represent a line with a positive slope. However, the line shown has a negative slope. Choice D is incorrect because the equation given in this choice represents a line with slope of $-\frac{1}{3}$. However, the line shown has a slope of -3 .

Question Difficulty:

Easy

Question ID a9c04a21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a9c04a21

What is the solution to the equation $2x + 3 = 7$?

- A. 1
- B. 1.5
- C. 2
- D. 4

ID: a9c04a21 Answer

Correct Answer:

C

Rationale

Choice C is correct. Subtracting 3 from both sides of the given equation yields $2x = 4$. Dividing both sides by 2 results in $x = 2$.

Choices A and B are incorrect and may result from computational errors. Choice D is incorrect. This is the value of $2x$.

Question Difficulty:

Easy

Question ID a73a5c22

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a73a5c22

The function g is defined by $g(x) = 10x + 8$. What is the value of $g(x)$ when $x = 8$?

- A. 0
- B. 8
- C. 10
- D. 88

ID: a73a5c22 Answer

Correct Answer:

D

Rationale

Choice D is correct. The value of gx when $x = 8$ can be found by substituting 8 for x in the given equation $gx = 10x + 8$. This yields $g8 = 108 + 8$, or $g8 = 88$. Therefore, when $x = 8$, the value of gx is 88.

Choice A is incorrect. This is the value of x when $gx = 8$, rather than the value of gx when $x = 8$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 8c515062

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8c515062

A candle is made of 17 ounces of wax. When the candle is burning, the amount of wax in the candle decreases by 1 ounce every 4 hours. If 6 ounces of wax remain in this candle, for how many hours has it been burning?

- A. 3
- B. 6
- C. 24
- D. 44

ID: 8c515062 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the candle starts with 17 ounces of wax and has 6 ounces of wax remaining after a period of time has passed. The amount of wax the candle has lost during the time period can be found by subtracting the remaining amount of wax from the amount of wax the candle was made of, which yields $17 - 6$ ounces, or 11 ounces. This means the candle loses 11 ounces of wax during that period of time. It's given that the amount of wax decreases by 1 ounce every 4 hours. If h represents the number of hours the candle has been burning, it follows that $\frac{1}{4} = \frac{11}{h}$. Multiplying both sides of this equation by $4h$ yields $h = 44$. Therefore, the candle has been burning for 44 hours.

Choice A is incorrect and may result from using the equation $\frac{1}{4} = \frac{h}{11}$ rather than $\frac{1}{4} = \frac{11}{h}$ to represent the situation, and then rounding to the nearest whole number.

Choice B is incorrect. This is the amount of wax, in ounces, remaining in the candle, not the number of hours it has been burning.

Choice C is incorrect and may result from using the equation $\frac{1}{4} = \frac{6}{h}$ rather than $\frac{1}{4} = \frac{11}{h}$ to represent the situation.

Question Difficulty:

Medium

Question ID 4b76c7f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 4b76c7f1

$$2x + 7y = 9$$

$$8x + 28y = a$$

In the given system of equations, a is a constant. If the system has infinitely many solutions, what is the value of a ?

A. 4

B. 9

C. 36

D. 54

ID: 4b76c7f1 Answer

Correct Answer:

C

Rationale

Choice C is correct. A system of two linear equations has infinitely many solutions if one equation is equivalent to the other. This means that when the two equations are written in the same form, each coefficient or constant in one equation is equal to the corresponding coefficient or constant in the other equation multiplied by the same number. The equations in the given system of equations are written in the same form, with x and y on the left-hand side of the equation and a constant on the right-hand side of the equation. The coefficients of x and y in the second equation are equal to the coefficients of x and y , respectively, in the first equation multiplied by 4: $8 = 2(4)$ and $28 = 7(4)$. Therefore, the constant in the second equation must be equal to 4 times the constant in the first equation: $a = 9(4)$, or $a = 36$.

Choices A, B, and D are incorrect. When $a = 4$, $a = 9$, or $a = 54$, the given system of equations has no solution.

Question Difficulty:

Easy

Question ID 1993561d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1993561d

For the linear function f , the graph of $y = f(x)$ in the xy -plane has a slope of $\frac{1}{4}$ and passes through the point $(0, 5)$. Which equation defines f ?

- A. $f(x) = \frac{1}{4}x + 5$
- B. $f(x) = \frac{1}{4}x + \frac{1}{5}$
- C. $f(x) = \frac{1}{4}x - \frac{5}{4}$
- D. $f(x) = \frac{1}{4}x - 5$

ID: 1993561d Answer

Correct Answer:

A

Rationale

Choice A is correct. An equation that defines a linear function f can be written in the form $f(x) = mx + b$, where m is the slope of the graph of $y = f(x)$ in the xy -plane and $(0, b)$ is the y -intercept of the graph. It's given that for the linear function f , the graph of $y = f(x)$ in the xy -plane has a slope of $\frac{1}{4}$. Therefore, $m = \frac{1}{4}$. It's also given that the graph of $y = f(x)$ passes through the point $(0, 5)$. Therefore, the y -intercept of the graph is $(0, 5)$, and it follows that $b = 5$. Substituting $\frac{1}{4}$ for m and 5 for b in the equation $f(x) = mx + b$ yields $f(x) = \frac{1}{4}x + 5$.

Choice B is incorrect. This equation defines a function whose graph has a y -intercept of $(0, \frac{1}{5})$, not $(0, 5)$.

Choice C is incorrect. This equation defines a function whose graph has a y -intercept of $(0, -\frac{5}{4})$, not $(0, 5)$.

Choice D is incorrect. This equation defines a function whose graph has a y -intercept of $(0, -5)$, not $(0, 5)$.

Question Difficulty:

Easy

Question ID a8e6bd75

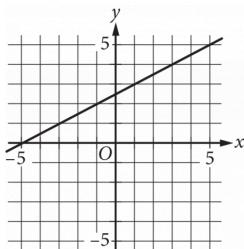
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a8e6bd75

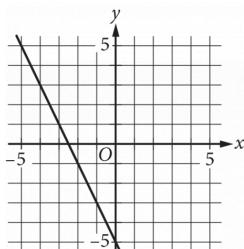
Which of the following is the graph of the equation

$$y = 2x - 5$$
 in the xy -plane?

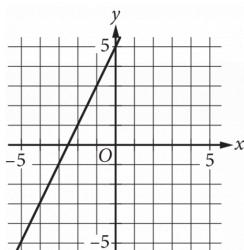
A.



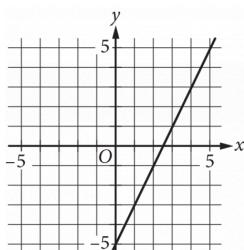
B.



C.



D.



ID: a8e6bd75 Answer

Correct Answer:

D

Rationale

Choice D is correct. In the xy-plane, the graph of the equation $y = mx + b$, where m and b are constants, is a line with slope m and y-intercept $(0, b)$. Therefore, the graph of $y = 2x - 5$ in the xy-plane is a line with slope 2 and a y-intercept $(0, -5)$. Having a slope of 2 means that for each increase in x by 1, the value of y increases by 2. Only the graph in choice D has a slope of 2 and crosses the y-axis at $(0, -5)$. Therefore, the graph shown in choice D must be the correct answer.

Choices A, B, and C are incorrect. The graph of $y = 2x - 5$ in the xy-plane is a line with slope 2 and a y-intercept at $(0, -5)$. The graph in choice A crosses the y-axis at the point $(0, 2.5)$, not $(0, -5)$, and it has a slope of $\frac{1}{2}$, not 2. The graph in choice B crosses the y-axis at $(0, -5)$; however, the slope of this line is -2 , not 2. The graph in choice C has a slope of 2; however, the graph crosses the y-axis at $(0, 5)$, not $(0, -5)$.

Question Difficulty:

Easy

Question ID 948087f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 948087f2

$$y \leq 3x + 1$$

$$x - y > 1$$

Which of the following ordered pairs (x, y) satisfies the system of inequalities above?

- A. $(-2, -1)$
- B. $(-1, 3)$
- C. $(1, 5)$
- D. $(2, -1)$

ID: 948087f2 Answer

Correct Answer:

D

Rationale

Choice D is correct. Any point (x, y) that is a solution to the given system of inequalities must satisfy both inequalities in the system. The second inequality in the system can be rewritten as $x > y + 1$. Of the given answer choices, only choice D satisfies this inequality, because inequality $2 > -1 + 1$ is a true statement. The point $(2, -1)$ also satisfies the first inequality.

Alternate approach: Substituting $(2, -1)$ into the first inequality gives $-1 \leq 3(2) + 1$, or $-1 \leq 7$, which is a true statement. Substituting $(2, -1)$ into the second inequality gives $2 - (-1) > 1$, or $3 > 1$, which is a true statement. Therefore, since $(2, -1)$ satisfies both inequalities, it is a solution to the system.

Choice A is incorrect because substituting -2 for x and -1 for y in the first inequality gives $-1 \leq 3(-2) + 1$, or $-1 \leq -5$, which is false. Choice B is incorrect because substituting -1 for x and 3 for y in the first inequality gives $3 \leq 3(-1) + 1$, or $3 \leq -2$, which is false. Choice C is incorrect because substituting 1 for x and 5 for y in the first inequality gives $5 \leq 3(1) + 1$, or $5 \leq 4$, which is false.

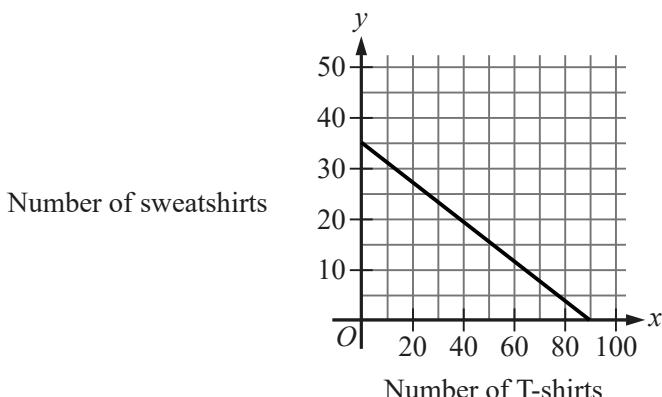
Question Difficulty:

Medium

Question ID 00b9bd37

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 00b9bd37



The graph models the relationship between the number of T-shirts, x , and the number of sweatshirts, y , that Kira can purchase for a school fundraiser. Which equation could represent this relationship?

- A. $y = 7x + 18$
- B. $7x + 18y = 630$
- C. $y = 18x + 7$
- D. $18x + 7y = 630$

ID: 00b9bd37 Answer

Correct Answer:

B

Rationale

Choice B is correct. A line in the xy -plane can be written as $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept. The graph shown is a line passing through the points $(0, 35)$ and $(90, 0)$. Substituting 0 for x and 35 for y in the equation $y = mx + b$ yields $35 = m(0) + b$, or $35 = b$. Substituting 35 for b , 90 for x , and 0 for y in the equation $y = mx + b$ yields $0 = 90m + 35$. Subtracting 35 from both sides of this equation yields $-35 = 90m$. Dividing both sides of this equation by 90 yields $-\frac{35}{90} = m$, or $-\frac{7}{18} = m$. Substituting $-\frac{7}{18}$ for m and 35 for b in the equation $y = mx + b$ yields $y = -\frac{7}{18}x + 35$. Multiplying both sides of this equation by 18 yields $18y = -7x + 35(18)$, or $18y = -7x + 630$. Adding $7x$ to both sides of this equation yields $7x + 18y = 630$. Therefore, the equation $7x + 18y = 630$ represents the relationship between x and y modeled by the graph.

Choice A is incorrect. The point $(0, 35)$ is not on the graph of this equation, since $7(0) + 18 = 18$, not 35.

Choice C is incorrect. The point $(0, 35)$ is not on the graph of this equation, since $18(0) + 7 = 7$, not 35.

Choice D is incorrect. The point $(90, 0)$ is not on the graph of this equation, since $18(90) + 7(0) = 1,620$, not 630.

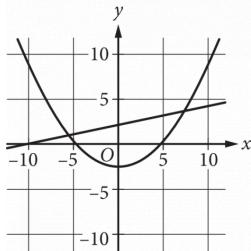
Question Difficulty:

Medium

Question ID a5663025

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a5663025



A system of equations consists of a quadratic equation and a linear equation. The equations in this system are graphed in the xy -plane above. How many solutions does this system have?

- A. 0
- B. 1
- C. 2
- D. 3

ID: a5663025 Answer

Correct Answer:

C

Rationale

Choice C is correct. The solutions to a system of two equations correspond to points where the graphs of the equations intersect. The given graphs intersect at 2 points; therefore, the system has 2 solutions.

Choice A is incorrect because the graphs intersect. Choice B is incorrect because the graphs intersect more than once. Choice D is incorrect. It's not possible for the graph of a quadratic equation and the graph of a linear equation to intersect more than twice.

Question Difficulty:

Medium

Question ID 3c95093c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 3c95093c

$$6x - 9y > 12$$

Which of the following inequalities is equivalent to the inequality above?

- A. $x - y > 2$
- B. $2x - 3y > 4$
- C. $3x - 2y > 4$
- D. $3y - 2x > 2$

ID: 3c95093c Answer

Correct Answer:

B

Rationale

Choice B is correct. Both sides of the given inequality can be divided by 3 to yield $2x - 3y > 4$.

Choices A, C, and D are incorrect because they are not equivalent to (do not have the same solution set as) the given inequality. For example, the ordered pair $(0, -1.5)$ is a solution to the given inequality, but it is not a solution to any of the inequalities in choices A, C, or D.

Question Difficulty:

Easy

Question ID d0a7871e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0070C0; height: 10px;"></div> <div style="width: 50%; background-color: #D9E1F2; height: 10px;"></div>

ID: d0a7871e

$$y = x + 1$$

$$y = x^2 + x$$

If (x, y) is a solution to the system of equations above, which of the following could be the value of x ?

- A. -1
- B. 0
- C. 2
- D. 3

ID: d0a7871e Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that $y = x + 1$ and $y = x^2 + x$. Setting the values for y equal to each other yields $x + 1 = x^2 + x$. Subtracting x from each side of this equation yields $x^2 = 1$. Therefore, x can equal 1 or -1. Of these, only -1 is given as a choice.

Choice B is incorrect. If $x = 0$, then $x + 1 = 1$, but $x^2 + x = 0^2 + 0 = 0 \neq 1$. Choice C is incorrect. If $x = 2$, then $x + 1 = 3$, but $x^2 + x = 2^2 + 2 = 6 \neq 3$. Choice D is incorrect. If $x = 3$, then $x + 1 = 4$, but $x^2 + x = 3^2 + 3 = 12 \neq 4$.

Question Difficulty:

Medium

Question ID dd4ab4c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd4ab4c4

$$4a^2 + 20ab + 25b^2$$

Which of the following is a factor of the polynomial above?

- A. $a + b$
- B. $2a + 5b$
- C. $4a + 5b$
- D. $4a + 25b$

ID: dd4ab4c4 Answer

Correct Answer:

B

Rationale

Choice B is correct. The first and last terms of the polynomial are both squares such that $4a^2 = (2a)^2$ and $25b^2 = (5b)^2$. The second term is twice the product of the square root of the first and last terms: $20ab = 2(2a)(5b)$. Therefore, the polynomial is the square of a binomial such that $4a^2 + 20ab + 25b^2 = (2a + 5b)^2$, and $(2a + 5b)$ is a factor.

Choice A is incorrect and may be the result of incorrectly factoring the polynomial. Choice C is incorrect and may be the result of dividing the second and third terms of the polynomial by their greatest common factor. Choice D is incorrect and may be the result of not factoring the coefficients.

Question Difficulty:

Medium

Question ID b8caaf84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b8caaf84

If $p = 3x + 4$ and $v = x + 5$, which of the following is equivalent to $pv - 2p + v$?

- A. $3x^2 + 12x + 7$
- B. $3x^2 + 14x + 17$
- C. $3x^2 + 19x + 20$
- D. $3x^2 + 26x + 33$

ID: b8caaf84 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $p = 3x + 4$ and $v = x + 5$. Substituting the values for p and v into the expression $pv - 2p + v$ yields $(3x + 4)(x + 5) - 2(3x + 4) + x + 5$. Multiplying the terms $(3x + 4)(x + 5)$ yields $3x^2 + 4x + 15x + 20$. Using the distributive property to rewrite $-2(3x + 4)$ yields $-6x - 8$. Therefore, the entire expression can be represented as $3x^2 + 4x + 15x + 20 - 6x - 8 + x + 5$. Combining like terms yields $3x^2 + 14x + 17$.

Choice A is incorrect and may result from subtracting, instead of adding, the term $x + 5$. Choice C is incorrect. This is the result of multiplying the terms $(3x + 4)(x + 5)$. Choice D is incorrect and may result from distributing 2, instead of -2 , to the term $3x + 4$.

Question Difficulty:

Medium

Question ID 7f81d0c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7f81d0c3

$$x^2 - x - 1 = 0$$

What values satisfy the equation above?

A. $x = 1$ and $x = 2$

B. $x = -\frac{1}{2}$ and $x = \frac{3}{2}$

C. $x = \frac{1+\sqrt{5}}{2}$ and $x = \frac{1-\sqrt{5}}{2}$

D. $x = \frac{-1+\sqrt{5}}{2}$ and $x = \frac{-1-\sqrt{5}}{2}$

ID: 7f81d0c3 Answer

Correct Answer:

C

Rationale

Choice C is correct. Using the quadratic formula to solve the given expression yields

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - (4)(1)(-1)}}{(2)(1)} = \frac{1 \pm \sqrt{5}}{2}. \text{ Therefore, } x = \frac{1+\sqrt{5}}{2} \text{ and } x = \frac{1-\sqrt{5}}{2} \text{ satisfy the given equation.}$$

Choices A and B are incorrect and may result from incorrectly factoring or incorrectly applying the quadratic formula. Choice D is incorrect and may result from a sign error.

Question Difficulty:

Medium

Question ID 332cd67b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 332cd67b

$$3x^2 - 15x + 18 = 0$$

How many distinct real solutions are there to the given equation?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 332cd67b Answer

Correct Answer:

B

Rationale

Choice B is correct. The number of solutions to a quadratic equation of the form $ax^2 + bx + c = 0$, where a , b , and c are constants, can be determined by the value of the discriminant, $b^2 - 4ac$. If the value of the discriminant is positive, then the quadratic equation has exactly two distinct real solutions. If the value of the discriminant is equal to zero, then the quadratic equation has exactly one real solution. If the value of the discriminant is negative, then the quadratic equation has zero real solutions. In the given equation, $3x^2 - 15x + 18 = 0$, $a = 3$, $b = -15$, and $c = 18$. Substituting 3 for a , -15 for b , and 18 for c in $b^2 - 4ac$ yields $(-15)^2 - 4(3)(18)$, or 9. Since the value of the discriminant is positive, the given equation has exactly two distinct real solutions.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 128c75e2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 128c75e2

The function g is defined by $g(x) = \frac{|x|}{a} - 14$, where $a < 0$. What is the product of $g(15a)$ and $g(7a)$?

ID: 128c75e2 Answer

Correct Answer:

609

Rationale

The correct answer is 609. It's given that the function g is defined by $gx = \frac{x}{a} - 14$, where $a < 0$. Substituting $15a$ for x in function g yields $g15a = \frac{15a}{a} - 14$. This function can be rewritten as $g15a = \frac{15a}{a} - 14$, or $g15a = 15\frac{a}{a} - 14$. Since $a < 0$, it follows that $\frac{a}{a} = -1$. Substituting -1 for $\frac{a}{a}$ in $g15a = 15\frac{a}{a} - 14$ yields $g(15a) = 15(-1) - 14$, or $g(15a) = -29$. Similarly, substituting $7a$ for x in function g yields $g7a = \frac{7a}{a} - 14$. This function can be rewritten as $g7a = \frac{7a}{a} - 14$, or $g7a = 7\frac{a}{a} - 14$. Since $a < 0$, it again follows that $\frac{a}{a} = -1$. Substituting -1 for $\frac{a}{a}$ in $g7a = 7\frac{a}{a} - 14$ yields $g(7a) = 7(-1) - 14$, or $g(7a) = -21$. Therefore, $g(15a) = -29$ and $g(7a) = -21$. Thus, the product of $g(15a)$ and $g(7a)$ is $(-29)(-21)$, or 609.

Question Difficulty:

Hard

Question ID e312081b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e312081b

$$(x + 5) + (2x - 3)$$

Which of the following is equivalent to the given expression?

- A. $3x - 2$
- B. $3x + 2$
- C. $3x - 8$
- D. $3x + 8$

ID: e312081b Answer

Correct Answer:

B

Rationale

Choice B is correct. Using the associative and commutative properties of addition, the given expression $(x + 5) + (2x - 3)$ can be rewritten as $(x + 2x) + (5 - 3)$. Adding these like terms results in $3x + 2$.

Choice A is incorrect and may result from adding $(x - 5) + (2x + 3)$. Choice C is incorrect and may result from adding $(x - 5) + (2x - 3)$. Choice D is incorrect and may result from adding $(x + 5) + (2x + 3)$.

Question Difficulty:

Easy

Question ID 91e7ea5e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 91e7ea5e

$$h(x) = 2(x - 4)^2 - 32$$

The quadratic function h is defined as shown. In the xy -plane, the graph of $y = h(x)$ intersects the x -axis at the points $(0, 0)$ and $(t, 0)$, where t is a constant. What is the value of t ?

- A. 1
- B. 2
- C. 4
- D. 8

ID: 91e7ea5e Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the graph of $y = h(x)$ intersects the x -axis at $(0, 0)$ and $(t, 0)$, where t is a constant. Since this graph intersects the x -axis when $y = 0$ or when $h(x) = 0$, it follows that $h(0) = 0$ and $h(t) = 0$. If $h(t) = 0$, then $0 = 2(t - 4)^2 - 32$. Adding 32 to both sides of this equation yields $32 = 2(t - 4)^2$. Dividing both sides of this equation by 2 yields $16 = (t - 4)^2$. Taking the square root of both sides of this equation yields $4 = |t - 4|$. Adding 4 to both sides of this equation yields $8 = t$. Therefore, the value of t is 8.

Choices A, B, and C are incorrect and may result from calculation errors.

Question Difficulty:

Hard

Question ID 3a9d60b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 3a9d60b2

$$2|4 - x| + 3|4 - x| = 25$$

What is the positive solution to the given equation?

ID: 3a9d60b2 Answer

Correct Answer:

9

Rationale

The correct answer is 9. The given equation can be rewritten as $54 - x = 25$. Dividing each side of this equation by 5 yields $4 - x = 5$. By the definition of absolute value, if $4 - x = 5$, then $4 - x = 5$ or $4 - x = -5$. Subtracting 4 from each side of the equation $4 - x = 5$ yields $-x = 1$. Dividing each side of this equation by -1 yields $x = -1$. Similarly, subtracting 4 from each side of the equation $4 - x = -5$ yields $-x = -9$. Dividing each side of this equation by -1 yields $x = 9$. Therefore, since the two solutions to the given equation are -1 and 9, the positive solution to the given equation is 9.

Question Difficulty:

Hard

Question ID ebed7dc6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ebed7dc6

An auditorium has seats for 1,800 people. Tickets to attend a show at the auditorium currently cost \$4.00. For each \$1.00 increase to the ticket price, 100 fewer tickets will be sold. This situation can be modeled by the equation

$y = -100x^2 + 1,400x + 7,200$, where x represents the increase in ticket price, in dollars, and y represents the revenue, in dollars, from ticket sales. If this equation is graphed in the xy -plane, at what value of x is the maximum of the graph?

- A. 4
- B. 7
- C. 14
- D. 18

ID: ebed7dc6 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the situation can be modeled by the equation $y = -100x^2 + 1,400x + 7,200$, where x represents the increase in ticket price, in dollars, and y represents the revenue, in dollars, from ticket sales. Since the coefficient of the x^2 term is negative, the graph of this equation in the xy -plane opens downward and reaches its maximum value at its vertex. If a quadratic equation in the form $y = ax^2 + bx + c$, where a , b , and c are constants, is graphed in the xy -plane, the x -coordinate of the vertex is equal to $-\frac{b}{2a}$. For the equation $y = -100x^2 + 1,400x + 7,200$, $a = -100$, $b = 1,400$, and $c = 7,200$. It follows that the x -coordinate of the vertex is $-\frac{1,400}{2(-100)}$, or 7. Therefore, if the given equation is graphed in the xy -plane, the maximum of the graph occurs at an x -value of 7.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID fc3d783a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: fc3d783a

In the xy -plane, a line with equation $2y = 4.5$ intersects a parabola at exactly one point. If the parabola has equation $y = -4x^2 + bx$, where b is a positive constant, what is the value of b ?

ID: fc3d783a Answer

Correct Answer:

6

Rationale

The correct answer is 6. It's given that a line with equation $2y = 4.5$ intersects a parabola with equation $y = -4x^2 + bx$, where b is a positive constant, at exactly one point in the xy -plane. It follows that the system of equations consisting of $2y = 4.5$ and $y = -4x^2 + bx$ has exactly one solution. Dividing both sides of the equation of the line by 2 yields $y = 2.25$. Substituting 2.25 for y in the equation of the parabola yields $2.25 = -4x^2 + bx$. Adding $4x^2$ and subtracting bx from both sides of this equation yields $4x^2 - bx + 2.25 = 0$. A quadratic equation in the form of $ax^2 + bx + c = 0$, where a , b , and c are constants, has exactly one solution when the discriminant, $b^2 - 4ac$, is equal to zero. Substituting 4 for a and 2.25 for c in the expression $b^2 - 4ac$ and setting this expression equal to 0 yields $b^2 - 4(4)(2.25) = 0$, or $b^2 - 36 = 0$. Adding 36 to each side of this equation yields $b^2 = 36$. Taking the square root of each side of this equation yields $b = \pm 6$. It's given that b is positive, so the value of b is 6.

Question Difficulty:

Hard

Question ID a9084ca4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a9084ca4

$$f(x) = 9,000(0.66)^x$$

The given function f models the number of advertisements a company sent to its clients each year, where x represents the number of years since 1997, and $0 \leq x \leq 5$. If $y = f(x)$ is graphed in the xy -plane, which of the following is the best interpretation of the y -intercept of the graph in this context?

- A. The minimum estimated number of advertisements the company sent to its clients during the 5 years was 1,708.
- B. The minimum estimated number of advertisements the company sent to its clients during the 5 years was 9,000.
- C. The estimated number of advertisements the company sent to its clients in 1997 was 1,708.
- D. The estimated number of advertisements the company sent to its clients in 1997 was 9,000.

ID: a9084ca4 Answer

Correct Answer:

D

Rationale

Choice D is correct. The y -intercept of a graph in the xy -plane is the point where $x = 0$. For the given function f , the y -intercept of the graph of $y = f(x)$ in the xy -plane can be found by substituting 0 for x in the equation $y = 9,000(0.66)^x$, which gives $y = 9,000(0.66)^0$. This is equivalent to $y = 9,000(1)$, or $y = 9,000$. Therefore, the y -intercept of the graph of $y = f(x)$ is 9,000. It's given that the function f models the number of advertisements a company sent to its clients each year. Therefore, $f(x)$ represents the estimated number of advertisements the company sent to its clients each year. It's also given that x represents the number of years since 1997. Therefore, $x = 0$ represents 0 years since 1997, or 1997. Thus, the best interpretation of the y -intercept of the graph of $y = f(x)$ is that the estimated number of advertisements the company sent to its clients in 1997 was 9,000.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 4661e2a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4661e2a9

$$x - y = 1$$

$$x + y = x^2 - 3$$

Which ordered pair is a solution to the system of equations above?

A. $(1 + \sqrt{3}, \sqrt{3})$

B. $(\sqrt{3}, -\sqrt{3})$

C. $(1 + \sqrt{5}, \sqrt{5})$

D. $(\sqrt{5}, -1 + \sqrt{5})$

ID: 4661e2a9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The solution to the given system of equations can be found by solving the first equation for x , which gives $x = y + 1$, and substituting that value of x into the second equation which gives $y + 1 + y = (y + 1)^2 - 3$. Rewriting this equation by adding like terms and expanding $(y + 1)^2$ gives $2y + 1 = y^2 + 2y - 2$. Subtracting $2y$ from both sides of this equation gives $1 = y^2 - 2$. Adding 2 to both sides of this equation gives $3 = y^2$. Therefore, it follows that $y = \pm\sqrt{3}$. Substituting $\sqrt{3}$ for y in the first equation yields $x - \sqrt{3} = 1$. Adding $\sqrt{3}$ to both sides of this equation yields $x = 1 + \sqrt{3}$. Therefore, the ordered pair $(1 + \sqrt{3}, \sqrt{3})$ is a solution to the given system of equations.

Choice B is incorrect. Substituting $\sqrt{3}$ for x and $-\sqrt{3}$ for y in the first equation yields $\sqrt{3} - (-\sqrt{3}) = 1$, or $2\sqrt{3} = 1$, which isn't a true statement. Choice C is incorrect. Substituting $1 + \sqrt{5}$ for x and $\sqrt{5}$ for y in the second equation yields $(1 + \sqrt{5}) + \sqrt{5} = (1 + \sqrt{5})^2 - 3$, or $1 + 2\sqrt{5} = 2\sqrt{5} + 3$, which isn't a true statement. Choice D is incorrect. Substituting $\sqrt{5}$ for x and $(-1 + \sqrt{5})$ for y in the second equation yields $\sqrt{5} + (-1 + \sqrt{5}) = (\sqrt{5})^2 - 3$, or $2\sqrt{5} - 1 = 2$, which isn't a true statement.

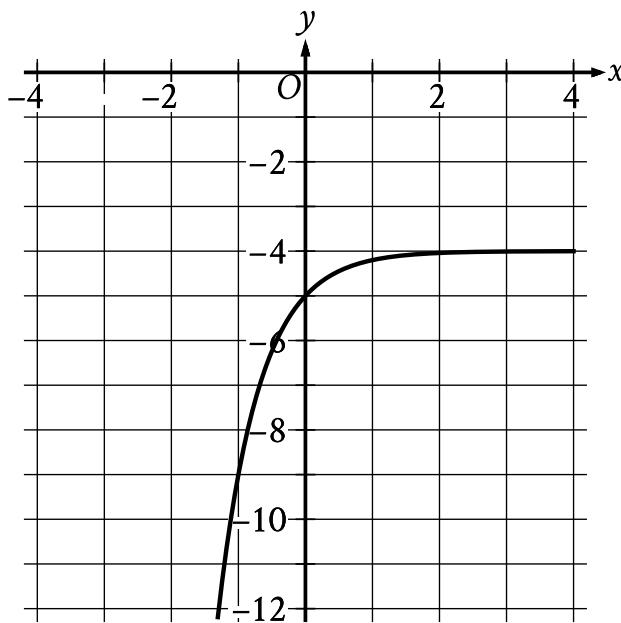
Question Difficulty:

Hard

Question ID 6abec9a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 6abec9a8



What is the y -intercept of the graph shown?

- A. $(-1, -9)$
- B. $(0, -5)$
- C. $(0, -4)$
- D. $(0, 0)$

ID: 6abec9a8 Answer

Correct Answer:

B

Rationale

Choice B is correct. The y -intercept of a graph in the xy -plane is the point x, y on the graph where $x = 0$. At $x = 0$, the corresponding value of y is -5 . Therefore, the y -intercept of the graph shown is $0, -5$.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect. This is the y -intercept of a graph in the xy -plane that intersects the y -axis at $y = -4$, not $y = -5$.

Choice D is incorrect. This is the y -intercept of a graph in the xy -plane that intersects the y -axis at $y = 0$, not $y = -5$.

Question Difficulty:

Easy

Question ID ad2ec615

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: ad2ec615

Which of the following is equivalent to the expression $x^4 - x^2 - 6$?

- A. $(x^2 + 1)(x^2 - 6)$
- B. $(x^2 + 2)(x^2 - 3)$
- C. $(x^2 + 3)(x^2 - 2)$
- D. $(x^2 + 6)(x^2 - 1)$

ID: ad2ec615 Answer

Correct Answer:

B

Rationale

Choice B is correct. The term x^4 can be factored as $(x^2)(x^2)$. Factoring -6 as $(2)(-3)$ yields values that add to -1 , the coefficient of x^2 in the expression.

Choices A, C, and D are incorrect and may result from finding factors of -6 that don't add to the coefficient of x^2 in the original expression.

Question Difficulty:

Medium

Question ID 42c71eb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 42c71eb5

$$(2x + 5)^2 - (x - 2) + 2(x + 3)$$

Which of the following is equivalent to the expression above?

- A. $4x^2 + 21x + 33$
- B. $4x^2 + 21x + 29$
- C. $4x^2 + x + 29$
- D. $4x^2 + x + 33$

ID: 42c71eb5 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given expression can be rewritten as $(2x + 5)^2 + (-1)(x - 2) + 2(x + 3)$. Applying the distributive property, the expression $(-1)(x - 2) + 2(x + 3)$ can be rewritten as $-1(x) + (-1)(-2) + 2(x) + 2(3)$, or $-x + 2 + 2x + 6$. Adding like terms yields $x + 8$. Substituting $x + 8$ for $(-1)(x - 2) + 2(x + 3)$ in the given expression yields $(2x + 5)^2 + x + 8$. By the rules of exponents, the expression $(2x + 5)^2$ is equivalent to $(2x + 5)(2x + 5)$. Applying the distributive property, this expression can be rewritten as $2x(2x) + 2x(5) + 5(2x) + 5(5)$, or $4x^2 + 10x + 10x + 25$. Adding like terms gives $4x^2 + 20x + 25$. Substituting $4x^2 + 20x + 25$ for $(2x + 5)^2$ in the rewritten expression yields $4x^2 + 20x + 25 + x + 8$, and adding like terms yields $4x^2 + 21x + 33$.

Choices B, C, and D are incorrect. Choices C and D may result from rewriting the expression $(2x + 5)^2$ as $4x^2 + 25$, instead of as $4x^2 + 20x + 25$. Choices B and C may result from rewriting the expression $-(x - 2)$ as $-x - 2$, instead of $-x + 2$.

Question Difficulty:

Medium

Question ID 371cbf6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 371cbf6b

$$(ax + 3)(5x^2 - bx + 4) = 20x^3 - 9x^2 - 2x + 12$$

The equation above is true for all x , where a and b are constants. What is the value of ab ?

- A. 18
- B. 20
- C. 24
- D. 40

ID: 371cbf6b Answer

Correct Answer:

C

Rationale

Choice C is correct. If the equation is true for all x , then the expressions on both sides of the equation will be equivalent. Multiplying the polynomials on the left-hand side of the equation gives $5ax^3 - abx^2 + 4ax + 15x^2 - 3bx + 12$. On the right-hand side of the equation, the only x^2 -term is $-9x^2$. Since the expressions on both sides of the equation are equivalent, it follows that $-abx^2 + 15x^2 = -9x^2$, which can be rewritten as $(-ab + 15)x^2 = -9x^2$. Therefore, $-ab + 15 = -9$, which gives $ab = 24$.

Choice A is incorrect. If $ab = 18$, then the coefficient of x^2 on the left-hand side of the equation would be $-18 + 15 = -3$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side. Choice B is incorrect. If $ab = 20$, then the coefficient of x^2 on the left-hand side of the equation would be $-20 + 15 = -5$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side. Choice D is incorrect. If $ab = 40$, then the coefficient of x^2 on the left-hand side of the equation would be $-40 + 15 = -25$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side.

Question Difficulty:

Hard

Question ID a05bd3a4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a05bd3a4

Which of the following expressions is equivalent to $x^2 - 5$?

A. $(x + \sqrt{5})^2$

B. $(x - \sqrt{5})^2$

C. $(x + \sqrt{5})(x - \sqrt{5})$

D. $(x + 5)(x - 1)$

ID: a05bd3a4 Answer

Correct Answer:

C

Rationale

Choice C is correct. The expression can be written as a difference of squares $x^2 - y^2$, which can be factored as $(x + y)(x - y)$. Here, $y^2 = 5$, so $y = \sqrt{5}$, and the expression therefore factors as $(x + \sqrt{5})(x - \sqrt{5})$.

Choices A and B are incorrect and may result from misunderstanding how to factor a difference of squares. Choice D is incorrect; $(x + 5)(x - 1)$ can be rewritten as $x^2 + 4x - 5$, which is not equivalent to the original expression.

Question Difficulty:

Medium

Question ID c3b116d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%;"><div style="display: inline-block; width: 100%; height: 10px; background-color: #005a9f;"></div></div>

ID: c3b116d7

Which of the following expressions is(are) a factor of $3x^2 + 20x - 63$?

- I. $x - 9$
- II. $3x - 7$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: c3b116d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression can be factored by first finding two values whose sum is 20 and whose product is 3-63, or -189. Those two values are 27 and -7. It follows that the given expression can be rewritten as $3x^2 + 27x - 7x - 63$. Since the first two terms of this expression have a common factor of $3x$ and the last two terms of this expression have a common factor of -7, this expression can be rewritten as $3xx + 9 - 7x + 9$. Since the two terms of this expression have a common factor of $x + 9$, it can be rewritten as $3x - 7x + 9$. Therefore, expression II, $3x - 7$, is a factor of $3x^2 + 20x - 63$, but expression I, $x - 9$, is not a factor of $3x^2 + 20x - 63$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 40c09d66

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 40c09d66

If $\frac{\sqrt{x^5}}{3\sqrt[3]{x^4}} = x^{\frac{a}{b}}$ for all positive values of x ,

what is the value of $\frac{a}{b}$?

ID: 40c09d66 Answer

Rationale

The correct answer is $\frac{7}{6}$. The value of $\frac{a}{b}$ can be found by first rewriting the left-hand side of the given equation as $x^{\frac{5}{2} - \frac{4}{3}}$. Using the properties of exponents, this expression can be rewritten as $x^{\left(\frac{5}{2} - \frac{4}{3}\right)}$.

This expression can be rewritten by subtracting the fractions in the exponent, which yields $x^{\frac{7}{6}}$. Thus, $\frac{a}{b}$ is $\frac{7}{6}$. Note that 7/6, 1.166, and 1.167 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID b8f13a3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b8f13a3a

Function f is defined by $f(x) = -a^x + b$, where a and b are constants. In the xy -plane, the graph of $y = f(x) - 12$ has a y -intercept at $(0, -\frac{75}{7})$. The product of a and b is $\frac{320}{7}$. What is the value of a ?

ID: b8f13a3a Answer

Correct Answer:

20

Rationale

The correct answer is 20. It's given that $f(x) = -a^x + b$. Substituting $-a^x + b$ for $f(x)$ in the equation $y = f(x) - 12$ yields $y = -a^x + b - 12$. It's given that the y -intercept of the graph of $y = f(x) - 12$ is $0, -\frac{75}{7}$. Substituting 0 for x and $-\frac{75}{7}$ for y in the equation $y = -a^x + b - 12$ yields $-\frac{75}{7} = -a^0 + b - 12$, which is equivalent to $-\frac{75}{7} = -1 + b - 12$, or $-\frac{75}{7} = b - 13$. Adding 13 to both sides of this equation yields $\frac{16}{7} = b$. It's given that the product of a and b is $\frac{320}{7}$, or $ab = \frac{320}{7}$. Substituting $\frac{16}{7}$ for b in this equation yields $a \cdot \frac{16}{7} = \frac{320}{7}$. Dividing both sides of this equation by $\frac{16}{7}$ yields $a = 20$.

Question Difficulty:

Hard

Question ID 1d3c5c95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 1d3c5c95

$$f(x) = 4,000(0.75)^x$$

An entomologist recommended a program to reduce a certain invasive beetle population in an area. The given function estimates this beetle species' population x years after 2012, where $x \leq 7$. Which of the following is the best interpretation of 4,000 in this context?

- A. The estimated initial beetle population for this species and area in 2012
- B. The estimated beetle population for this species and area 7 years after 2012
- C. The estimated percent decrease in the beetle population for this species and area each year after 2012
- D. The estimated percent decrease in the beetle population for this species and area every 7 years after 2012

ID: 1d3c5c95 Answer

Correct Answer:

A

Rationale

Choice A is correct. For an exponential function in the form $f(x) = ab^x$, where a and b are positive constants and $b < 1$, the initial value of $f(x)$, or the value of $f(x)$ when $x = 0$, is a and the value of $f(x)$ decreases by $100(1 - b)\%$ each time x increases by 1. Therefore, the initial value of the function $f(x) = 4,000(0.75)^x$, or the value of $f(x)$ when $x = 0$, is 4,000. Therefore, the best interpretation of 4,000 in this context is the estimated initial beetle population for this species and area in 2012.

Choice B is incorrect. The estimated beetle population for this species and area 7 years after 2012 is $4,000(0.75)^7$, or approximately 534, not 4,000.

Choice C is incorrect. The estimated percent decrease in the beetle population for this species and area each year after 2012 is $100(1 - 0.75)$, or 25, not 4,000.

Choice D is incorrect. The estimated percent decrease in the beetle population for this species and area every 7 years after 2012 is $100(1 - 0.75^7)$, or approximately 87, not 4,000.

Question Difficulty:

Medium

Question ID f65288e8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f65288e8

$$\frac{1}{x^2 + 10x + 25} = 4$$

If x is a solution to the given equation, which of the following is a possible value of $x + 5$?

A. $\frac{1}{2}$

B. $\frac{5}{2}$

C. $\frac{9}{2}$

D. $\frac{11}{2}$

ID: f65288e8 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given equation can be rewritten as $\frac{1}{(x+5)^2} = 4$. Multiplying both sides of this equation by $(x+5)^2$ yields $1 = 4(x+5)^2$. Dividing both sides of this equation by 4 yields $\frac{1}{4} = (x+5)^2$. Taking the square root of both sides of this equation

yields $\frac{1}{2} = x+5$ or $-\frac{1}{2} = x+5$. Therefore, a possible value of $x+5$ is $\frac{1}{2}$.

Choices B, C, and D are incorrect and may result from computational or conceptual errors.

Question Difficulty:

Hard

Question ID 788bfd56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 788bfd56

The function f is defined by $f(x) = 4 + \sqrt{x}$. What is the value of $f(144)$?

- A. 0
- B. 16
- C. 40
- D. 76

ID: 788bfd56 Answer

Correct Answer:

B

Rationale

Choice B is correct. The value of $f(144)$ is the value of $f(x)$ when $x = 144$. It's given that the function f is defined by $f(x) = 4 + \sqrt{x}$. Substituting 144 for x in this equation yields $f(144) = 4 + \sqrt{144}$. Since the positive square root of 144 is 12, it follows that this equation can be rewritten as $f(144) = 4 + 12$, or $f(144) = 16$. Therefore, the value of $f(144)$ is 16.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of $f(1,296)$, not $f(144)$.

Choice D is incorrect. This is the value of $f(5,184)$, not $f(144)$.

Question Difficulty:

Easy

Question ID f89af023

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: f89af023

A rectangular volleyball court has an area of 162 square meters. If the length of the court is twice the width, what is the width of the court, in meters?

- A. 9
- B. 18
- C. 27
- D. 54

ID: f89af023 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the volleyball court is rectangular and has an area of 162 square meters. The formula for the area of a rectangle is $A = \ell \cdot w$, where A is the area, ℓ is the length, and w is the width of the rectangle. It's also given that the length of the volleyball court is twice the width, thus $\ell = 2w$. Substituting the given value into the formula for the area of a rectangle and using the relationship between length and width for this rectangle yields $162 = (2w)(w)$. This equation can be rewritten as $162 = 2w^2$. Dividing both sides of this equation by 2 yields $81 = w^2$. Taking the square root of both sides of this equation yields $\pm 9 = w$. Since the width of a rectangle is a positive number, the width of the volleyball court is 9 meters.

Choice B is incorrect because this is the length of the rectangle. Choice C is incorrect because this is the result of using 162 as the perimeter rather than the area. Choice D is incorrect because this is the result of calculating w in the equation $162 = 2w + w$ instead of $162 = (2w)(w)$.

Question Difficulty:

Medium

Question ID e53add44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: e53add44

$$S(n) = 38,000a^n$$

The function S above models the annual salary, in dollars, of an employee n years after starting a job, where a is a constant. If the employee's salary increases by 4% each year, what is the value of a ?

- A. 0.04
- B. 0.4
- C. 1.04
- D. 1.4

ID: e53add44 Answer

Correct Answer:

C

Rationale

Choice C is correct. A model for a quantity S that increases by a certain percentage per time period n is an exponential function in the form $S(n) = I\left(1 + \frac{r}{100}\right)^n$, where I is the initial value at time $n = 0$ for $r\%$ annual increase. It's given that the annual increase in an employee's salary is 4%, so $r = 4$. The initial value can be found by substituting 0 for n in the given function, which yields $S(0) = 38,000$. Therefore, $I = 38,000$. Substituting these values for r and I into the form of the exponential function $S(n) = I\left(1 + \frac{r}{100}\right)^n$ yields $S(n) = 38,000\left(1 + \frac{4}{100}\right)^n$, or $S(n) = 38,000(1.04)^n$. Therefore, the value of a in the given function is 1.04.

Choices A, B, and D are incorrect and may result from incorrectly representing the annual increase in the exponential function.

Question Difficulty:

Medium

Question ID f2f3fa00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f2f3fa00

During a 5-second time interval, the average acceleration a , in meters per second squared, of an object with an initial velocity of 12 meters per second is defined by the

$$a = \frac{v_f - 12}{5}, \text{ where } v_f \text{ is the final velocity of the object in}$$

meters per second. If the equation is rewritten in the form $v_f = xa + y$, where x and y are constants, what is the value of x ?

ID: f2f3fa00 Answer

Rationale

The correct answer is 5. The given equation can be rewritten in the form $v_f = xa + y$, like so:

$$a = \frac{v_f - 12}{5}$$

$$v_f - 12 = 5a$$

$$v_f = 5a + 12$$

It follows that the value of x is 5 and the value of y is 12.

Question Difficulty:

Hard

Question ID 9654add7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9654add7

$$f(x) = -500x^2 + 25,000x$$

The revenue $f(x)$, in dollars, that a company receives from sales of a product is given by the function f above, where x is the unit price, in dollars, of the product. The graph of $y = f(x)$ in the xy -plane intersects the x -axis at 0 and a . What does a represent?

- A. The revenue, in dollars, when the unit price of the product is \$0
- B. The unit price, in dollars, of the product that will result in maximum revenue
- C. The unit price, in dollars, of the product that will result in a revenue of \$0
- D. The maximum revenue, in dollars, that the company can make

ID: 9654add7 Answer

Correct Answer:

C

Rationale

Choice C is correct. By definition, the y -value when a function intersects the x -axis is 0. It's given that the graph of the function intersects the x -axis at 0 and a , that x is the unit price, in dollars, of a product, and that $f(x)$, where $y = f(x)$, is the revenue, in dollars, that a company receives from the sales of the product. Since the value of a occurs when $y = 0$, a is the unit price, in dollars, of the product that will result in a revenue of \$0.

Choice A is incorrect. The revenue, in dollars, when the unit price of the product is \$0 is represented by $f(x)$, when $x = 0$. Choice B is incorrect. The unit price, in dollars, of the product that will result in maximum revenue is represented by the x -coordinate of the maximum of f . Choice D is incorrect. The maximum revenue, in dollars, that the company can make is represented by the y -coordinate of the maximum of f .

Question Difficulty:

Hard

Question ID 34847f8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 34847f8a

$$\frac{2}{x-2} + \frac{3}{x+5} = \frac{rx+t}{(x-2)(x+5)}$$

The equation above is true for all $x > 2$, where r and t are positive constants. What is the value of rt ?

- A. -20
- B. 15
- C. 20
- D. 60

ID: 34847f8a Answer

Correct Answer:

C

Rationale

Choice C is correct. To express the sum of the two rational expressions on the left-hand side of the equation as the single rational expression on the right-hand side of the equation, the expressions on the left-hand side must have the same denominator.

Multiplying the first expression by $\frac{x+5}{x-5}$ results in $\frac{2(x+5)}{(x-2)(x+5)}$, and multiplying the second expression by $\frac{x-2}{x-2}$ results in $\frac{3(x-2)}{(x-2)(x+5)}$, so the given equation can be rewritten as $\frac{2(x+5)}{(x-2)(x+5)} + \frac{3(x-2)}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$, or $\frac{2x+10}{(x-2)(x+5)} + \frac{3x-6}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$. Since the two rational expressions on the left-hand side of the equation have the same denominator as the rational expression on the right-hand side of the equation, it follows that $(2x+10) + (3x-6) = rx+t$. Combining like terms on the left-hand side yields $5x+4 = rx+t$, so it follows that $r=5$ and $t=4$. Therefore, the value of rt is $(5)(4)=20$.

Choice A is incorrect and may result from an error when determining the sign of either r or t . Choice B is incorrect and may result from not distributing the 2 and 3 to their respective terms in $\frac{2(x+5)}{(x-2)(x+5)} + \frac{3(x-2)}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$. Choice D is incorrect and may result from a calculation error.

Question Difficulty:

Hard

Question ID cc776a04

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: cc776a04

Which of the following is an equivalent form of

$$(1.5x - 2.4)^2 - (5.2x^2 - 6.4) ?$$

- A. $-2.2x^2 + 1.6$
- B. $-2.2x^2 + 11.2$
- C. $-2.95x^2 - 7.2x + 12.16$
- D. $-2.95x^2 - 7.2x + 0.64$

ID: cc776a04 Answer

Correct Answer:

C

Rationale

Choice C is correct. The first expression $(1.5x - 2.4)^2$ can be rewritten as $(1.5x - 2.4)(1.5x - 2.4)$. Applying the distributive property to this product yields $(2.25x^2 - 3.6x - 3.6x + 5.76) - (5.2x^2 - 6.4)$. This difference can be rewritten as $(2.25x^2 - 3.6x - 3.6x + 5.76) + (-1)(5.2x^2 - 6.4)$. Distributing the factor of -1 through the second expression yields $2.25x^2 - 3.6x - 3.6x + 5.76 - 5.2x^2 + 6.4$. Regrouping like terms, the expression becomes $(2.25x^2 - 5.2x^2) + (-3.6x - 3.6x) + (5.76 + 6.4)$. Combining like terms yields $-2.95x^2 - 7.2x + 12.16$.

Choices A, B, and D are incorrect and likely result from errors made when applying the distributive property or combining the resulting like terms.

Question Difficulty:

Medium

Question ID 263f9937

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 263f9937

Growth of a Culture of Bacteria

Day	Number of bacteria per milliliter at end of day
1	2.5×10^5
2	5.0×10^5
3	1.0×10^6

A culture of bacteria is growing at an exponential rate, as shown in the table above. At this rate, on which day would the number of bacteria per milliliter reach 5.12×10^8 ?

- A. Day 5
- B. Day 9
- C. Day 11
- D. Day 12

ID: 263f9937 Answer

Correct Answer:

D

Rationale

Choice D is correct. The number of bacteria per milliliter is doubling each day. For example, from day 1 to day 2, the number of bacteria increased from 2.5×10^5 to 5.0×10^5 . At the end of day 3 there are 10^6 bacteria per milliliter. At the end of day 4, there will be $10^6 \times 2$ bacteria per milliliter. At the end of day 5, there will be $(10^6 \times 2) \times 2$, or $10^6 \times (2^2)$ bacteria per milliliter, and so on. At the end of day d, the number of bacteria will be $10^6 \times (2^{d-3})$. If the number of bacteria per milliliter will reach 5.12×10^8 at the end of day d, then the equation $10^6 \times (2^{d-3}) = 5.12 \times 10^8$ must hold. Since 5.12×10^8 can be rewritten as 512×10^6 , the equation is equivalent to $2^{d-3} = 512$. Rewriting 512 as 2^9 gives $d - 3 = 9$, so $d = 12$. The number of bacteria per milliliter would reach 5.12×10^8 at the end of day 12.

Choices A, B, and C are incorrect. Given the growth rate of the bacteria, the number of bacteria will not reach 5.12×10^8 per milliliter by the end of any of these days.

Question Difficulty:

Hard

Question ID 926c246b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 926c246b

$$D = 5,640(1.9)^t$$

The equation above estimates the global data traffic D , in terabytes, for the year that is t years after 2010. What is the best interpretation of the number 5,640 in this context?

- A. The estimated amount of increase of data traffic, in terabytes, each year
- B. The estimated percent increase in the data traffic, in terabytes, each year
- C. The estimated data traffic, in terabytes, for the year that is t years after 2010
- D. The estimated data traffic, in terabytes, in 2010

ID: 926c246b Answer

Correct Answer:

D

Rationale

Choice D is correct. Since t represents the number of years after 2010, the estimated data traffic, in terabytes, in 2010 can be calculated using the given equation when $t = 0$. Substituting 0 for t in the given equation yields $D = 5,640(1.9)^0$, or $5,640(1) = 5,640$. Thus, 5,640 represents the estimated data traffic, in terabytes, in 2010.

Choice A is incorrect. Since the equation is exponential, the amount of increase of data traffic each year isn't constant. Choice B is incorrect. According to the equation, the percent increase in data traffic each year is 90%. Choice C is incorrect. The estimated data traffic, in terabytes, for the year that is t years after 2010 is represented by D, not the number 5,640.

Question Difficulty:

Medium

Question ID 137cc6fd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 137cc6fd

$$\sqrt[5]{70n} \left(\sqrt[6]{70n} \right)^2$$

For what value of x is the given expression equivalent to $(70n)^{30x}$, where $n > 1$?

ID: 137cc6fd Answer

Correct Answer:

.0177, .0178, 4/225

Rationale

The correct answer is $\frac{4}{225}$. An expression of the form $\sqrt[k]{a}$, where k is an integer greater than 1 and $a \geq 0$, is equivalent to $a^{\frac{1}{k}}$. Therefore, the given expression, where $n > 1$, is equivalent to $70n^{\frac{1}{5}}70n^{\frac{1}{6}}^2$. Applying properties of exponents, this expression can be rewritten as $70n^{\frac{1}{5}}70n^{\frac{1}{6}\cdot 2}$, or $70n^{\frac{1}{5}}70n^{\frac{1}{3}}$, which can be rewritten as $70n^{\frac{1}{5} + \frac{1}{3}}$, or $70n^{\frac{8}{15}}$. It's given that the expression $\sqrt[5]{70n} \sqrt[6]{70n}^2$ is equivalent to $70n^{30x}$, where $n > 1$. It follows that $70n^{\frac{8}{15}}$ is equivalent to $70n^{30x}$. Therefore, $\frac{8}{15} = 30x$. Dividing both sides of this equation by 30 yields $\frac{8}{450} = x$, or $\frac{4}{225} = x$. Thus, the value of x for which the given expression is equivalent to $70n^{30x}$, where $n > 1$, is $\frac{4}{225}$. Note that 4/225, .0177, .0178, 0.017, and 0.018 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 6ce95fc8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6ce95fc8

$$2x^2 - 2 = 2x + 3$$

Which of the following is a solution to the equation above?

- A. 2
- B. $1 - \sqrt{11}$
- C. $\frac{1}{2} + \sqrt{11}$
- D. $\frac{1 + \sqrt{11}}{2}$

ID: 6ce95fc8 Answer

Correct Answer:

D

Rationale

Choice D is correct. A quadratic equation in the form $ax^2 + bx + c = 0$, where a, b, and c are constants, can be solved using the

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

quadratic formula: . Subtracting $2x + 3$ from both sides of the given equation yields $2x^2 - 2x - 5 = 0$.

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(-5)}}{2(2)}$$

Applying the quadratic formula, where $a = 2$, $b = -2$, and $c = -5$, yields . This can be

rewritten as $x = \frac{2 \pm \sqrt{44}}{4}$. Since $\sqrt{44} = \sqrt{2^2(11)}$, or $2\sqrt{11}$, the equation can be rewritten as $x = \frac{2 \pm 2\sqrt{11}}{4}$. Dividing 2 from

$$\frac{1 + \sqrt{11}}{2} \text{ or } \frac{1 - \sqrt{11}}{2}$$

both the numerator and denominator yields $\frac{1 + \sqrt{11}}{2}$. Of these two solutions, only $\frac{1 + \sqrt{11}}{2}$ is present among the choices. Thus, the correct choice is D.

Choice A is incorrect and may result from a computational or conceptual error. Choice B is incorrect and may result from using

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{a} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

instead of

as the quadratic formula. Choice C is incorrect and may result from

rewriting $\sqrt{44}$ as $4\sqrt{11}$ instead of $2\sqrt{11}$.

Question Difficulty:

Hard

Question ID 4dd4efcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 4dd4efcf

$$f(x) = ax^2 + 4x + c$$

In the given quadratic function, a and c are constants. The graph of $y = f(x)$ in the xy -plane is a parabola that opens upward and has a vertex at the point (h, k) , where h and k are constants. If $k < 0$ and $f(-9) = f(3)$, which of the following must be true?

- I. $c < 0$
- II. $a \geq 1$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: 4dd4efcf Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the graph of $y = f(x)$ in the xy -plane is a parabola with vertex (h, k) . If $f(-9) = f(3)$, then for the graph of $y = f(x)$, the point with an x -coordinate of -9 and the point with an x -coordinate of 3 have the same y -coordinate. In the xy -plane, a parabola is a symmetric graph such that when two points have the same y -coordinate, these points are equidistant from the vertex, and the x -coordinate of the vertex is halfway between the x -coordinates of these two points. Therefore, for the graph of $y = f(x)$, the points with x -coordinates -9 and 3 are equidistant from the vertex, (h, k) , and h is halfway between -9 and 3. The value that is halfway between -9 and 3 is $\frac{-9+3}{2}$, or -3. Therefore, $h = -3$. The equation defining f can also be written in vertex form, $f(x) = a(x - h)^2 + k$. Substituting -3 for h in this equation yields $f(x) = a(x - -3)^2 + k$, or $f(x) = ax^2 + 6x + 9 + k$. This equation is equivalent to $f(x) = ax^2 + 6x + 9 + k$, or $f(x) = ax^2 + 6ax + 9a + k$. Since $f(x) = ax^2 + 4x + c$, it follows that $6a = 4$ and $9a + k = c$. Dividing both sides of the equation $6a = 4$ by 6 yields $a = \frac{4}{6}$, or $a = \frac{2}{3}$. Since $\frac{2}{3} < 1$, it's not true that $a \geq 1$. Therefore, statement II isn't true. Substituting $\frac{2}{3}$ for a in the equation $9a + k = c$ yields $9\frac{2}{3} + k = c$, or $6 + k = c$. Subtracting 6 from both sides of this equation yields $k = c - 6$. If $k < 0$, then $c - 6 < 0$, or $c < 6$. Since c could be any value less than 6, it's not necessarily true that $c < 0$. Therefore, statement I isn't necessarily true. Thus, neither I nor II must be true.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID f5aa5040

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f5aa5040

In the xy -plane, a line with equation $2y = c$ for some constant c intersects a parabola at exactly one point. If the parabola has equation $y = -2x^2 + 9x$, what is the value of c ?

ID: f5aa5040 Answer

Correct Answer:

20.25, 81/4

Rationale

The correct answer is $\frac{81}{4}$. The given linear equation is $2y = c$. Dividing both sides of this equation by 2 yields $y = \frac{c}{2}$. Substituting $\frac{c}{2}$ for y in the equation of the parabola yields $\frac{c}{2} = -2x^2 + 9x$. Adding $2x^2$ and $-9x$ to both sides of this equation yields $2x^2 - 9x + \frac{c}{2} = 0$. Since it's given that the line and the parabola intersect at exactly one point, the equation $2x^2 - 9x + \frac{c}{2} = 0$ must have exactly one solution. An equation of the form $Ax^2 + Bx + C = 0$, where A , B , and C are constants, has exactly one solution when the discriminant, $B^2 - 4AC$, is equal to 0. In the equation $2x^2 - 9x + \frac{c}{2} = 0$, where $A = 2$, $B = -9$, and $C = \frac{c}{2}$, the discriminant is $-9^2 - 42\frac{c}{2}$. Setting the discriminant equal to 0 yields $-9^2 - 42\frac{c}{2} = 0$, or $81 - 4c = 0$. Adding $4c$ to both sides of this equation yields $81 = 4c$. Dividing both sides of this equation by 4 yields $c = \frac{81}{4}$. Note that $81/4$ and 20.25 are examples of ways to enter a correct answer.

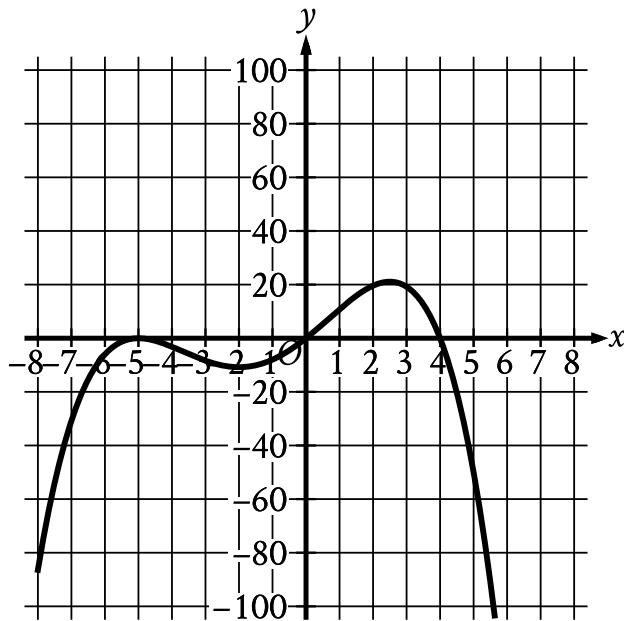
Question Difficulty:

Hard

Question ID 252a3b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 252a3b3a



Which of the following could be the equation of the graph shown in the xy -plane?

- A. $y = -\frac{1}{10}x(x - 4)(x + 5)$
- B. $y = -\frac{1}{10}x(x - 4)(x + 5)^2$
- C. $y = -\frac{1}{10}x(x - 5)(x + 4)$
- D. $y = -\frac{1}{10}x(x - 5)^2(x + 4)$

ID: 252a3b3a Answer

Correct Answer:

B

Rationale

Choice B is correct. Each of the given choices is an equation of the form $y = -\frac{1}{10}xx - a^mx + b^n$, where a , b , m , and n are positive constants. In the xy -plane, the graph of an equation of this form has x -intercepts at $x = 0$, $x = a$, and $x = -b$. The graph shown has x -intercepts at $x = 0$, $x = 4$, and $x = -5$. Therefore, $a = 4$ and $b = 5$. Of the given choices, only choices A and B have $a = 4$ and $b = 5$. For an equation in the form $y = -\frac{1}{10}xx - a^mx + b^n$, if all values of x that are less than $-b$ or greater than a correspond to negative y -values, then the sum of all the exponents of the factors on the right-hand side of the equation is even. In the graph shown, all values of x less than -5 or greater than 4 correspond to negative y -values. Therefore, the sum of all the exponents of the factors on the right-hand side of the equation $y = -\frac{1}{10}xx - 4^mx + 5^n$ must be even. For choice A, the sum of these exponents is $1 + 1 + 1$, or 3 , which is odd. For choice B, the sum of these exponents is $1 + 1 + 2$, or 4 , which is even. Therefore, $y = -\frac{1}{10}xx - 4x + 5^2$ could be the equation of the graph shown.

Choice A is incorrect. For the graph of this equation, all values of x less than -5 correspond to positive, not negative, y -values.

Choice C is incorrect. The graph of this equation has x -intercepts at $x = -4$, $x = 0$, and $x = 5$, rather than x -intercepts at $x = -5$, $x = 0$, and $x = 4$.

Choice D is incorrect. The graph of this equation has x -intercepts at $x = -4$, $x = 0$, and $x = 5$, rather than x -intercepts at $x = -5$, $x = 0$, and $x = 4$.

Question Difficulty:

Medium

Question ID 58443765

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 58443765

$$y = 5x + 4$$

$$y = 5x^2 + 4$$

Which ordered pair (x, y) is a solution to the given system of equations?

- A. $(0, 0)$
- B. $(0, 4)$
- C. $(8, 44)$
- D. $(8, 84)$

ID: 58443765 Answer

Correct Answer:

B

Rationale

Choice B is correct. The second equation in the given system is $y = 5x^2 + 4$. Substituting $5x^2 + 4$ for y in the first equation of the given system yields $5x^2 + 4 = 5x + 4$. Subtracting 4 from both sides of this equation yields $5x^2 = 5x$. Subtracting $5x$ from both sides of this equation yields $5x^2 - 5x = 0$. Factoring out a common factor of $5x$ from the left-hand side of this equation yields $5x(x - 1) = 0$. It follows that $5x = 0$ or $x - 1 = 0$. Dividing both sides of the equation $5x = 0$ by 5 yields $x = 0$. Substituting 0 for x in the equation $y = 5x + 4$ yields $y = 5(0) + 4$, or $y = 4$. Therefore, a solution to the given system of equations is the ordered pair $(0, 4)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 70482e20

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70482e20

Which expression is equivalent to $11x^3 - 5x^3$?

- A. $16x^3$
- B. $6x^3$
- C. $6x^6$
- D. $16x^6$

ID: 70482e20 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression can be rewritten as $11x^3 + -5x^3$. Since the two terms of this expression are both constant multiples of x^3 , they are like terms and can, therefore, be combined through addition. Adding like terms in the expression $11x^3 + -5x^3$ yields $6x^3$.

Choice A is incorrect. This is equivalent to $11x^3 + 5x^3$, not $11x^3 - 5x^3$.

Choice C is incorrect. This is equivalent to $11x^6 - 5x^6$, not $11x^3 - 5x^3$.

Choice D is incorrect. This is equivalent to $11x^6 + 5x^6$, not $11x^3 - 5x^3$.

Question Difficulty:

Easy

Question ID b39d74a0

Assessment

Test

Domain

SAT

Math

Advanced Math

Skill

Nonlinear functions

Difficulty

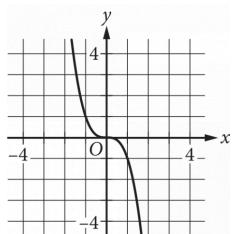


ID: b39d74a0

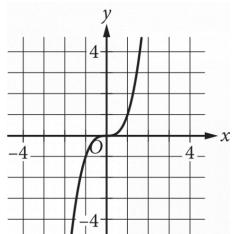
x	y
0	0
1	1
2	8
3	27

The table shown includes some values of x and their corresponding values of y . Which of the following graphs in the xy -plane could represent the relationship between x and y ?

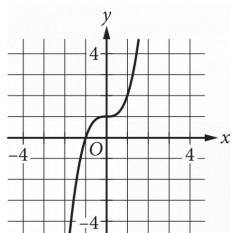
A.



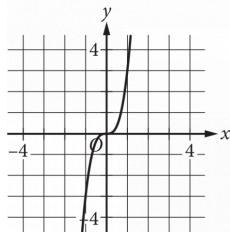
B.



C.



D.



ID: b39d74a0 Answer

Correct Answer:

B

Rationale

Choice B is correct. Each pair of values shown in the table gives the ordered pair of coordinates for a point that lies on the graph that represents the relationship between x and y in the xy -plane: $(0,0)$, $(1,1)$, $(2,8)$, and $(3,27)$. Only the graph in choice B passes through the points listed in the table that are visible in the given choices.

Choices A, C, and D are incorrect. None of these graphs passes through the point $(1,1)$.

Question Difficulty:

Easy

Question ID ea6d05bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ea6d05bb

The expression $(3x - 23)(19x + 6)$ is equivalent to the expression $ax^2 + bx + c$, where a , b , and c are constants. What is the value of b ?

ID: ea6d05bb Answer

Correct Answer:

-419

Rationale

The correct answer is -419. It's given that the expression $3x - 2319x + 6$ is equivalent to the expression $ax^2 + bx + c$, where a , b , and c are constants. Applying the distributive property to the given expression, $3x - 2319x + 6$, yields $3x19x + 3x6 - 2319x - 236$, which can be rewritten as $57x^2 + 18x - 437x - 138$. Combining like terms yields $57x^2 - 419x - 138$. Since this expression is equivalent to $ax^2 + bx + c$, it follows that the value of b is -419.

Question Difficulty:

Hard

Question ID 722de804

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 722de804

$$(x - 47)^2 = 1$$

What is the sum of the solutions to the given equation?

ID: 722de804 Answer

Correct Answer:

94

Rationale

The correct answer is 94. Taking the square root of each side of the given equation yields $x - 47 = 1$ or $x - 47 = -1$. Adding 47 to both sides of the equation $x - 47 = 1$ yields $x = 48$. Adding 47 to both sides of the equation $x - 47 = -1$ yields $x = 46$. Therefore, the sum of the solutions to the given equation is 48 + 46, or 94.

Question Difficulty:

Hard

Question ID 0536ad4f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0536ad4f

Which expression is equivalent to $20w - (4w + 3w)$?

- A. $10w$
- B. $13w$
- C. $19w$
- D. $21w$

ID: 0536ad4f Answer

Correct Answer:

B

Rationale

Choice B is correct. Combining like terms inside the parentheses of the given expression, $20w - 4w + 3w$, yields $20w - 7w$. Combining like terms in this resulting expression yields $13w$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 433184f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 433184f1

Which expression is equivalent to $\frac{4}{4x-5} - \frac{1}{x+1}$?

- A. $\frac{1}{(x+1)(4x-5)}$
- B. $\frac{3}{3x-6}$
- C. $-\frac{1}{(x+1)(4x-5)}$
- D. $\frac{9}{(x+1)(4x-5)}$

ID: 433184f1 Answer

Correct Answer:

D

Rationale

Choice D is correct. The expression $\frac{4}{4x-5} - \frac{1}{x+1}$ can be rewritten as $\frac{4}{4x-5} + \frac{-1}{x+1}$. To add the two terms of this expression, the terms can be rewritten with a common denominator. Since $\frac{x+1}{x+1} = 1$, the expression $\frac{4}{4x-5}$ can be rewritten as $\frac{x+14}{x+14x-5}$. Since $\frac{4x-5}{4x-5} = 1$, the expression $\frac{-1}{x+1}$ can be rewritten as $\frac{4x-5-1}{4x-5x+1}$. Therefore, the expression $\frac{4}{4x-5} + \frac{-1}{x+1}$ can be rewritten as $\frac{x+14}{x+14x-5} + \frac{4x-5-1}{4x-5x+1}$, which is equivalent to $\frac{x+14+4x-5-1}{x+14x-5}$. Applying the distributive property to each term of the numerator yields $\frac{4x+4+-4x+5}{x+14x-5}$, or $\frac{9}{x+14x-5}$. Adding like terms in the numerator yields $\frac{9}{x+14x-5}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 1d3fee25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 1d3fee25

Which of the following is equivalent to $3(x + 5) - 6$?

- A. $3x - 3$
- B. $3x - 1$
- C. $3x + 9$
- D. $15x - 6$

ID: 1d3fee25 Answer

Correct Answer:

C

Rationale

Choice C is correct. Using the distributive property to multiply 3 and $(x + 5)$ gives $3x + 15 - 6$, which can be rewritten as $3x + 9$.

Choice A is incorrect and may result from rewriting the given expression as $3(x + 5 - 6)$. Choice B is incorrect and may result from incorrectly rewriting the expression as $(3x + 5) - 6$. Choice D is incorrect and may result from incorrectly rewriting the expression as $3(5x) - 6$.

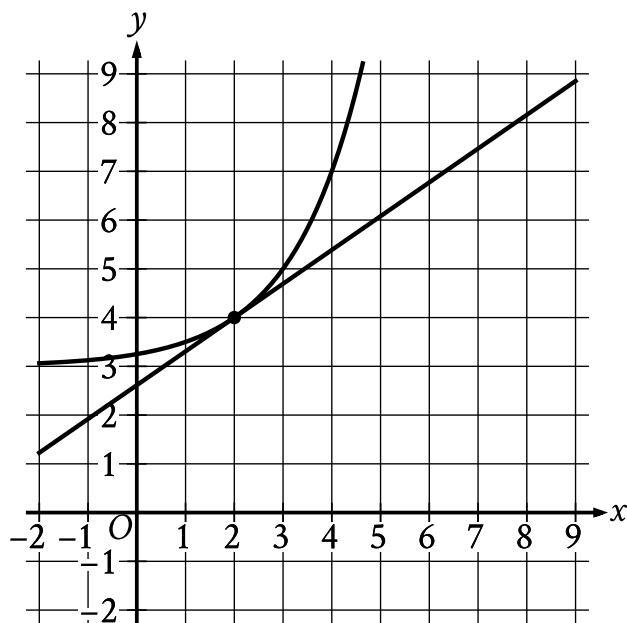
Question Difficulty:

Easy

Question ID 4ca30186

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4ca30186



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution (x, y) to this system?

- A. $(0, 0)$
- B. $(0, 2)$
- C. $(2, 4)$
- D. $(4, 0)$

ID: 4ca30186 Answer

Correct Answer:

C

Rationale

Choice C is correct. The solution to the system of two equations corresponds to the point where the graphs of the equations intersect. The graphs of the linear equation and the nonlinear equation shown intersect at the point $(2, 4)$. Thus, the solution to the system is $(2, 4)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 911383f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 911383f2

$$(x - 4)(x + 2)(x - 1) = 0$$

What is the product of the solutions to the given equation?

- A. 8
- B. 3
- C. -3
- D. -8

ID: 911383f2 Answer

Correct Answer:

D

Rationale

Choice D is correct. By the zero-product property, if $(x - 4)(x + 2)(x - 1) = 0$, then $x - 4 = 0$, $x + 2 = 0$, or $x - 1 = 0$. Solving each of these equations for x yields $x = 4$, $x = -2$, or $x = 1$. The product of these solutions is $(4)(-2)(1) = -8$.

Choice A is incorrect and may result from sign errors made when solving the given equation. Choice B is incorrect and may result from finding the sum, not the product, of the solutions. Choice C is incorrect and may result from finding the sum, not the product, of the solutions in addition to making sign errors when solving the given equation.

Question Difficulty:

Medium

Question ID d8789a4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d8789a4c

$$\frac{x^2 - c}{x - b}$$

In the expression above, b and c are positive integers. If the expression is equivalent to $x + b$ and $x \neq b$, which of the following could be the value of c ?

- A. 4
- B. 6
- C. 8
- D. 10

ID: d8789a4c Answer

Correct Answer:

A

Rationale

Choice A is correct. If the given expression is equivalent to $x + b$, then $\frac{x^2 - c}{x - b} = x + b$, where x isn't equal to b . Multiplying both sides of this equation by $x - b$ yields $x^2 - c = (x + b)(x - b)$. Since the right-hand side of this equation is in factored form for the difference of squares, the value of c must be a perfect square. Only choice A gives a perfect square for the value of c .

Choices B, C, and D are incorrect. None of these values of c produces a difference of squares. For example, when 6 is substituted

for c in the given expression, the result is $\frac{x^2 - 6}{x - b}$. The expression $x^2 - 6$ can't be factored with integer values, and therefore $\frac{x^2 - 6}{x - b}$ isn't equivalent to $x + b$.

Question Difficulty:

Hard

Question ID b80d10d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: b80d10d7

$$\frac{2(x+1)}{x+5} = 1 - \frac{1}{x+5}$$

What is the solution to the equation above?

- A. 0
- B. 2
- C. 3
- D. 5

ID: b80d10d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since $\frac{x+5}{x+5}$ is equivalent to 1, the right-hand side of the given equation can be rewritten as $\frac{x+5}{x+5} - \frac{1}{x+5}$, or $\frac{x+4}{x+5}$. Since the left- and right-hand sides of the equation $\frac{2(x+1)}{x+5} = \frac{x+4}{x+5}$ have the same denominator, it follows that $2(x+1) = x+4$. Applying the distributive property of multiplication to the expression $2(x+1)$ yields $2(x)+2(1)$, or $2x+2$. Therefore, $2x+2 = x+4$. Subtracting x and 2 from both sides of this equation yields $x = 2$.

Choices A, C, and D are incorrect. If $x = 0$, then $\frac{2(0+1)}{0+5} = 1 - \frac{1}{0+5}$. This can be rewritten as $\frac{2}{5} = \frac{4}{5}$, which is a false statement. Therefore, 0 isn't a solution to the given equation. Substituting 3 and 5 into the given equation yields similarly false statements.

Question Difficulty:

Medium

Question ID d4950429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: d4950429

A rectangle has a length of x units and a width of $(x - 15)$ units. If the rectangle has an area of 76 square units, what is the value of x ?

- A. 4
- B. 19
- C. 23
- D. 76

ID: d4950429 Answer

Correct Answer:

B

Rationale

Choice B is correct. The area of a rectangle is equal to its length multiplied by its width. Multiplying the given length, x units, by the given width, $x - 15$ units, yields $xx - 15$ square units. If the rectangle has an area of 76 square units, it follows that $xx - 15 = 76$, or $x^2 - 15x = 76$. Subtracting 76 from both sides of this equation yields $x^2 - 15x - 76 = 0$. Factoring the left-hand side of this equation yields $x - 19x + 4 = 0$. Applying the zero product property to this equation yields two solutions: $x = 19$ and $x = -4$. Since x is the rectangle's length, in units, which must be positive, the value of x is 19.

Choice A is incorrect. This is the width, in units, of the rectangle, not the value of x .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the area, in square units, of the rectangle, not the value of x .

Question Difficulty:

Medium

Question ID fcdf87b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: fcdf87b7

$$y = x^2 - 4x + 4$$

$$y = 4 - x$$

If the ordered pair (x, y) satisfies the system of equations above,
what is one possible value of x ?

ID: fcdf87b7 Answer

Rationale

The correct answer is either 0 or 3. For an ordered pair to satisfy a system of equations, both the x - and y -values of the ordered pair must satisfy each equation in the system. Both expressions on the right-hand side of the given equations are equal to y , therefore it follows that both expressions on the right-hand side of the equations are equal to each other: $x^2 - 4x + 4 = 4 - x$.

This equation can be rewritten as $x^2 - 3x = 0$, and then through factoring, the equation becomes $x(x - 3) = 0$. Because the product of the two factors is equal to 0, it can be concluded that either $x = 0$ or $x - 3 = 0$, or rather, $x = 0$ or $x = 3$. Note that 0 and 3 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID a520ba07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: a520ba07

$$\sqrt[3]{x^3y^6}$$

Which of the following expressions is equivalent to the expression above?

- A. y^2
- B. xy^2
- C. y^3
- D. xy^3

ID: a520ba07 Answer

Correct Answer:

B

Rationale

Choice B is correct. One of the properties of radicals is $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$. Thus, the given expression can be rewritten as $\sqrt[3]{x^3} \cdot \sqrt[3]{y^6}$. Simplifying by taking the cube root of each part gives $x^1 \cdot y^2$, or xy^2 .

Choices A, C, and D are incorrect and may be the result of incorrect application of the properties of exponents and radicals.

Question Difficulty:

Medium

Question ID 652054da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 652054da

An oceanographer uses the equation $s = \frac{3}{2}p$ to model the speed s , in knots, of an ocean wave, where p represents the period of the wave, in seconds. Which of the following represents the period of the wave in terms of the speed of the wave?

- A. $p = \frac{2}{3}s$
- B. $p = \frac{3}{2}s$
- C. $p = \frac{2}{3} + s$
- D. $p = \frac{3}{2} + s$

ID: 652054da Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that p represents the period of the ocean wave, so the equation $s = \frac{3}{2}p$ can be solved for p to represent the period of the wave in terms of the speed of the wave. Multiplying both sides of the equation by the reciprocal of $\frac{3}{2}$

will isolate p . This yields $\frac{2}{3}s = \frac{2}{3}\left(\frac{3}{2}p\right)$, which simplifies to $\frac{2}{3}s = p$. Therefore, $p = \frac{2}{3}s$.

Choices B, C, and D are incorrect and may result from errors made when rearranging the equation to solve for p .

Question Difficulty:

Medium

Question ID a255ae72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a255ae72

If $x^2 = a + b$ and $y^2 = a + c$, which of the

following is equal to $(x^2 - y^2)^2$?

- A. $a^2 - 2ac + c^2$
- B. $b^2 - 2bc + c^2$
- C. $4a^2 - 4abc + c^2$
- D. $4a^2 - 2abc + b^2c^2$

ID: a255ae72 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $x^2 = a + b$ and $y^2 = a + c$. Using the distributive property, the expression $(x^2 - y^2)^2$ can be rewritten as $(x^2)^2 - 2x^2y^2 + (y^2)^2$. Substituting $a + b$ and $a + c$ for x^2 and y^2 , respectively, in this expression yields $(a + b)^2 - 2((a + b)(a + c)) + (a + c)^2$. Expanding this expression yields $(a^2 + 2ab + b^2) - (2a^2 + 2bc + 2ac + 2ab) + (a^2 + 2ac + c^2)$. Combining like terms, this expression can be rewritten as $b^2 - 2bc + c^2$.

Choices A, C, and D are incorrect and may result from an error in using the distributive property, substituting, or combining like terms.

Question Difficulty:

Medium

Question ID dd3b1e1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd3b1e1a

$$f(x) = x^5 + 9x + 17$$

For the given function f , the graph of $y = f(x)$ in the xy -plane passes through the point $(0, b)$, where b is a constant. What is the value of b ?

ID: dd3b1e1a Answer

Correct Answer:

17

Rationale

The correct answer is 17. It's given that the graph of $y = f(x)$ in the xy -plane passes through the point $(0, b)$, where b is a constant. It follows that $f(0)$ equals b . Substituting 0 for x in the given function yields $f(0) = 0^5 + 9(0) + 17$, or $f(0) = 17$. Therefore, the value of b is 17.

Question Difficulty:

Medium

Question ID 3de7a7d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3de7a7d7

Which of the following is a solution to the equation $2x^2 - 4 = x^2$?

- A. 1
- B. 2
- C. 3
- D. 4

ID: 3de7a7d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting x^2 from both sides of the given equation yields $x^2 - 4 = 0$. Adding 4 to both sides of the equation gives $x^2 = 4$. Taking the square root of both sides of the equation gives $x = 2$ or $x = -2$. Therefore, $x = 2$ is one solution to the original equation.

Alternative approach: Subtracting x^2 from both sides of the given equation yields $x^2 - 4 = 0$. Factoring this equation gives $x^2 - 4 = (x + 2)(x - 2) = 0$, such that $x = 2$ or $x = -2$. Therefore, $x = 2$ is one solution to the original equation.

Choices A, C, and D are incorrect and may be the result of computation errors.

Question Difficulty:

Easy

Question ID 35e05e19

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 35e05e19

A park ranger hung squirrel houses each in the shape of a right rectangular prism for fox squirrels. Each house has a height of 11 inches. The length of each house's base is x inches, which is 1 inch more than the width of the house's base. Which function V gives the volume of each house, in cubic inches, in terms of the length of the house's base?

- A. $V(x) = 11x(x - 1)$
- B. $V(x) = 11x(x + 1)$
- C. $V(x) = x(x + 11)(x - 1)$
- D. $V(x) = x(x + 11)(x + 1)$

ID: 35e05e19 Answer

Correct Answer:

A

Rationale

Choice A is correct. The volume of a prism is equal to the area of its base times its height. It's given that the length of each house's base is x inches and that this length is 1 inch more than the width, in inches, of the house's base. It follows that the width, in inches, of the house's base is $x - 1$. The area of a rectangle is the product of its length and its width. Therefore, the area of the base of the house is $x(x - 1)$ square inches. It's given that the height of each house is 11 inches. Therefore, the function V that gives the volume of each house, in cubic inches, in terms of the length of the house's base x is $V(x) = x(x - 1)11$, or $V(x) = 11x(x - 1)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 463eec13

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 463eec13

If $x \neq 0$, which of the following expressions is

$$\frac{\sqrt{16x^4y^8}}{x^3} \quad ?$$

- A. $8x^2y^4$
- B. $4xy^4$
- C. $4x^{-2}y^2$
- D. $4x^{-1}y^4$

ID: 463eec13 Answer

Correct Answer:

D

Rationale

$$\frac{\sqrt{16x^4y^8}}{x^3} = \frac{4x^2y^4}{x^3}$$

Choice D is correct. Taking the square root of an exponential expression halves the exponent, so

$$\frac{4y^4}{x} \text{ further reduces to } 4x^{-1}y^4.$$

Choice A is incorrect and may result from neglecting the denominator of the given expression and from incorrectly calculating the square root of 16. Choice B is incorrect and may result from rewriting $\frac{1}{x}$ as x^1 rather than x^{-1} . Choice C is incorrect and may result from taking the square root of the variables in the numerator twice instead of once.

Question Difficulty:

Medium

Question ID 341ba5db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 341ba5db

$$g(x) = x^2 + 55$$

What is the minimum value of the given function?

- A. 0
- B. 55
- C. 110
- D. 3,025

ID: 341ba5db Answer

Correct Answer:

B

Rationale

Choice B is correct. For a quadratic function defined by an equation of the form $gx = ax - h^2 + k$, where a , h , and k are constants and $a > 0$, the minimum value of the function is k . In the given function, $a = 1$, $h = 0$, and $k = 55$. Therefore, the minimum value of the given function is 55.

Choice A is incorrect. This is the value of x for which the given function reaches its minimum value, not the minimum value of the function.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 18e35375

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 18e35375

$$f(x) = (x - 14)(x + 19)$$

The function f is defined by the given equation. For what value of x does $f(x)$ reach its minimum?

- A. -266
- B. -19
- C. $-\frac{33}{2}$
- D. $-\frac{5}{2}$

ID: 18e35375 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that $f(x) = x^2 - 14x + 19$, which can be rewritten as $f(x) = x^2 + 5x - 266$. Since the coefficient of the x^2 -term is positive, the graph of $y = f(x)$ in the xy -plane opens upward and reaches its minimum value at its vertex. The x -coordinate of the vertex is the value of x such that $f(x)$ reaches its minimum. For an equation in the form $f(x) = ax^2 + bx + c$, where a , b , and c are constants, the x -coordinate of the vertex is $-\frac{b}{2a}$. For the equation $f(x) = x^2 + 5x - 266$, $a = 1$, $b = 5$, and $c = -266$. It follows that the x -coordinate of the vertex is $-\frac{5}{2}$, or $-\frac{5}{2}$. Therefore, $f(x)$ reaches its minimum when the value of x is $-\frac{5}{2}$.

Alternate approach: The value of x for the vertex of a parabola is the x -value of the midpoint between the two x -intercepts of the parabola. Since it's given that $f(x) = x^2 - 14x + 19$, it follows that the two x -intercepts of the graph of $y = f(x)$ in the xy -plane occur when $x = 14$ and $x = -19$, or at the points $(14, 0)$ and $(-19, 0)$. The midpoint between two points, (x_1, y_1) and (x_2, y_2) , is $\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$. Therefore, the midpoint between $(14, 0)$ and $(-19, 0)$ is $\frac{14 + -19}{2}, \frac{0 + 0}{2}$, or $-\frac{5}{2}, 0$. It follows that $f(x)$ reaches its minimum when the value of x is $-\frac{5}{2}$.

Choice A is incorrect. This is the y -coordinate of the y -intercept of the graph of $y = f(x)$ in the xy -plane.

Choice B is incorrect. This is one of the x -coordinates of the x -intercepts of the graph of $y = f(x)$ in the xy -plane.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6e02cd78

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e02cd78

In the xy -plane, what is the y -coordinate of the point of intersection of the graphs of $y = (x - 1)^2$ and $y = 2x - 3$?

ID: 6e02cd78 Answer

Rationale

The correct answer is 1. The point of intersection of the graphs of the given equations is the solution to the system of the two equations. Since $y = (x - 1)^2$ and $y = 2x - 3$, it follows that $(x - 1)^2 = 2x - 3$, or $(x - 1)(x - 1) = 2x - 3$. Applying the distributive property to the left-hand side of this equation yields $x^2 - 2x + 1 = 2x - 3$. Subtracting $2x$ from and adding 3 to both sides of this equation yields $x^2 - 4x + 4 = 0$. Factoring the left-hand side of this equation yields $(x - 2)(x - 2) = 0$. By the zero product property, if $(x - 2)(x - 2) = 0$, it follows that $x - 2 = 0$. Adding 2 to both sides of $x - 2 = 0$ yields $x = 2$. Substituting 2 for x in either of the given equations yields $y = 1$. For example, substituting 2 for x in the second given equation yields $y = 2(2) - 3$, or $y = 1$. Therefore, the point of intersection of the graphs of the given equations is $(2, 1)$. The y -coordinate of this point is 1.

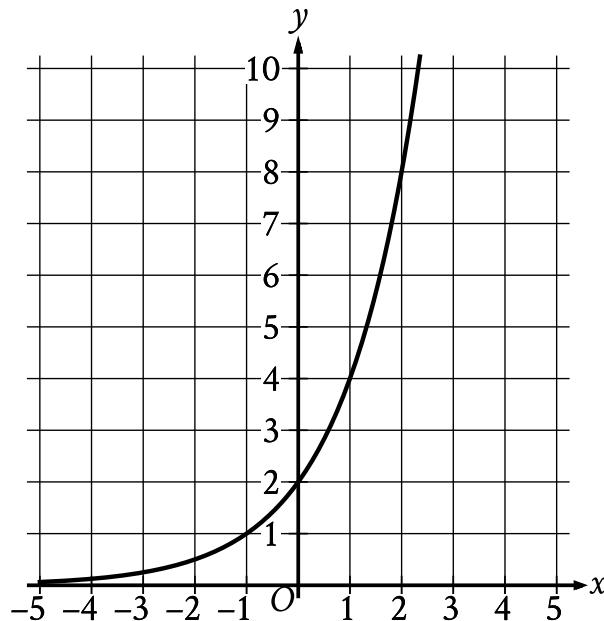
Question Difficulty:

Medium

Question ID b5c43226

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: b5c43226



What is the y -intercept of the graph shown?

- A. $(0, 0)$
- B. $(0, 2)$
- C. $(2, 0)$
- D. $(2, 2)$

ID: b5c43226 Answer

Correct Answer:

B

Rationale

Choice B is correct. The y -intercept of a graph in the xy -plane is the point at which the graph crosses the y -axis. The graph shown crosses the y -axis at the point $0, 2$. Therefore, the y -intercept of the graph shown is $0, 2$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 13e5a5d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 13e5a5d5

$$5|x| = 45$$

What is the positive solution to the given equation?

ID: 13e5a5d5 Answer

Correct Answer:

9

Rationale

The correct answer is 9. Dividing both sides of the given equation by 5 yields $|x| = 9$. By the definition of absolute value, if $|x| = 9$, then $x = 9$ or $x = -9$. Therefore, the two solutions to the equation $5x = 45$ are 9 and -9. It follows that the positive solution to the given equation is 9.

Question Difficulty:

Easy

Question ID 7bd10ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7bd10ef3

$$2x^2 - 4x = t$$

In the equation above, t is a constant. If the equation has no real solutions, which of the following could be the value of t ?

- A. -3
- B. -1
- C. 1
- D. 3

ID: 7bd10ef3 Answer

Correct Answer:

A

Rationale

Choice A is correct. The number of solutions to any quadratic equation in the form $ax^2 + bx + c = 0$, where a , b , and c are constants, can be found by evaluating the expression $b^2 - 4ac$, which is called the discriminant. If the value of $b^2 - 4ac$ is a positive number, then there will be exactly two real solutions to the equation. If the value of $b^2 - 4ac$ is zero, then there will be exactly one real solution to the equation. Finally, if the value of $b^2 - 4ac$ is negative, then there will be no real solutions to the equation.

The given equation $2x^2 - 4x = t$ is a quadratic equation in one variable, where t is a constant. Subtracting t from both sides of the equation gives $2x^2 - 4x - t = 0$. In this form, $a = 2$, $b = -4$, and $c = -t$. The values of t for which the equation has no real solutions are the same values of t for which the discriminant of this equation is a negative value. The discriminant is equal to $(-4)^2 - 4(2)(-t)$; therefore, $(-4)^2 - 4(2)(-t) < 0$. Simplifying the left side of the inequality gives $16 + 8t < 0$. Subtracting 16 from both sides of the inequality and then dividing both sides by 8 gives $t < -2$. Of the values given in the options, -3 is the only value that is less than -2 . Therefore, choice A must be the correct answer.

Choices B, C, and D are incorrect and may result from a misconception about how to use the discriminant to determine the number of solutions of a quadratic equation in one variable.

Question Difficulty:
Hard

Question ID 11ccf3e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 11ccf3e1

$$14j + 5k = m$$

The given equation relates the numbers j , k , and m . Which equation correctly expresses k in terms of j and m ?

- A. $k = \frac{m-14j}{5}$
- B. $k = \frac{1}{5}m - 14j$
- C. $k = \frac{14j-m}{5}$
- D. $k = 5m - 14j$

ID: 11ccf3e1 Answer

Correct Answer:

A

Rationale

Choice A is correct. Subtracting $14j$ from each side of the given equation results in $5k = m - 14j$. Dividing each side of this equation by 5 results in $k = \frac{m-14j}{5}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 50e40f08

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 50e40f08

$$f(x) = (x + 6)(x - 4)$$

If the given function f is graphed in the xy -plane, where $y = f(x)$, what is the x -coordinate of an x -intercept of the graph?

ID: 50e40f08 Answer

Correct Answer:

-6, 4

Rationale

The correct answer is either -6 or 4. The x -intercepts of a graph in the xy -plane are the points where $y = 0$. Thus, for an x -intercept of the graph of $y = fx$, $0 = fx$. Substituting 0 for fx in the equation $fx = x + 6x - 4$ yields $0 = x + 6x - 4$. By the zero product property, $x + 6 = 0$ and $x - 4 = 0$. Subtracting 6 from both sides of the equation $x + 6 = 0$ yields $x = -6$. Adding 4 to both sides of the equation $x - 4 = 0$ yields $x = 4$. Therefore, the x -coordinates of the x -intercepts of the graph of $y = fx$ are -6 and 4. Note that -6 and 4 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID cfff8f8e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: cfff8f8e

At the time of posting a video, a social media channel had 53 subscribers. Each day for five days after the video was posted, the number of subscribers doubled from the number the previous day. Which equation gives the total number of subscribers, n , to the channel d days after the video was posted?

- A. $n = (53)^d$
- B. $n = 53(2)^d$
- C. $n = 53\left(\frac{1}{2}\right)^d$
- D. $n = (53)^2 + d$

ID: cfff8f8e Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that each day for five days after a social media channel posted a video, the number of subscribers doubled from the number the previous day. Since the number of subscribers doubled each day, the relationship between n and d can be represented by an exponential equation of the form $n = ab^d$, where a is the number of subscribers at the time of posting the video and the number of subscribers to the channel increases by a factor of b each day. It's given that at the time of posting the video, the channel had 53 subscribers. Therefore, $a = 53$. It's also given that the number of subscribers doubled, or increased by a factor of 2, from the number the previous day. Therefore, $b = 2$. Substituting 53 for a and 2 for b in the equation $n = ab^d$ yields $n = 532^d$.

Choice A is incorrect. This equation gives the total number of subscribers to a channel for which the initial number of subscribers was 1 and the number increased each day by 53 times the number from the previous day.

Choice C is incorrect. This equation gives the total number of subscribers to a channel for which the number of subscribers each day was half the number from the previous day, rather than double the number.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 88a0c425

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 88a0c425

$$-2x^2 + 20x + c = 0$$

In the given equation, c is a constant. The equation has exactly one solution. What is the value of c ?

- A. -68
- B. -50
- C. -32
- D. 0

ID: 88a0c425 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the equation $-2x^2 + 20x + c = 0$, where c is a constant, has exactly one solution. A quadratic equation of the form $ax^2 + bx + c = 0$ has exactly one solution if and only if its discriminant, $b^2 - 4ac$, is equal to zero. It follows that for the given equation, $a = -2$ and $b = 20$. Substituting -2 for a and 20 for b in $b^2 - 4ac$ yields $20^2 - 4(-2)(c)$, or $400 + 8c$. Since the discriminant must equal zero, it follows that $400 + 8c = 0$. Subtracting 400 from both sides of this equation yields $8c = -400$. Dividing each side of this equation by 8 yields $c = -50$. Therefore, the value of c is -50.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 8462b105

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8462b105

The function f gives the product of a number, x , and a number that is 91 more than x . Which equation defines f ?

- A. $f(x) = x^2 + x + 91$
- B. $f(x) = x^2 + 91$
- C. $f(x) = x^2 + 91x$
- D. $f(x) = x^2 + 91x + 91$

ID: 8462b105 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the function f gives the product of a number, x , and a number that is 91 more than x . A number that is 91 more than x can be represented by the expression $x + 91$. Therefore, f can be defined by the equation $f(x) = x(x + 91)$, or $f(x) = x^2 + 91x$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID ce579859

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ce579859

A model estimates that at the end of each year from **2015** to **2020**, the number of squirrels in a population was **150%** more than the number of squirrels in the population at the end of the previous year. The model estimates that at the end of **2016**, there were **180** squirrels in the population. Which of the following equations represents this model, where n is the estimated number of squirrels in the population t years after the end of **2015** and $t \leq 5$?

- A. $n = 72(1.5)^t$
- B. $n = 72(2.5)^t$
- C. $n = 180(1.5)^t$
- D. $n = 180(2.5)^t$

ID: ce579859 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since the model estimates that the number of squirrels in the population increased by a fixed percentage, 150%, each year, the model can be represented by an exponential equation of the form $n = a1 + \frac{p}{100}^t$, where a is the estimated number of squirrels in the population at the end of 2015, and the model estimates that at the end of each year, the number is $p\%$ more than the number at the end of the previous year. Since the model estimates that at the end of each year, the number was 150% more than the number at the end of the previous year, $p = 150$. Substituting 150 for p in the equation $n = a1 + \frac{p}{100}^t$ yields $n = a1 + \frac{150}{100}^t$, which is equivalent to $n = a1 + 1.5^t$, or $n = a2.5^t$. It's given that the estimated number of squirrels at the end of 2016 was 180. This means that when $t = 1$, $n = 180$. Substituting 1 for t and 180 for n in the equation $n = a2.5^t$ yields $180 = a2.5^1$, or $180 = 2.5a$. Dividing each side of this equation by 2.5 yields $72 = a$. Substituting 72 for a in the equation $n = a2.5^t$ yields $n = 722.5^t$.

Choice A is incorrect. This equation represents a model where at the end of each year, the estimated number of squirrels was 150% of, not 150% more than, the estimated number at the end of the previous year.

Choice C is incorrect. This equation represents a model where at the end of each year, the estimated number of squirrels was 150% of, not 150% more than, the estimated number at the end of the previous year, and the estimated number of squirrels at the end of 2015, not the end of 2016, was 180.

Choice D is incorrect. This equation represents a model where the estimated number of squirrels at the end of 2015, not the end of 2016, was 180.

Question Difficulty:

Hard

Question ID 5355c0ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5355c0ef

$$0.36x^2 + 0.63x + 1.17$$

The given expression can be rewritten as $a(4x^2 + 7x + 13)$, where a is a constant. What is the value of a ?

ID: 5355c0ef Answer

Correct Answer:

.09, 9/100

Rationale

The correct answer is .09. It's given that the expression $0.36x^2 + 0.63x + 1.17$ can be rewritten as $a4x^2 + 7x + 13$. Applying the distributive property to the expression $a4x^2 + 7x + 13$ yields $4ax^2 + 7ax + 13a$. Therefore, $0.36x^2 + 0.63x + 1.17$ can be rewritten as $4ax^2 + 7ax + 13a$. It follows that in the expressions $0.36x^2 + 0.63x + 1.17$ and $4ax^2 + 7ax + 13a$, the coefficients of x^2 are equivalent, the coefficients of x are equivalent, and the constant terms are equivalent. Therefore, $0.36 = 4a$, $0.63 = 7a$, and $1.17 = 13a$. Solving any of these equations for a yields the value of a . Dividing both sides of the equation $0.36 = 4a$ by 4 yields $0.09 = a$. Therefore, the value of a is 0.09. Note that .09 and 9/100 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID a1bf1c4e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #cccccc;"></div>

ID: a1bf1c4e

$$x^2 + 6x + 4$$

Which of the following is equivalent to the expression above?

- A. $(x + 3)^2 + 5$
- B. $(x + 3)^2 - 5$
- C. $(x - 3)^2 + 5$
- D. $(x - 3)^2 - 5$

ID: a1bf1c4e Answer

Correct Answer:

B

Rationale

Choice B is correct. The given quadratic expression is in standard form, and each answer choice is in vertex form. Completing the square converts the expression from standard form to vertex form. The first step is to rewrite the expression as follows:

$$x^2 + 6x + 4 = x^2 + 6x + 9 + 4 - 9.$$

$$x^2 + 6x + 9 + 4 - 9 = (x + 3)^2 + 4 - 9.$$

Combining the constant terms gives $(x + 3)^2 - 5$.

Choice A is incorrect. Squaring the binomial and simplifying the expression in choice A gives $x^2 + 6x + 9 + 5$. Combining like terms gives $x^2 + 6x + 14$, not $x^2 + 6x + 4$. Choice C is incorrect. Squaring the binomial and simplifying the expression in choice C gives $x^2 - 6x + 9 + 5$. Combining like terms gives $x^2 - 6x + 14$, not $x^2 + 6x + 4$. Choice D is incorrect. Squaring the binomial and simplifying the expression in choice D gives $x^2 - 6x + 9 - 5$. Combining like terms gives $x^2 - 6x + 4$, not $x^2 + 6x + 4$.

Question Difficulty:

Medium

Question ID c81b6c57

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: c81b6c57

In the expression $3(2x^2 + px + 8) - 16x(p + 4)$, p is a constant. This expression is equivalent to the expression $6x^2 - 155x + 24$. What is the value of p ?

- A. -3
- B. 7
- C. 13
- D. 155

ID: c81b6c57 Answer

Correct Answer:

B

Rationale

Choice B is correct. Using the distributive property, the first given expression can be rewritten as $6x^2 + 3px + 24 - 16px - 64x + 24$, and then rewritten as $6x^2 + (3p - 16p - 64)x + 24$. Since the expression $6x^2 + (3p - 16p - 64)x + 24$ is equivalent to $6x^2 - 155x + 24$, the coefficients of the x terms from each expression are equivalent to each other; thus $3p - 16p - 64 = -155$. Combining like terms gives $-13p - 64 = -155$. Adding 64 to both sides of the equation gives $-13p = -71$. Dividing both sides of the equation by -13 yields $p = 7$.

Choice A is incorrect. If $p = -3$, then the first expression would be equivalent to $6x^2 - 25x + 24$. Choice C is incorrect. If $p = 13$, then the first expression would be equivalent to $6x^2 - 233x + 24$. Choice D is incorrect. If $p = 155$, then the first expression would be equivalent to $6x^2 - 2,079x + 24$.

Question Difficulty:

Hard

Question ID d139cf4b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d139cf4b

$$f(t) = 55t - 2t^2$$

The function f is defined by the given equation. The function g is defined by $g(t) = f(t) + 3$. Which expression represents the maximum value of $g(t)$?

- A. $3 + \left(\frac{55}{2}\right)^2$
- B. $3 + 2\left(\frac{55}{4}\right)^2$
- C. $3 - 2\left(\frac{55}{4}\right)^2$
- D. $3 - \left(\frac{55}{2}\right)^2$

ID: d139cf4b Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that function g is defined by $g(t) = f(t) + 3$ and that $f(t) = 55t - 2t^2$. Substituting $55t - 2t^2$ for $f(t)$ in $g(t) = f(t) + 3$ yields $g(t) = 55t - 2t^2 + 3$, or $g(t) = -2t^2 + 55t + 3$. The maximum value of $g(t)$ can be found by completing the square to rewrite the equation defining g in the form $gt = a(t - h)^2 + k$, where the maximum value of the function is k , which occurs when $t = h$, and a is a negative constant. The equation $gt = -2t^2 + 55t + 3$ is equivalent to

$g(t) = -2\left(t^2 - \frac{55}{2}t\right) + 3$, which can be rewritten as $gt = -2\left(t^2 - \frac{55}{2}t + \left(\frac{55}{4}\right)^2\right) + 3 + 2\left(\frac{55}{4}\right)^2$, or

$gt = -2\left(t - \frac{55}{4}\right)^2 + 3 + 2\left(\frac{55}{4}\right)^2$. This equation is in the form $gt = a(t - h)^2 + k$, where $a = -2$, $h = \frac{55}{4}$, and $k = 3 + 2\left(\frac{55}{4}\right)^2$. Thus, the maximum value of $g(t)$ is $3 + 2\left(\frac{55}{4}\right)^2$.

Alternate approach: Since the function f is a quadratic function, the maximum value of $f(t)$ occurs at the value of t that's halfway between the two zeros of the function. The zeros of function f can be found by substituting 0 for $f(t)$ in the equation defining f , which yields $0 = 55t - 2t^2$. This equation can be rewritten as $0 = t(55 - 2t)$. By the zero product property, it follows that $t = 0$ or $55 - 2t = 0$. Subtracting 55 from each side of the equation $55 - 2t = 0$ yields $-2t = -55$. Dividing each side of this equation by -2 yields $t = \frac{55}{2}$. Therefore, the zeros of function f are 0 and $\frac{55}{2}$. The value that's halfway between 0 and $\frac{55}{2}$ can be found by

calculating the average of 0 and $\frac{55}{2}$, which is $\frac{0 + \frac{55}{2}}{2}$, or $\frac{55}{4}$. It follows that the maximum of function f occurs when $t = \frac{55}{4}$.

Substituting $\frac{55}{4}$ for t in the equation defining function f yields $f\left(\frac{55}{4}\right) = 55\left(\frac{55}{4}\right) - 2\left(\frac{55}{4}\right)^2$, which is equivalent to

$f\left(\frac{55}{4}\right) = \frac{55^2}{4} - 2\left(\frac{55^2}{4^2}\right)$. Multiplying $\frac{55^2}{4}$ by $\frac{4}{4}$ in this equation to get a common denominator yields $f\left(\frac{55}{4}\right) = 4\left(\frac{55^2}{4^2}\right) - 2\left(\frac{55^2}{4^2}\right)$, or

$f\left(\frac{55}{4}\right) = 2\left(\frac{55^2}{4^2}\right)$, which is equivalent to $f\left(\frac{55}{4}\right) = 2\left(\frac{55}{4}\right)^2$. Thus, the maximum value of $f(t)$ is $2\left(\frac{55}{4}\right)^2$. Since the equation

defining $g(t)$ is $g(t) = f(t) + 3$, the maximum value of $g(t)$ is 3 greater than the maximum value of $f(t)$. It follows that the maximum value of $g(t)$ is $3 + 2\left(\frac{55}{4}\right)^2$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 802549ac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 802549ac

$$(x+2)(x+3) = (x-2)(x-3) + 10$$

Which of the following is a solution to the given equation?

- A. 1
- B. 0
- C. -2
- D. -5

ID: 802549ac Answer

Correct Answer:

A

Rationale

Choice A is correct. Applying the distributive property on the left- and right-hand sides of the given equation yields $x^2 + 2x + 3x + 6 = x^2 - 2x - 3x + 6 + 10$, or $x^2 + 5x + 6 = x^2 - 5x + 16$. Subtracting x^2 from and adding $5x$ to both sides of this equation yields $10x + 6 = 16$. Subtracting 6 from both sides of this equation and then dividing both sides by 10 yields $x = 1$.

Choices B, C, and D are incorrect. Substituting 0, -2, or -5 for x in the given equation will result in a false statement. If $x = 0$, the given equation becomes $6 = 16$; if $x = -2$, the given equation becomes $0 = 30$; and if $x = -5$, the given equation becomes $6 = 66$. Therefore, the values 0, -2, and -5 aren't solutions to the given equation.

Question Difficulty:

Medium

Question ID 75a32330

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

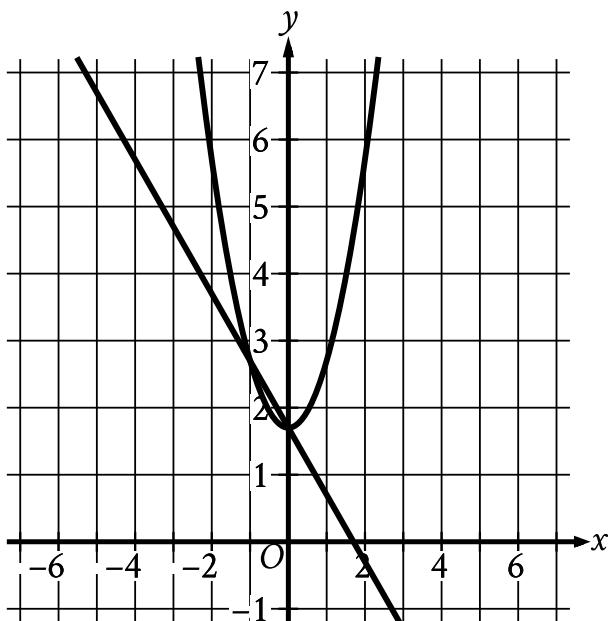
ID: 75a32330

$$y = x^2 + 1.7$$

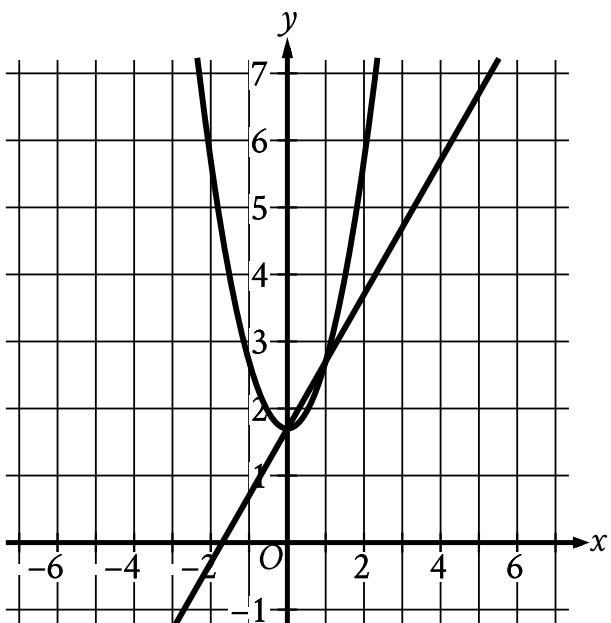
$$y = 1.7 - x$$

Which graph represents the given system of equations?

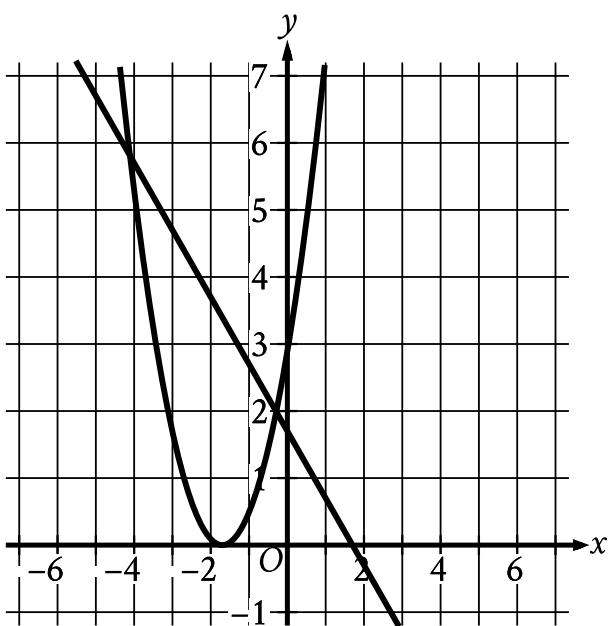
A.



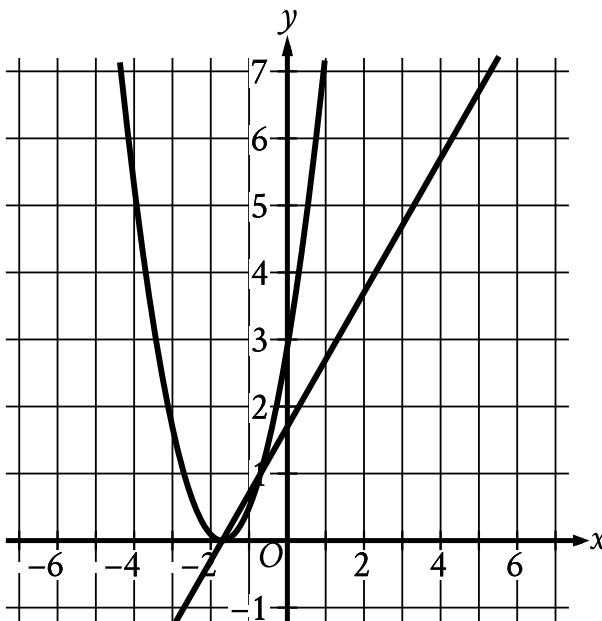
B.



C.



D.

**ID: 75a32330 Answer****Correct Answer:**

A

Rationale

Choice A is correct. The graph of a quadratic equation in the form $y = x^2 + c$ has its vertex at $(0, c)$. The first equation in the given system of equations is $y = x^2 + 1.7$, so the graph of this quadratic equation has its vertex at $(0, 1.7)$. The graph of a linear equation of the form $y = b - x$ has a slope of -1 and a y-intercept at $(0, b)$. The second equation in the given system of equations is $y = 1.7 - x$, so the graph of this linear equation has a slope of -1 and a y-intercept at $(0, 1.7)$. Of the choices, only choice A has the graph of a quadratic equation with its vertex at $(0, 1.7)$ and the graph of a linear equation with a slope of -1 and a y-intercept at $(0, 1.7)$.

Choice B is incorrect. This graph represents a system in which the second equation is $y = 1.7 + x$, not $y = 1.7 - x$.

Choice C is incorrect. This graph represents a system in which the first equation is $y = (x + 1.7)^2$, not $y = x^2 + 1.7$.

Choice D is incorrect. This graph represents a system in which the first equation is $y = (x + 1.7)^2$, not $y = x^2 + 1.7$, and the second equation is $y = 1.7 + x$, not $y = 1.7 - x$.

Question Difficulty:

Medium

Question ID a4f61d75

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a4f61d75

$$x^2 - ax + 12 = 0$$

In the equation above, a is a constant and $a > 0$. If the equation has two integer solutions, what is a possible value of a ?

ID: a4f61d75 Answer

Rationale

The correct answer is either 7, 8, or 13. Since the given equation has two integer solutions, the expression on the left-hand side of this equation can be factored as $(x + c)(x + d)$, where c and d are also integers. The product of c and d must equal the constant term of the original quadratic expression, which is 12. Additionally, the sum of c and d must be a negative number since it's given that $a > 0$, but the sign preceding a in the given equation is negative. The possible pairs of values for c and d that satisfy both of these conditions are -4 and -3 , -6 and -2 , and -12 and -1 . Since the value of $-a$ is the sum of c and d , the possible values of $-a$ are $-4 + (-3) = -7$, $-6 + (-2) = -8$, and $-12 + (-1) = -13$. It follows that the possible values of a are 7, 8, and 13. Note that 7, 8, and 13 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID a31417d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a31417d1

From 2005 through 2014, the number of music CDs sold in the United States declined each year by approximately 15% of the number sold the preceding year. In 2005, approximately 600 million CDs were sold in the United States. Of the following, which best models C , the number of millions of CDs sold in the United States, t years after 2005?

A. $C = 600(0.15)^t$

B. $C = 600(0.85)^t$

C. $C = 600(1.15)^t$

D. $C = 600(1.85)^t$

ID: a31417d1 Answer

Correct Answer:

B

Rationale

Choice B is correct. A model for a quantity C that decreases by a certain percentage per time period t is an exponential equation in the form $C = I \left(1 - \frac{r}{100}\right)^t$, where I is the initial value at time $t = 0$ for $r\%$ annual decline. It's given that C is the number of millions of CDs sold in the United States and that t is the number of years after 2005. It's also given that 600 million CDs were sold at time $t = 0$, so $I = 600$. This number declines by 15% per year, so $r = 15$. Substituting these values into the equation produces

$$C = 600 \left(1 - \frac{15}{100}\right)^t, \text{ or } C = 600(0.85)^t.$$

Choice A is incorrect and may result from errors made when representing the percent decline. Choices C and D are incorrect. These equations model exponential increases in CD sales, not exponential decreases.

Question Difficulty:

Medium

Question ID 66bce0c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 66bce0c1

$$\sqrt{2x+6} + 4 = x + 3$$

What is the solution set of the equation above?

- A. $\{-1\}$
- B. $\{5\}$
- C. $\{-1, 5\}$
- D. $\{0, -1, 5\}$

ID: 66bce0c1 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting 4 from both sides of $\sqrt{2x+6} + 4 = x + 3$ isolates the radical expression on the left side of the equation as follows: $\sqrt{2x+6} = x - 1$. Squaring both sides of $\sqrt{2x+6} = x - 1$ yields $2x + 6 = x^2 - 2x + 1$. This equation can be rewritten as a quadratic equation in standard form: $x^2 - 4x - 5 = 0$. One way to solve this quadratic equation is to factor the expression $x^2 - 4x - 5$ by identifying two numbers with a sum of -4 and a product of -5 . These numbers are -5 and 1 . So the quadratic equation can be factored as $(x - 5)(x + 1) = 0$. It follows that 5 and -1 are the solutions to the quadratic equation. However, the solutions must be verified by checking whether 5 and -1 satisfy the original equation, $\sqrt{2x+6} + 4 = x + 3$. When $x = -1$, the original equation gives $\sqrt{2(-1)+6} + 4 = (-1) + 3$, or $6 = 2$, which is false. Therefore, -1 does not satisfy the original equation. When $x = 5$, the original equation gives $\sqrt{2(5)+6} + 4 = 5 + 3$, or $8 = 8$, which is true. Therefore, $x = 5$ is the only solution to the original equation, and so the solution set is $\{5\}$.

Choices A, C, and D are incorrect because each of these sets contains at least one value that results in a false statement when substituted into the given equation. For instance, in choice D, when 0 is substituted for x into the given equation, the result is $\sqrt{2(0)+6} + 4 = (0) + 3$, or $\sqrt{6} + 4 = 3$. This is not a true statement, so 0 is not a solution to the given equation.

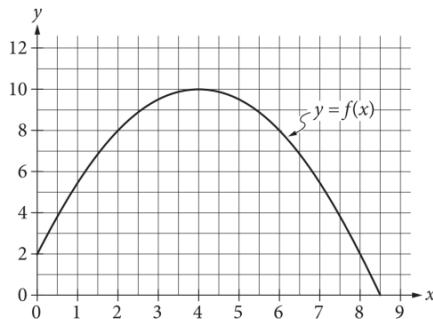
Question Difficulty:

Hard

Question ID 97e50fa2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 97e50fa2



The graph of the function f , defined by $f(x) = -\frac{1}{2}(x-4)^2 + 10$, is shown in the xy -plane above. If the function g (not shown) is defined by $g(x) = -x + 10$, what is one possible value of a such that $f(a) = g(a)$?

ID: 97e50fa2 Answer

Rationale

The correct answer is either 2 or 8. Substituting $x = a$ in the definitions for f and g gives $f(a) = -\frac{1}{2}(a-4)^2 + 10$ and $g(a) = -a + 10$, respectively. If $f(a) = g(a)$, then $-\frac{1}{2}(a-4)^2 + 10 = -a + 10$. Subtracting 10 from both sides of this equation gives $-\frac{1}{2}(a-4)^2 = -a$. Multiplying both sides by -2 gives $(a-4)^2 = 2a$. Expanding $(a-4)^2$ gives $a^2 - 8a + 16 = 2a$. Combining the like terms on one side of the equation gives $a^2 - 10a + 16 = 0$. One way to solve this equation is to factor $a^2 - 10a + 16$ by identifying two numbers with a sum of -10 and a product of 16. These numbers are -2 and -8 , so the quadratic equation can be factored as $(a-2)(a-8) = 0$. Therefore, the possible values of a are either 2 or 8. Note that 2 and 8 are examples of ways to enter a correct answer.

Alternate approach: Graphically, the condition $f(a) = g(a)$ implies the graphs of the functions $y = f(x)$ and $y = g(x)$ intersect at $x = a$. The graph $y = f(x)$ is given, and the graph of $y = g(x)$ may be sketched as a line with y -intercept 10 and a slope of -1 (taking care to note the different scales on each axis). These two graphs intersect at $x = 2$ and $x = 8$.

Question Difficulty:

Hard

Question ID 6d04c89d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6d04c89d

The expression $\frac{24}{6x+42}$ is equivalent to $\frac{4}{x+b}$, where b is a constant and $x > 0$. What is the value of b ?

- A. 7
- B. 10
- C. 24
- D. 252

ID: 6d04c89d Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the given expressions are equivalent and the numerator of the second expression is $\frac{1}{6}$ of the numerator of the first expression, the denominator of the second expression must also be $\frac{1}{6}$ of the denominator of the first expression. By the distributive property, $\frac{1}{6}6x + \frac{1}{6}42$ is equivalent to $\frac{1}{6}6x + \frac{1}{6}42$, or $x + 7$. Therefore, the value of b is 7.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 9afe2370

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9afe2370

The population P of a certain city y years after the last census is modeled by the equation below, where r is a constant and P_0 is the population when $y = 0$.

$$P = P_0(1 + r)^y$$

If during this time the population of the city decreases by a fixed percent each year, which of the following must be true?

- A. $r < -1$
- B. $-1 < r < 0$
- C. $0 < r < 1$
- D. $r > 1$

ID: 9afe2370 Answer

Correct Answer:

B

Rationale

Choice B is correct. The term $(1 + r)$ represents a percent change. Since the population is decreasing, the percent change must be between 0% and 100%. When the percent change is expressed as a decimal rather than as a percent, the percentage change must be between 0 and 1. Because $(1 + r)$ represents percent change, this can be expressed as $0 < 1 + r < 1$. Subtracting 1 from all three terms of this compound inequality results in $-1 < r < 0$.

Choice A is incorrect. If $r < -1$, then after 1 year, the population P would be a negative value, which is not possible. Choices C and D are incorrect. For any value of $r > 0$, $1 + r > 1$, and the exponential function models growth for positive values of the exponent. This contradicts the given information that the population is decreasing.

Question Difficulty:

Hard

Question ID 60fdb4d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 60fdb4d4

Which expression is equivalent to $(2x^2 - 4) - (-3x^2 + 2x - 7)$?

- A. $5x^2 - 2x + 3$
- B. $5x^2 + 2x - 3$
- C. $-x^2 - 2x - 11$
- D. $-x^2 + 2x - 11$

ID: 60fdb4d4 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given expression $(2x^2 - 4) - (-3x^2 + 2x - 7)$ can be rewritten as $2x^2 - 4 + 3x^2 - 2x + 7$. Combining like terms yields $5x^2 - 2x + 3$.

Choices B, C, and D are incorrect and may be the result of errors when applying the distributive property.

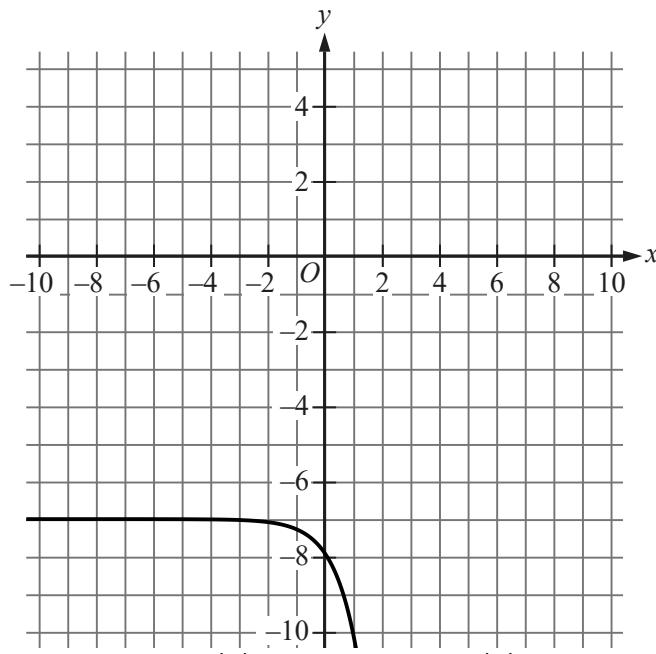
Question Difficulty:

Easy

Question ID df71424b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: df71424b



The graph of $y = f(x)$ is shown, where $f(x) = ab^x + c$, and a , b , and c are constants. For how many values of x does $f(x) = 0$?

- A. Three
- B. Two
- C. One
- D. Zero

ID: df71424b Answer

Correct Answer:

D

Rationale

Choice D is correct. Each point x, y on the graph of $y = f(x)$ in the xy -plane gives a value of x and its corresponding value of $f(x)$, or y . For any value of x for which $f(x) = 0$, there is a corresponding point on the graph of $y = f(x)$ with a y -coordinate of 0. A point with a y -coordinate of 0 is a point where the graph intersects the x -axis. It's given that $f(x) = ab^x + c$, where a , b , and c are constants. In the xy -plane, the graph of an equation of this form will lie entirely either above or below the horizontal line defined by $y = c$. The part of the graph of $y = f(x)$ shown lies entirely below the horizontal line defined by $y = -7$, and thus the entire graph of $y = f(x)$ must lie below the line defined by $y = -7$. It follows that the graph of $y = f(x)$ will never intersect the x -axis. Therefore, there are zero values of x for which $f(x) = 0$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Hard

Question ID 203774bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 203774bc

The product of two positive integers is 546. If the first integer is 11 greater than twice the second integer, what is the smaller of the two integers?

- A. 7
- B. 14
- C. 39
- D. 78

ID: 203774bc Answer

Correct Answer:

B

Rationale

Choice B is correct. Let x be the first integer and let y be the second integer. If the first integer is 11 greater than twice the second integer, then $x = 2y + 11$. If the product of the two integers is 546, then $xy = 546$. Substituting $2y + 11$ for x in this equation results in $2y + 11y = 546$. Distributing the y to both terms in the parentheses results in $2y^2 + 11y = 546$. Subtracting 546 from both sides of this equation results in $2y^2 + 11y - 546 = 0$. The left-hand side of this equation can be factored by finding two values whose product is 2-546, or -1,092, and whose sum is 11. The two values whose product is -1,092 and whose sum is 11 are 39 and -28. Thus, the equation $2y^2 + 11y - 546 = 0$ can be rewritten as $2y^2 + 28y - 39y - 546 = 0$, which is equivalent to $2yy - 14 + 39y - 14 = 0$, or $2y + 39y - 14 = 0$. By the zero product property, it follows that $2y + 39 = 0$ and $y - 14 = 0$. Subtracting 39 from both sides of the equation $2y + 39 = 0$ yields $2y = -39$. Dividing both sides of this equation by 2 yields $y = -\frac{39}{2}$. Since y is a positive integer, the value of y is not $-\frac{39}{2}$. Adding 14 to both sides of the equation $y - 14 = 0$ yields $y = 14$. Substituting 14 for y in the equation $xy = 546$ yields $x14 = 546$. Dividing both sides of this equation by 14 results in $x = 39$. Therefore, the two integers are 14 and 39, so the smaller of the two integers is 14.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the larger of the two integers.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 3d12b1e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 3d12b1e0

$$-16x^2 - 8x + c = 0$$

In the given equation, c is a constant. The equation has exactly one solution. What is the value of c ?

ID: 3d12b1e0 Answer

Correct Answer:

-1

Rationale

The correct answer is -1. A quadratic equation in the form $ax^2 + bx + c = 0$, where a , b , and c are constants, has exactly one solution when its discriminant, $b^2 - 4ac$, is equal to 0. In the given equation, $-16x^2 - 8x + c = 0$, $a = -16$ and $b = -8$. Substituting -16 for a and -8 for b in $b^2 - 4ac$ yields $-8^2 - 4(-16)c$, or $64 + 64c$. Since the given equation has exactly one solution, $64 + 64c = 0$. Subtracting 64 from both sides of this equation yields $64c = -64$. Dividing both sides of this equation by 64 yields $c = -1$. Therefore, the value of c is -1.

Question Difficulty:

Hard

Question ID 2c88af4d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c88af4d

$$\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$$

The expression $\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$, where $x > 1$ and $y > 1$, is equivalent to which of the following?

A. $\frac{\sqrt{y}}{\sqrt[3]{x^2}}$

B. $\frac{y\sqrt{y}}{\sqrt[3]{x^2}}$

C. $\frac{y\sqrt{y}}{x\sqrt{x}}$

D. $\frac{y\sqrt{y}}{x^2 \sqrt[3]{x}}$

ID: 2c88af4d Answer

Correct Answer:

D

Rationale

$$x^{\frac{1}{3}} \quad \text{and} \quad y^{\frac{1}{2}}$$

Choice D is correct. For $x > 1$ and $y > 1$, x^{-2} and y^{-1} are equivalent to $\frac{1}{x^2}$ and $\frac{1}{y}$, respectively. Therefore, the given expression can be rewritten as $\frac{y\sqrt{y}}{x^2 \sqrt[3]{x}}$.

Choices A, B, and C are incorrect because these choices are not equivalent to the given expression for $x > 1$ and $y > 1$.

$$2^{-\frac{5}{6}}$$

$$2^{-\frac{1}{3}} 2^{\frac{5}{6}}$$

For example, for $x = 2$ and $y = 2$, the value of the given expression is $2^{-\frac{5}{6}}$; the values of the choices, however, are $2^{-\frac{1}{3}}$, $2^{\frac{5}{6}}$, and 1, respectively.

Question Difficulty:

Hard

Question ID c4cd5bcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: c4cd5bcc

In the xy -plane, the y -coordinate of the y -intercept of the graph of the function f is c .

Which of the following must be equal to c ?

- A. $f(0)$
- B. $f(1)$
- C. $f(2)$
- D. $f(3)$

ID: c4cd5bcc Answer

Correct Answer:

A

Rationale

Choice A is correct. A y -intercept is the point in the xy -plane where the graph of the function crosses the y -axis, which is where $x = 0$. It's given that the y -coordinate of the y -intercept of the graph of function f is c . It follows that the coordinate pair representing the y -intercept must be $(0, c)$. Therefore, c must equal $f(0)$.

Choices B, C, and D are incorrect because $f(1)$, $f(2)$, and $f(3)$ would represent the y -value of the coordinate where $x = 1$, $x = 2$, and $x = 3$, respectively.

Question Difficulty:

Medium

Question ID 68607eca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 68607eca

On April 1, there were 233 views of an advertisement posted on a website. Every 2 days after April 1, the number of views of the advertisement had increased by 70% of the number of views 2 days earlier. The function f gives the predicted number of views x days after April 1. Which equation defines f ?

- A. $f(x) = 233(0.70)^{\frac{x}{2}}$
- B. $f(x) = 233(0.70)^{2x}$
- C. $f(x) = 233(1.70)^{\frac{x}{2}}$
- D. $f(x) = 233(1.70)^{2x}$

ID: 68607eca Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that on April 1, there were 233 views of the advertisement. It's also given that every 2 days after April 1, the number of views of the advertisement had increased by 70% of the number of views 2 days earlier. This situation can be represented by an exponential function of the form $fx = a1 + \frac{r}{100}^{\frac{x}{c}}$, where a is the number of views on April 1 and every c days after April 1, the number of views had increased by $r\%$ of the number of views c days earlier. It follows that $a = 233$, $r = 70$, and $c = 2$. Substituting 233 for a , 70 for r , and 2 for c in the equation $fx = a1 + \frac{r}{100}^{\frac{x}{c}}$ yields $fx = 2331 + \frac{70}{100}^{\frac{x}{2}}$, or $fx = 2331.70^{\frac{x}{2}}$.

Choice A is incorrect. This function gives the predicted number of views for an advertisement for which every 2 days, the number of views was 70%, rather than increased by 70%, of the number of views 2 days earlier.

Choice B is incorrect. This function gives the predicted number of views for an advertisement for which every $\frac{1}{2}$ days, the number of views was 70% of the number of views $\frac{1}{2}$ days earlier, rather than an advertisement for which every 2 days, the number of views had increased by 70% of the number of views 2 days earlier.

Choice D is incorrect. This function gives the predicted number of views for an advertisement for which every $\frac{1}{2}$ days, rather than every 2 days, the number of views had increased by 70% of the number of views $\frac{1}{2}$ days earlier, rather than 2 days earlier.

Question Difficulty:

Medium

Question ID 71014fb1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 71014fb1

$$(x - 1)^2 = -4$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 71014fb1 Answer

Correct Answer:

D

Rationale

Choice D is correct. Any quantity that is positive or negative in value has a positive value when squared. Therefore, the left-hand side of the given equation is either positive or zero for any value of x . Since the right-hand side of the given equation is negative, there is no value of x for which the given equation is true. Thus, the number of distinct real solutions for the given equation is zero.

Choices A, B, and C are incorrect and may result from conceptual errors.

Question Difficulty:

Hard

Question ID 22fd3e1f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 22fd3e1f

$$f(x) = x^3 - 9x$$

$$g(x) = x^2 - 2x - 3$$

Which of the following expressions is

equivalent to $\frac{f(x)}{g(x)}$, for $x > 3$?

A. $\frac{1}{x+1}$

B. $\frac{x+3}{x+1}$

C. $\frac{x(x-3)}{x+1}$

D. $\frac{x(x+3)}{x+1}$

ID: 22fd3e1f Answer

Correct Answer:

D

Rationale

Choice D is correct. Since $x^3 - 9x = x(x+3)(x-3)$ and $x^2 - 2x - 3 = (x+1)(x-3)$, the fraction $\frac{f(x)}{g(x)}$ can be written as

$$\frac{x(x+3)(x-3)}{(x+1)(x-3)}$$
. It is given that $x > 3$, so the common factor $x - 3$ is not equal to 0. Therefore, the fraction can be further

simplified to $\frac{x(x+3)}{x+1}$.

Choice A is incorrect. The expression $\frac{1}{x+1}$ is not equivalent to $\frac{f(x)}{g(x)}$ because at $x = 0$, $\frac{1}{x+1}$ has a value of 1 and $\frac{f(x)}{g(x)}$ has a value of 0.

Choice B is incorrect and results from omitting the factor x in the factorization of $f(x)$. Choice C is incorrect and may result from incorrectly factoring $g(x)$ as $(x+1)(x+3)$ instead of $(x+1)(x-3)$.

Question Difficulty:
Hard

Question ID 78d5f91a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 78d5f91a

$$f(x) = x^3 + 3x^2 - 6x - 1$$

For the function f defined above, what is the value of $f(-1)$?

- A. -11
- B. -7
- C. 7
- D. 11

ID: 78d5f91a Answer

Correct Answer:

C

Rationale

Choice C is correct. Substituting -1 for x in the given function f gives $f(-1) = (-1)^3 + 3(-1)^2 - 6(-1) - 1$, which simplifies to $f(-1) = -1 + 3(1) - 6(-1) - 1$. This further simplifies to $f(-1) = -1 + 3 + 6 - 1$, or $f(-1) = 7$.

Choice A is incorrect and may result from correctly substituting -1 for x in the function but incorrectly simplifying the resulting expression to $f(-1) = -1 - 3 - 6 - 1$, or -11 . Choice B is incorrect and may result from arithmetic errors. Choice D is incorrect and may result from correctly substituting -1 for x in the function but incorrectly simplifying the expression to $f(-1) = 1 + 3 + 6 + 1$, or 11 .

Question Difficulty:

Medium

Question ID d675744f

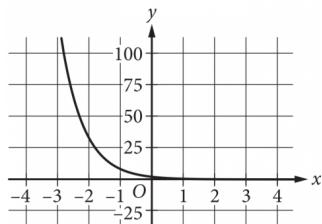
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d675744f

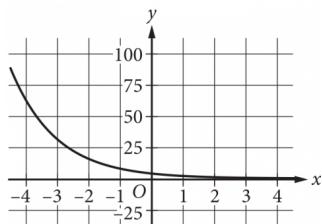
$$y = 4(2^x)$$

Which of the following is the graph in the xy -plane of the given equation?

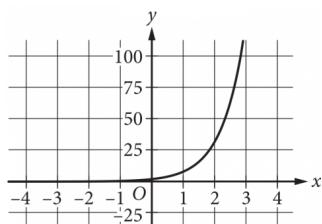
A.



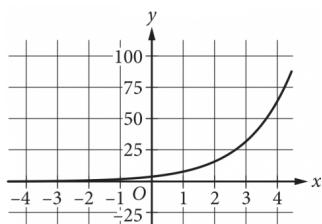
B.



C.



D.



ID: d675744f Answer

Correct Answer:

D

Rationale

Choice D is correct. The y-intercept of the graph of an equation is the point $(0, b)$, where b is the value of y when $x = 0$. For the given equation, $y = 4$ when $x = 0$. It follows that the y-intercept of the graph of the given equation is $(0, 4)$. Additionally, for the given equation, the value of y doubles for each increase of 1 in the value of x . Therefore, the graph contains the points $(1, 8)$, $(2, 16)$, $(3, 32)$, and $(4, 64)$. Only the graph shown in choice D passes through these points.

Choices A and B are incorrect because these are graphs of decreasing, not increasing, exponential functions. Choice C is incorrect because the value of y increases by a growth factor greater than 2 for each increase of 1 in the value of x .

Question Difficulty:

Medium

Question ID a0b4103e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a0b4103e

The expression $\frac{1}{3}x^2 - 2$ can be rewritten as $\frac{1}{3}(x-k)(x+k)$, where k is a positive constant. What is the value of k ?

- A. 2
- B. 6
- C. $\sqrt{2}$
- D. $\sqrt{6}$

ID: a0b4103e Answer

Correct Answer:

D

Rationale

Choice D is correct. Factoring out the coefficient $\frac{1}{3}$, the given expression can be rewritten as $\frac{1}{3}(x^2 - 6)$. The expression $x^2 - 6$ can be approached as a difference of squares and rewritten as $(x - \sqrt{6})(x + \sqrt{6})$. Therefore, k must be $\sqrt{6}$.

Choice A is incorrect. If k were 2, then the expression given would be rewritten as $\frac{1}{3}(x-2)(x+2)$, which is equivalent to $\frac{1}{3}x^2 - \frac{4}{3}$, not $\frac{1}{3}x^2 - 2$.

Choice B is incorrect. This may result from incorrectly factoring the expression and finding $(x-6)(x+6)$ as the factored form of the expression. Choice C is incorrect. This may result from incorrectly distributing the $\frac{1}{3}$ and rewriting the expression as $\frac{1}{3}(x^2 - 2)$.

Question Difficulty:

Hard

Question ID 5377d9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 5377d9cf

If $f(x) = \frac{x^2 - 6x + 3}{x - 1}$,

what is $f(-1)$?

- A. -5
- B. -2
- C. 2
- D. 5

ID: 5377d9cf Answer

Correct Answer:

A

Rationale

$$f(-1) = \frac{(-1)^2 - 6(-1) + 3}{(-1) - 1}$$

Choice A is correct. Substituting -1 for x in the equation that defines f gives

expressions in the numerator and denominator yields $\frac{1+6+3}{-2}$, which is equal to $\frac{10}{-2}$ or -5.

Choices B, C, and D are incorrect and may result from misapplying the order of operations when substituting -1 for x.

Question Difficulty:

Easy

Question ID f880f910

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f880f910

The area of a triangle is **270** square centimeters. The length of the base of the triangle is **12** centimeters greater than the height of the triangle. What is the height, in centimeters, of the triangle?

- A. **15**
- B. **18**
- C. **30**
- D. **36**

ID: f880f910 Answer

Correct Answer:

B

Rationale

Choice B is correct. The area, A , of a triangle is given by the formula $A = \frac{1}{2}bh$, where b represents the length of the base of the triangle and h represents its height. It's given that the area of a triangle is 270 square centimeters and that the length of the base of this triangle is 12 centimeters greater than the height of the triangle. Let x represent the height, in centimeters, of the triangle. It follows that the length of the base of the triangle can be expressed as $x + 12$. Substituting 270 for A , x for h , and $x + 12$ for b in the formula $A = \frac{1}{2}bh$ yields $270 = \frac{1}{2}(x + 12)(x)$, or $270 = \frac{1}{2}x(x + 12)$. Multiplying both sides of this equation by 2 yields $540 = x(x + 12)$. Applying the distributive property on the right-hand side of this equation yields $540 = x^2 + 12x$. Subtracting 540 from both sides of this equation yields $0 = x^2 + 12x - 540$. In factored form, this equation is equivalent to $(x + 30)(x - 18) = 0$. Applying the zero product property, it follows that $x + 30 = 0$ or $x - 18 = 0$. Subtracting 30 from both sides of the equation $x + 30 = 0$ yields $x = -30$. Adding 18 to both sides of the equation $x - 18 = 0$ yields $x = 18$. Since x represents the height of the triangle, it must be positive. Therefore, the height, in centimeters, of the triangle is 18.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID e9349667

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e9349667

$$y = x^2 + 2x + 1$$

$$x + y + 1 = 0$$

If (x_1, y_1) and (x_2, y_2) are the two solutions to the system of equations

above, what is the value of $y_1 + y_2$?

A. -3

B. -2

C. -1

D. 1

ID: e9349667 Answer

Correct Answer:

D

Rationale

Choice D is correct. The system of equations can be solved using the substitution method. Solving the second equation for y gives $y = -x - 1$. Substituting the expression $-x - 1$ for y into the first equation gives $-x - 1 = x^2 + 2x + 1$. Adding $x + 1$ to both sides of the equation yields $x^2 + 3x + 2 = 0$. The left-hand side of the equation can be factored by finding two numbers whose sum is 3 and whose product is 2, which gives $(x + 2)(x + 1) = 0$. Setting each factor equal to 0 yields $x + 2 = 0$ and $x + 1 = 0$, and solving for x yields $x = -2$ or $x = -1$. These values of x can be substituted for x in the equation $y = -x - 1$ to find the corresponding y -values: $y = -(-2) - 1 = 2 - 1 = 1$ and $y = -(-1) - 1 = 1 - 1 = 0$. It follows that $(-2, 1)$ and $(-1, 0)$ are the solutions to the given system of equations. Therefore, $(x_1, y_1) = (-2, 1)$, $(x_2, y_2) = (-1, 0)$, and $y_1 + y_2 = 1 + 0 = 1$.

Choice A is incorrect. The solutions to the system of equations are $(x_1, y_1) = (-2, 1)$ and $(x_2, y_2) = (-1, 0)$. Therefore, -3 is the sum of the x -coordinates of the solutions, not the sum of the y -coordinates of the solutions. Choices B and C are incorrect and may be the result of computation or substitution errors.

Question Difficulty:

Hard

Question ID 49efde89

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 49efde89

The expression $2x^2 + ax$ is equivalent to $x(2x + 7)$ for some constant a . What is the value of a ?

- A. 2
- B. 3
- C. 4
- D. 7

ID: 49efde89 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that $2x^2 + ax$ is equivalent to $x(2x + 7)$ for some constant a . Distributing the x over each term in the parentheses gives $2x^2 + 7x$, which is in the same form as the first given expression, $2x^2 + ax$. The coefficient of the second term in $2x^2 + 7x$ is 7. Therefore, the value of a is 7.

Choice A is incorrect. If the value of a were 2, then $2x^2 + ax$ would be equivalent to $2x^2 + 2x$, which isn't equivalent to $x(2x + 7)$.

Choice B is incorrect. If the value of a were 3, then $2x^2 + ax$ would be equivalent to $2x^2 + 3x$, which isn't equivalent to $x(2x + 7)$.

Choice C is incorrect. If the value of a were 4, then $2x^2 + ax$ would be equivalent to $2x^2 + 4x$, which isn't equivalent to $x(2x + 7)$.

Question Difficulty:

Easy

Question ID b03adde3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b03adde3

If $\frac{u-3}{t-2} = \frac{6}{u}$, what is t

in terms of u ?

A. $t = \frac{1}{u}$

B. $t = \frac{2u+9}{u}$

C. $t = \frac{1}{u-3}$

D. $t = \frac{2u}{u-3}$

ID: b03adde3 Answer

Correct Answer:

D

Rationale

Choice D is correct. Multiplying both sides of the given equation by $t-2$ yields $(t-2)(u-3) = 6$. Dividing both sides of this equation by $u-3$ yields $t-2 = \frac{6}{u-3}$. Adding 2 to both sides of this equation yields $t = \frac{6}{u-3} + 2$, which can be rewritten as $t = \frac{6}{u-3} + \frac{2(u-3)}{u-3}$. Since the fractions on the right-hand side of this equation have a common denominator, adding the fractions yields $t = \frac{6+2(u-3)}{u-3}$. Applying the distributive property to the numerator on the right-hand side of this equation yields $t = \frac{6+2u-6}{u-3}$, which is equivalent to $t = \frac{2u}{u-3}$.

Choices A, B, and C are incorrect and may result from various misconceptions or miscalculations.

Question Difficulty:

Hard

Question ID 75915e3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 75915e3c

$$f(x) = 2(3^x)$$

For the function f defined above, what is the value of $f(2)$?

- A. 9
- B. 12
- C. 18
- D. 36

ID: 75915e3c Answer

Correct Answer:

C

Rationale

Choice C is correct. The value of $f(2)$ is found by evaluating the expression $2(3^x)$ when $x = 2$. Substituting 2 for x in the given equation yields $f(2) = 2(3^2)$. Simplifying 3^2 in the equation results in $f(2) = 2(9)$. Evaluating the right-hand side of the equation yields $f(2) = 18$. Therefore, the value of $f(2)$ is 18.

Choice A is incorrect and may result from evaluating the expression as (3^2) . Choice B is incorrect and may result from evaluating the expression as $2(3 \cdot 2)$. Choice D is incorrect and may result from evaluating the expression as $(2 \cdot 3)^2$.

Question Difficulty:

Easy

Question ID f44a29a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f44a29a8

An object's kinetic energy, in joules, is equal to the product of one-half the object's mass, in kilograms, and the square of the object's speed, in meters per second. What is the speed, in meters per second, of an object with a mass of 4 kilograms and kinetic energy of 18 joules?

- A. 3
- B. 6
- C. 9
- D. 36

ID: f44a29a8 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that an object's kinetic energy, in joules, is equal to the product of one-half the object's mass, in kilograms, and the square of the object's speed, in meters per second. This relationship can be represented by the equation

$K = \frac{1}{2}mv^2$, where K is the kinetic energy, m is the mass, and v is the speed. Substituting a mass of 4 kilograms for m and a

kinetic energy of 18 joules for K results in the equation $18 = \left(\frac{1}{2}\right)(4)v^2$, or $18 = 2v^2$. Dividing both sides of this equation by 2 yields $9 = v^2$. Taking the square root of both sides yields $v = -3$ and $v = 3$. Since speed can't be expressed as a negative number, the speed of the object is 3 meters per second.

Choice B is incorrect and may result from computation errors. Choice C is incorrect. This is the value of v^2 rather than v. Choice D is incorrect. This is the value of $4v^2$ rather than v.

Question Difficulty:

Medium

Question ID b8c4a1cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b8c4a1cd

$$8j = k + 15m$$

The given equation relates the distinct positive numbers j , k , and m . Which equation correctly expresses j in terms of k and m ?

- A. $j = \frac{k}{8} + 15m$
- B. $j = k + \frac{15m}{8}$
- C. $j = 8(k + 15m)$
- D. $j = \frac{k+15m}{8}$

ID: b8c4a1cd Answer

Correct Answer:

D

Rationale

Choice D is correct. To express j in terms of k and m , the given equation must be solved for j . Dividing each side of the given equation by 8 yields $j = \frac{k+15m}{8}$.

Choice A is incorrect. This is equivalent to $8j = k + 120m$.

Choice B is incorrect. This is equivalent to $8j = 8k + 15m$.

Choice C is incorrect. This is equivalent to $\frac{j}{8} = k + 15m$.

Question Difficulty:

Easy

Question ID 7dbd46d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7dbd46d9

$$\begin{aligned}8x + y &= -11 \\2x^2 &= y + 341\end{aligned}$$

The graphs of the equations in the given system of equations intersect at the point (x, y) in the xy -plane. What is a possible value of x ?

- A. -15
- B. -11
- C. 2
- D. 8

ID: 7dbd46d9 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the graphs of the equations in the given system of equations intersect at the point x, y . Therefore, this intersection point is a solution to the given system. The solution can be found by isolating y in each equation. The given equation $8x + y = -11$ can be rewritten to isolate y by subtracting $8x$ from both sides of the equation, which gives $y = -8x - 11$. The given equation $2x^2 = y + 341$ can be rewritten to isolate y by subtracting 341 from both sides of the equation, which gives $2x^2 - 341 = y$. With each equation solved for y , the value of y from one equation can be substituted into the other, which gives $2x^2 - 341 = -8x - 11$. Adding $8x$ and 11 to both sides of this equation results in $2x^2 + 8x - 330 = 0$. Dividing both sides of this equation by 2 results in $x^2 + 4x - 165 = 0$. This equation can be rewritten by factoring the left-hand side, which yields $x + 15x - 11 = 0$. By the zero-product property, if $x + 15x - 11 = 0$, then $x + 15 = 0$, or $x - 11 = 0$. It follows that $x = -15$, or $x = 11$. Since only -15 is given as a choice, a possible value of x is -15.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 0121a235

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0121a235

x	$p(x)$
-2	5
-1	0
0	-3
1	-1
2	0

The table above gives selected values of a polynomial function p . Based on the values in the table, which of the following must be a factor of p ?

- A. $(x - 3)$
- B. $(x + 3)$
- C. $(x - 1)(x + 2)$
- D. $(x + 1)(x - 2)$

ID: 0121a235 Answer

Correct Answer:

D

Rationale

Choice D is correct. According to the table, when x is -1 or 2 , $p(x) = 0$. Therefore, two x -intercepts of the graph of p are $(-1, 0)$ and $(2, 0)$. Since $(-1, 0)$ and $(2, 0)$ are x -intercepts, it follows that $(x + 1)$ and $(x - 2)$ are factors of the polynomial equation. This is because when $x = -1$, the value of $x + 1$ is 0. Similarly, when $x = 2$, the value of $x - 2$ is 0. Therefore, the product $(x + 1)(x - 2)$ is a factor of the polynomial function p .

Choice A is incorrect. The factor $x - 3$ corresponds to an x -intercept of $(3, 0)$, which isn't present in the table. Choice B is incorrect. The factor $x + 3$ corresponds to an x -intercept of $(-3, 0)$, which isn't present in the table. Choice C is incorrect. The factors $x - 1$ and $x + 2$ correspond to x -intercepts $(1, 0)$ and $(-2, 0)$, respectively, which aren't present in the table.

Question Difficulty:

Hard

Question ID d71f6dbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d71f6dbf

The height, in feet, of an object x seconds after it is thrown straight up in the air can be modeled by the function $h(x) = -16x^2 + 20x + 5$. Based on the model, which of the following statements best interprets the equation $h(1.4) = 1.64$?

- A. The height of the object 1.4 seconds after being thrown straight up in the air is 1.64 feet.
- B. The height of the object 1.64 seconds after being thrown straight up in the air is 1.4 feet.
- C. The height of the object 1.64 seconds after being thrown straight up in the air is approximately 1.4 times as great as its initial height.
- D. The speed of the object 1.4 seconds after being thrown straight up in the air is approximately 1.64 feet per second.

ID: d71f6dbf Answer

Correct Answer:

A

Rationale

Choice A is correct. The value 1.4 is the value of x , which represents the number of seconds after the object was thrown straight up in the air. When the function h is evaluated for $x = 1.4$, the function has a value of 1.64, which is the height, in feet, of the object.

Choices B and C are incorrect and may result from misidentifying seconds as feet and feet as seconds. Additionally, choice C may result from incorrectly including the initial height of the object as the input x . Choice D is incorrect and may result from misidentifying height as speed.

Question Difficulty:

Medium

Question ID 630897df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 630897df

The speed of sound in dry air, v , can be modeled by the formula $v = 331.3 + 0.606T$,

where T is the temperature in degrees Celsius and v is measured in meters per second.

Which of the following correctly expresses T in terms of v ?

A. $T = \frac{v + 0.606}{331.3}$

B. $T = \frac{v - 0.606}{331.3}$

C. $T = \frac{v + 331.3}{0.606}$

D. $T = \frac{v - 331.3}{0.606}$

ID: 630897df Answer

Correct Answer:

D

Rationale

Choice D is correct. To express T in terms of v , subtract 331.3 from both sides of the equation, which gives $v - 331.3 = 0.606T$.

Dividing both sides of the equation by 0.606 gives $\frac{v - 331.3}{0.606} = T$.

Choices A, B, and C are incorrect and are the result of incorrect steps while solving for T .

Question Difficulty:

Medium

Question ID 20722644

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 20722644

The function f is defined by $f(x) = x^3 + 9$. What is the value of $f(2)$?

- A. 14
- B. 15
- C. 17
- D. 18

ID: 20722644 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that $f(x) = x^3 + 9$. Substituting 2 for x in this equation yields $f(2) = 2^3 + 9$. This is equivalent to $f(2) = 8 + 9$, or $f(2) = 17$.

Choice A is incorrect. This is the value of $2 + 3 + 9$, not $2^3 + 9$.

Choice B is incorrect. This is the value of $23 + 9$, not $2^3 + 9$.

Choice D is incorrect. This is the value of $3^2 + 9$, not $2^3 + 9$.

Question Difficulty:

Easy

Question ID bba18ecb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bba18ecb

When the quadratic function f is graphed in the xy -plane, where $y = f(x)$, its vertex is $(-3, 6)$. One of the x -intercepts of this graph is $(-\frac{17}{4}, 0)$. What is the other x -intercept of the graph?

- A. $(-\frac{29}{4}, 0)$
- B. $(-\frac{7}{4}, 0)$
- C. $(\frac{5}{4}, 0)$
- D. $(\frac{17}{4}, 0)$

ID: bba18ecb Answer

Correct Answer:

B

Rationale

Choice B is correct. Since the line of symmetry for the graph of a quadratic function contains the vertex of the graph, the x -coordinate of the vertex of the graph of $y = f(x)$ is the x -coordinate of the midpoint of its two x -intercepts. The midpoint of two points with x -coordinates x_1 and x_2 has x -coordinate x_m , where $x_m = \frac{x_1 + x_2}{2}$. It's given that the vertex is $-3, 6$ and one of the x -intercepts is $-\frac{17}{4}, 0$. Substituting -3 for x_m and $-\frac{17}{4}$ for x_1 in the equation $x_m = \frac{x_1 + x_2}{2}$ yields $-3 = \frac{-\frac{17}{4} + x_2}{2}$. Multiplying each side of this equation by 2 yields $-6 = -\frac{17}{4} + x_2$. Adding $\frac{17}{4}$ to each side of this equation yields $\frac{7}{4} = x_2$. Therefore, the other x -intercept is $\frac{7}{4}, 0$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 668f1863

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 668f1863

Function f is a quadratic function where $f(-20) = 0$ and $f(-4) = 0$. The graph of $y = f(x)$ in the xy -plane has a vertex at $(r, -64)$. What is the value of r ?

ID: 668f1863 Answer

Correct Answer:

-12

Rationale

The correct answer is -12. It's given that function f is a quadratic function where $f(-20) = 0$ and $f(-4) = 0$. It follows that the graph of $y = f(x)$ in the xy -plane passes through the points $(-20, 0)$ and $(-4, 0)$. When the graph of a quadratic function contains two points $(a, 0)$ and $(b, 0)$, the x -coordinate of the vertex of the graph is the average of a and b . Therefore, the x -coordinate of the vertex of the graph of $y = f(x)$ is $\frac{-20 + -4}{2}$, or -12. It's given that the graph of $y = f(x)$ in the xy -plane has a vertex at $(r, -64)$. It follows that the value of r is -12.

Question Difficulty:

Hard

Question ID 70753f99

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 70753f99

The function f is defined by $f(x) = (x + 3)(x + 1)$. The graph of f in the xy -plane is a parabola. Which of the following intervals contains the x -coordinate of the vertex of the graph of f ?

- A. $-4 < x < -3$
- B. $-3 < x < 1$
- C. $1 < x < 3$
- D. $3 < x < 4$

ID: 70753f99 Answer

Correct Answer:

B

Rationale

Choice B is correct. The graph of a quadratic function in the xy -plane is a parabola. The axis of symmetry of the parabola passes through the vertex of the parabola. Therefore, the vertex of the parabola and the midpoint of the segment between the two x -intercepts of the graph have the same x -coordinate. Since $f(-3) = f(-1) = 0$, the x -coordinate of the vertex is

$\frac{(-3) + (-1)}{2} = -2$. Of the shown intervals, only the interval in choice B contains -2 . Choices A, C, and D are incorrect and may result from either calculation errors or misidentification of the graph's x -intercepts.

Question Difficulty:

Hard

Question ID 568aaf27

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 568aaf27

$$x + y = 12$$

$$y = x^2$$

If (x, y) is a solution to the system of equations above, which of the following is a possible value of x ?

- A. 0
- B. 1
- C. 2
- D. 3

ID: 568aaf27 Answer

Correct Answer:

D

Rationale

Choice D is correct. Substituting x^2 from the second equation for y in the first equation yields $x + x^2 = 12$. Subtracting 12 from both sides of this equation and rewriting the equation results in $x^2 + x - 12 = 0$. Factoring the left-hand side of this equation yields $(x - 3)(x + 4) = 0$. Using the zero product property to solve for x , it follows that $x - 3 = 0$ and $x + 4 = 0$. Solving each equation for x yields $x = 3$ and $x = -4$, respectively. Thus, two possible values of x are 3 and -4 . Of the choices given, 3 is the only possible value of x .

Choices A, B, and C are incorrect. Substituting 0 for x in the first equation gives $0 + y = 12$, or $y = 12$; then, substituting 12 for y and 0 for x in the second equation gives $12 = 0^2$, or $12 = 0$, which is false. Similarly, substituting 1 or 2 for x in the first equation yields $y = 11$ or $y = 10$, respectively; then, substituting 11 or 10 for y in the second equation yields a false statement.

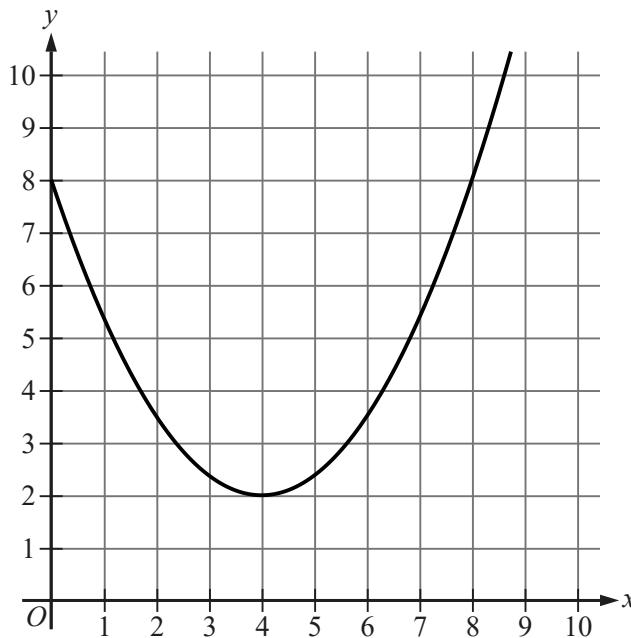
Question Difficulty:

Easy

Question ID 5e63b9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 5e63b9cf



The graph shows a marble's height above the ground y , in inches, x seconds after it started moving on an elevated track of a marble run. Which of the following is the best interpretation of the y -intercept of the graph?

- A. The marble's height was 0 inches above the ground 8 seconds after it started moving.
- B. The marble's height was 8 inches above the ground when it started moving.
- C. The marble's minimum height was 0 inches above the ground.
- D. The marble's minimum height was 8 inches above the ground.

ID: 5e63b9cf Answer

Correct Answer:

B

Rationale

Choice B is correct. The y -intercept of a graph is the point at which the graph intersects the y -axis. The graph shown intersects the y -axis at the point $(0, 8)$. Therefore, the y -intercept of the graph is $(0, 8)$. It's given that y is the height of the marble above the ground, in inches, and x is the number of seconds after the marble started moving. It follows that the marble's height was 8 inches above the ground 0 seconds after it started moving. Therefore, the best interpretation of the y -intercept of the graph is that the marble's height was 8 inches above the ground when it started moving.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID 6676f055

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6676f055

$$f(\theta) = -0.28(\theta - 27)^2 + 880$$

An engineer wanted to identify the best angle for a cooling fan in an engine in order to get the greatest airflow. The engineer discovered that the function above models the airflow $f(\theta)$, in cubic feet per minute, as a function of the angle of the fan θ , in degrees. According to the model, what angle, in degrees, gives the greatest airflow?

- A. -0.28
- B. 0.28
- C. 27
- D. 880

ID: 6676f055 Answer

Correct Answer:

C

Rationale

Choice C is correct. The function f is quadratic, so it will have either a maximum or a minimum at the vertex of the graph. Since the coefficient of the quadratic term (-0.28) is negative, the vertex will be at a maximum. The equation $f(\theta) = -0.28(\theta - 27)^2 + 880$ is given in vertex form, so the vertex is at $\theta = 27$. Therefore, an angle of 27 degrees gives the greatest airflow.

Choices A and B are incorrect and may be the result of misidentifying which value in a quadratic equation in vertex form represents the vertex. Choice D is incorrect. This choice identifies the maximum value of $f(\theta)$ rather than the value of θ for which $f(\theta)$ is maximized.

Question Difficulty:

Medium

Question ID 29ed5d39

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 29ed5d39

$$p = 20 + \frac{16}{n}$$

The given equation relates the numbers p and n , where n is not equal to 0 and $p > 20$. Which equation correctly expresses n in terms of p ?

- A. $n = \frac{p-20}{16}$
- B. $n = \frac{p}{16} + 20$
- C. $n = \frac{p}{16} - 20$
- D. $n = \frac{16}{p-20}$

ID: 29ed5d39 Answer

Correct Answer:

D

Rationale

Choice D is correct. To express n in terms of p , the given equation must be solved for n . Subtracting 9 from both sides of the given equation yields $p - 9 = \frac{14}{n}$. Since n is not equal to 0, multiplying both sides of this equation by n yields $p - 9n = 14$. It's given that $p > 9$, which means $p - 9$ is not equal to 0. Therefore, dividing both sides of $p - 9n = 14$ by $p - 9$ yields $\frac{p - 9n}{p - 9} = \frac{14}{p - 9}$, or $n = \frac{14}{p - 9}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 895628b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #006699; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 895628b5

$$y = (x - 2)(x + 4)$$

$$y = 6x - 12$$

Which ordered pair (x, y) is the solution to the given system of equations?

- A. $(0, 2)$
- B. $(-4, 2)$
- C. $(2, 0)$
- D. $(2, -4)$

ID: 895628b5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The second equation in the given system of equations is $y = 6x - 12$. Substituting $6x - 12$ for y in the first equation of the given system yields $6x - 12 = x - 2x + 4$. Factoring 6 out of the left-hand side of this equation yields $6x - 2 = x - 2x + 4$. An expression with a factor of the form $x - a$ is equal to zero when $x = a$. Each side of this equation has a factor of $x - 2$, so each side of the equation is equal to zero when $x = 2$. Substituting 2 for x into the equation $6x - 2 = x - 2x + 4$ yields $6(2) - 2 = 2 - 2(2) + 4$, or $0 = 0$, which is true. Substituting 2 for x into the second equation in the given system of equations yields $y = 6(2) - 12$, or $y = 0$. Therefore, the solution to the system of equations is the ordered pair $(2, 0)$.

Choice A is incorrect and may result from switching the order of the solutions for x and y .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 8f82ad81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8f82ad81

Which expression is equivalent to $4(x^2 + 6)$?

- A. $4x^2 + 24$
- B. $4x^2 + 10$
- C. $4x^2 + 6$
- D. $4x^2 - 2$

ID: 8f82ad81 Answer

Correct Answer:

A

Rationale

Choice A is correct. The expression $4(x^2 + 6)$ can be rewritten as $4x^2 + 4(6)$, which is equivalent to $4x^2 + 24$.

Choice B is incorrect. This expression is equivalent to $4x^2 + \frac{5}{2}$, not $4x^2 + 6$.

Choice C is incorrect. This expression is equivalent to $4x^2 + \frac{3}{2}$, not $4x^2 + 6$.

Choice D is incorrect. This expression is equivalent to $4x^2 - \frac{1}{2}$, not $4x^2 + 6$.

Question Difficulty:

Easy

Question ID 26eb61c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 26eb61c1

Which expression is equivalent to $6x^8y^2 + 12x^2y^2$?

- A. $6x^2y^2(2x^6)$
- B. $6x^2y^2(x^4)$
- C. $6x^2y^2(x^6 + 2)$
- D. $6x^2y^2(x^4 + 2)$

ID: 26eb61c1 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since each term of the given expression has a common factor of $6x^2y^2$, it may be rewritten as $6x^2y^2(x^6) + 6x^2y^2(2)$, or $6x^2y^2(x^6 + 2)$.

Choice A is incorrect. This expression is equivalent to $12x^8y^2$, not $6x^8y^2 + 12x^2y^2$.

Choice B is incorrect. This expression is equivalent to $6x^6y^2$, not $6x^8y^2 + 12x^2y^2$.

Choice D is incorrect. This expression is equivalent to $6x^6y^2 + 12x^2y^2$, not $6x^8y^2 + 12x^2y^2$.

Question Difficulty:

Medium

Question ID dd8ac009

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: dd8ac009

Time (years)	Total amount (dollars)
0	670.00
1	674.02
2	678.06

Sara opened a savings account at a bank. The table shows the exponential relationship between the time t , in years, since Sara opened the account and the total amount d , in dollars, in the account. If Sara made no additional deposits or withdrawals, which of the following equations best represents the relationship between t and d ?

- A. $d = 0.006(1 + 670)^t$
- B. $d = 670(1 + 0.006)^t$
- C. $d = (1 + 0.006)^t$
- D. $d = (1 + 670)^t$

ID: dd8ac009 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the relationship between t and d is exponential. The table shows that the value of d increases as the value of t increases. Therefore, the relationship between t and d can be represented by an increasing exponential equation of the form $d = a1 + b^t$, where a and b are positive constants. The table shows that when $t = 0$, $d = 670$. Substituting 0 for t and 670 for d in the equation $d = a1 + b^t$ yields $670 = a1 + b^0$, which is equivalent to $670 = a1$, or $670 = a$. Substituting 670 for a in the equation $d = a1 + b^t$ yields $d = 6701 + b^t$. The table also shows that when $t = 1$, $d = 674.02$. Substituting 1 for t and 674.02 for d in the equation $d = 6701 + b^t$ yields $674.02 = 6701 + b^1$, or $674.02 = 6701 + b$. Dividing both sides of this equation by 670 yields $1.006 = 1 + b$. Subtracting 1 from both sides of this equation yields $b = 0.006$. Substituting 0.006 for b in the equation $d = 6701 + b^t$ yields $d = 6701 + 0.006^t$. Therefore, of the choices, choice B best represents the relationship between t and d .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 58dcc59f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58dcc59f

A landscaper is designing a rectangular garden. The length of the garden is to be 5 feet longer than the width. If the area of the garden will be 104 square feet, what will be the length, in feet, of the garden?

ID: 58dcc59f Answer

Rationale

The correct answer is 13. Let w represent the width of the rectangular garden, in feet. Since the length of the garden will be 5 feet longer than the width of the garden, the length of the garden will be $w + 5$ feet. Thus the area of the garden will be $w(w + 5)$. It is also given that the area of the garden will be 104 square feet. Therefore, $w(w + 5) = 104$, which is equivalent to $w^2 + 5w - 104 = 0$. Factoring this equation results in $(w + 13)(w - 8) = 0$. Therefore, $w = 8$ and $w = -13$. Because width cannot be negative, the width of the garden must be 8 feet. This means the length of the garden must be $8 + 5 = 13$ feet.

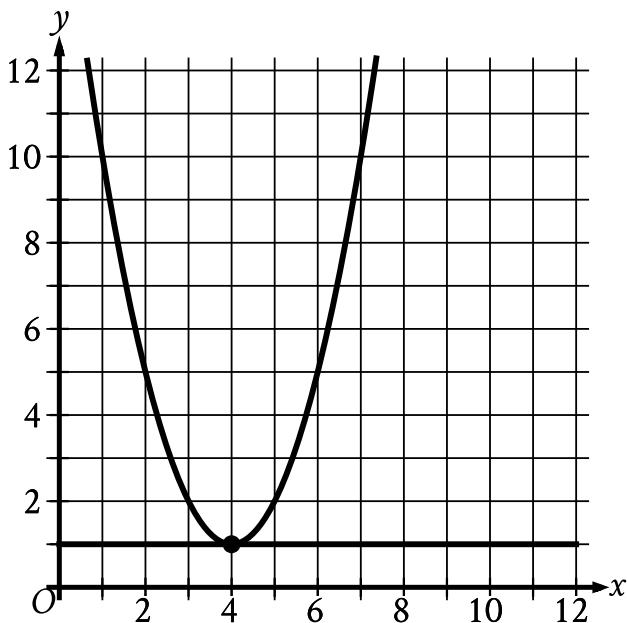
Question Difficulty:

Hard

Question ID d0e8e8f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: d0e8e8f5



The graph of a system of a linear and a quadratic equation is shown. What is the solution (x, y) to this system?

- A. $(0, 0)$
- B. $(-4, 1)$
- C. $(4, -1)$
- D. $(4, 1)$

ID: d0e8e8f5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The solution to the system corresponds to the point where the graphs of the equations intersect. The graphs of the linear equation and the quadratic equation shown intersect at the point $(4, 1)$. Therefore, $(4, 1)$ is the solution to this system.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 9ed9f54d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ed9f54d

Which of the following is equivalent to $2(x^2 - x) + 3(x^2 - x)$?

- A. $5x^2 - 5x$
- B. $5x^2 + 5x$
- C. $5x$
- D. $5x^2$

ID: 9ed9f54d Answer

Correct Answer:

A

Rationale

Choice A is correct. Since $(x^2 - x)$ is a common term in the original expression, like terms can be added:
 $2(x^2 - x) + 3(x^2 - x) = 5(x^2 - x)$. Distributing the constant term 5 yields $5x^2 - 5x$.

Choice B is incorrect and may result from not distributing the negative signs in the expressions within the parentheses. Choice C is incorrect and may result from not distributing the negative signs in the expressions within the parentheses and from incorrectly eliminating the x^2 -term. Choice D is incorrect and may result from incorrectly eliminating the x-term.

Question Difficulty:

Easy

Question ID 18c7c3e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 18c7c3e0

Which expression is equivalent to $13x^2 - 7x^2$?

- A. $-91x^2$
- B. $6x^2$
- C. $20x^2$
- D. $40x^2$

ID: 18c7c3e0 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since each term in the given expression has a common factor of x^2 , it can be rewritten as $(13 - 7)x^2$, or $6x^2$. Therefore, the expression $6x^2$ is equivalent to $13x^2 - 7x^2$.

Alternate approach: Since the two terms of the given expression are both constant multiples of x^2 , they are like terms and can, therefore, be combined through subtraction. Subtracting like terms in the expression $13x^2 - 7x^2$ yields $6x^2$.

Choice A is incorrect. This expression is equivalent to $(13x)(-7x)$, not $13x^2 - 7x^2$.

Choice C is incorrect. This expression is equivalent to $13x^2 + 7x^2$, not $13x^2 - 7x^2$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 30281058

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 30281058

In the xy -plane, the graph of $y = x^2 - 9$ intersects line p at $(1, a)$ and $(5, b)$, where a and b are constants. What is the slope of line p ?

- A. 6
- B. 2
- C. -2
- D. -6

ID: 30281058 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the graph of $y = x^2 - 9$ and line p intersect at $(1, a)$ and $(5, b)$. Therefore, the value of y when $x = 1$ is the value of a , and the value of y when $x = 5$ is the value of b . Substituting 1 for x in the given equation yields $y = (1)^2 - 9$, or $y = -8$. Similarly, substituting 5 for x in the given equation yields $y = (5)^2 - 9$, or $y = 16$. Therefore, the intersection points are $(1, -8)$ and $(5, 16)$. The slope of line p is the ratio of the change in y to the change in x between these two

points: $\frac{16 - (-8)}{5 - 1} = \frac{24}{4}$, or 6.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors in determining the values of a , b , or the slope of line p .

Question Difficulty:

Hard

Question ID 294db8ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 294db8ec

Which of the following is equivalent to $2x^3 + 4$?

- A. $4(x^3 + 4)$
- B. $4(x^3 + 2)$
- C. $2(x^3 + 4)$
- D. $2(x^3 + 2)$

ID: 294db8ec Answer

Correct Answer:

D

Rationale

Choice D is correct. The expression $2x^3 + 4$ has two terms, $2x^3$ and 4. The greatest common factor of these two terms is 2. Factoring 2 from each of these terms yields $2(x^3) + 2(2)$, or $2(x^3 + 2)$.

Choices A and B are incorrect because 4 is not a factor of the term $2x^3$. Choice C is incorrect and may result from factoring 2 from $2x^3$ but not from 4.

Question Difficulty:

Easy

Question ID 84dd43f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 84dd43f8

For the function f , $f(0) = 86$, and for each increase in x by 1, the value of $f(x)$ decreases by 80%. What is the value of $f(2)$?

ID: 84dd43f8 Answer

Correct Answer:

3.44, 86/25

Rationale

The correct answer is 3.44. It's given that $f(0) = 86$ and that for each increase in x by 1, the value of $f(x)$ decreases by 80%. Because the output of the function decreases by a constant percentage for each 1-unit increase in the value of x , this relationship can be represented by an exponential function of the form $f(x) = ab^x$, where a represents the initial value of the function and b represents the rate of decay,

expressed as a decimal. Because $f(0) = 86$, the value of a must be 86. Because the value of $f(x)$ decreases by 80% for each 1-unit increase in x , the value of b must be $(1 - 0.80)$, or 0.2. Therefore, the function f can be defined by $f(x) = 860 \cdot 2^x$. Substituting 2 for x in this function yields $f(2) = 860 \cdot 2^2$, which is equivalent to $f(2) = 860 \cdot 0.04$, or $f(2) = 3.44$. Either 3.44 or 86 / 25 may be entered as the correct answer.

Alternate approach: It's given that $f(0) = 86$ and that for each increase in x by 1, the value of $f(x)$ decreases by 80%. Therefore, when $x = 1$, the value of $f(x)$ is $(100 - 80)\%$, or 20%, of 86, which can be expressed as 0.2086. Since $0.2086 \cdot 86 = 17.2$, the value of $f(1)$ is 17.2. Similarly, when $x = 2$, the value of $f(x)$ is 20% of 17.2, which can be expressed as $0.20 \cdot 17.2$. Since $0.20 \cdot 17.2 = 3.44$, the value of $f(2)$ is 3.44. Either 3.44 or 86 / 25 may be entered as the correct answer.

Question Difficulty:

Hard

Question ID 59d1f4b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 59d1f4b5

$$M = 1,800(1.02)^t$$

The equation above models the number of members, M , of a gym t years after the gym opens. Of the following, which equation models the number of members of the gym q quarter years after the gym opens?

A. $M = 1,800(1.02)^{\frac{q}{4}}$

B. $M = 1,800(1.02)^{4q}$

C. $M = 1,800(1.005)^{4q}$

D. $M = 1,800(1.082)^q$

ID: 59d1f4b5 Answer

Correct Answer:

A

Rationale

Choice A is correct. In 1 year, there are 4 quarter years, so the number of quarter years, q , is 4 times the number of years, t ; that is,

$$q = 4t. \text{ This is equivalent to } t = \frac{q}{4}, \text{ and substituting this into the expression for } M \text{ in terms of } t \text{ gives } M = 1,800(1.02)^{\frac{q}{4}}.$$

Choices B and D are incorrect and may be the result of incorrectly using $t = 4q$ instead of $q = 4t$. (Choices B and D are nearly the same since 1.02^{4q} is equivalent to $(1.02^4)^q$, which is approximately 1.082^q .) Choice C is incorrect and may be the result of incorrectly using $t = 4q$ and unnecessarily dividing 0.02 by 4.

Question Difficulty:

Hard

Question ID 281a4f3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: 281a4f3b

A certain college had 3,000 students enrolled in 2015. The college predicts that after 2015, the number of students enrolled each year will be 2% less than the number of students enrolled the year before. Which of the following functions models the relationship between the number of students enrolled, $f(x)$, and the number of years after 2015, x ?

- A. $f(x) = 0.02(3,000)^x$
- B. $f(x) = 0.98(3,000)^x$
- C. $f(x) = 3,000(0.02)^x$
- D. $f(x) = 3,000(0.98)^x$

ID: 281a4f3b Answer

Correct Answer:

D

Rationale

Choice D is correct. Because the change in the number of students decreases by the same percentage each year, the relationship between the number of students and the number of years can be modeled with a decreasing exponential function in the form $f(x) = a(1 - r)^x$, where $f(x)$ is the number of students, a is the number of students in 2015, r is the rate of decrease each year, and x is the number of years since 2015. It's given that 3,000 students were enrolled in 2015 and that the rate of decrease is predicted to be 2%, or 0.02. Substituting these values into the decreasing exponential function yields $f(x) = 3,000(1 - 0.02)^x$, which is equivalent to $f(x) = 3,000(0.98)^x$.

Choices A, B, and C are incorrect and may result from conceptual errors when translating the given information into a decreasing exponential function.

Question Difficulty:

Medium

Question ID f237ccfc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f237ccfc

The sum of $-2x^2 + x + 31$ and $3x^2 + 7x - 8$ can be written in the form $ax^2 + bx + c$,

where a , b , and c are constants. What is the value of $a + b + c$?

ID: f237ccfc Answer

Rationale

The correct answer is 32. The sum of the given expressions is $(-2x^2 + x + 31) + (3x^2 + 7x - 8)$. Combining like terms yields $x^2 + 8x + 23$. Based on the form of the given equation, $a = 1$, $b = 8$, and $c = 23$. Therefore, $a + b + c = 32$.

Alternate approach: Because $a + b + c$ is the value of $ax^2 + bx + c$ when $x = 1$, it is possible to first make that substitution into each polynomial before adding them. When $x = 1$, the first polynomial is equal to $-2 + 1 + 31 = 30$ and the second polynomial is equal to $3 + 7 - 8 = 2$. The sum of 30 and 2 is 32.

Question Difficulty:

Medium

Question ID a391ed22

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a391ed22

$$\left(\frac{1}{2}x + \frac{3}{2}\right)\left(\frac{3}{2}x + \frac{1}{2}\right)$$

The expression above is equivalent to $ax^2 + bx + c$, where a , b , and c are constants. What is the value of b ?

ID: a391ed22 Answer

Rationale

The correct answer is $\frac{5}{2}$. The expression $\left(\frac{1}{2}x + \frac{3}{2}\right)\left(\frac{3}{2}x + \frac{1}{2}\right)$ can be written in the form $ax^2 + bx + c$, where a , b , and c are constants, by multiplying out the expression using the distributive property of multiplication over addition. The result is $\left(\frac{1}{2}x\right)\left(\frac{3}{2}x\right) + \left(\frac{1}{2}x\right)\left(\frac{1}{2}\right) + \left(\frac{3}{2}\right)\left(\frac{3}{2}x\right) + \left(\frac{3}{2}\right)\left(\frac{1}{2}\right)$. This expression can be rewritten by multiplying as indicated to give $\frac{3}{4}x^2 + \frac{1}{4}x + \frac{9}{4}x + \frac{3}{4}$, which can be simplified to $\frac{3}{4}x^2 + \frac{10}{4}x + \frac{3}{4}$, or $\frac{3}{4}x^2 + \frac{5}{2}x + \frac{3}{4}$. This is in the form $ax^2 + bx + c$, where the value of b is $\frac{5}{2}$. Note that $5/2$ and 2.5 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID c77ef2fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: c77ef2fb

Blood volume, V_B , in a human can be determined using the equation $V_B = \frac{V_P}{1-H}$, where V_P is the plasma volume and H is the hematocrit (the fraction of blood volume that is red blood cells). Which of the following correctly expresses the hematocrit in terms of the blood volume and the plasma volume?

A. $H = 1 - \frac{V_P}{V_B}$

B. $H = \frac{V_B}{V_P}$

C. $H = 1 + \frac{V_B}{V_P}$

D. $H = V_B - V_P$

ID: c77ef2fb Answer

Correct Answer:

A

Rationale

Choice A is correct. The hematocrit can be expressed in terms of the blood volume and the plasma volume by solving the given

equation $V_B = \frac{V_P}{1-H}$ for H . Multiplying both sides of this equation by $(1-H)$ yields $V_B(1-H) = V_P$. Dividing both sides by V_B yields $1-H = \frac{V_P}{V_B}$. Subtracting 1 from both sides yields $-H = -1 + \frac{V_P}{V_B}$. Dividing both sides by -1 yields $H = 1 - \frac{V_P}{V_B}$.

Choices B, C, and D are incorrect and may result from errors made when manipulating the equation.

Question Difficulty:

Medium

Question ID b76a2815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b76a2815

$$P = \frac{W}{t}$$

The power P produced by a machine is represented by the equation above, where W is the work performed during an amount of time t . Which of the following correctly expresses W in terms of P and t ?

- A. $W = Pt$
- B. $W = \frac{P}{t}$
- C. $W = \frac{t}{P}$
- D. $W = P + t$

ID: b76a2815 Answer

Correct Answer:

A

Rationale

Choice A is correct. Multiplying both sides of the equation by t yields $P \cdot t = (\frac{W}{t}) \cdot t$, or $Pt = W$, which expresses W in terms of P and t . This is equivalent to $W = Pt$.

Choices B, C, and D are incorrect. Each of the expressions given in these answer choices gives W in terms of P and t but doesn't maintain the given relationship between W , P , and t . These expressions may result from performing different operations with t on each side of the equation. In choice B, W has been multiplied by t , and P has been divided by t . In choice C, W has been multiplied by t , and the quotient of P divided by t has been reciprocated. In choice D, W has been multiplied by t , and P has been added to t . However, in order to maintain the relationship between the variables in the given equation, the same operation must be performed with t on each side of the equation.

Question Difficulty:

Easy

Question ID 364a2d25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 364a2d25

$$x + y = 17$$

$$xy = 72$$

If one solution to the system of equations above is (x, y) ,

what is one possible value of x ?

ID: 364a2d25 Answer

Rationale

The correct answer is either 8 or 9. The first equation can be rewritten as $y = 17 - x$. Substituting $17 - x$ for y in the second equation gives $x(17 - x) = 72$. By applying the distributive property, this can be rewritten as $17x - x^2 = 72$. Subtracting 72 from both sides of the equation yields $x^2 - 17x + 72 = 0$. Factoring the left-hand side of this equation yields $(x - 8)(x - 9) = 0$. Applying the Zero Product Property, it follows that $x - 8 = 0$ and $x - 9 = 0$. Solving each equation for x yields $x = 8$ and $x = 9$ respectively. Note that 8 and 9 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 100030d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 100030d9

A rubber ball bounces upward one-half the height that it falls each time it hits the ground. If the ball was originally dropped from a distance of 20.0 feet above the ground, what was its maximum height above the ground, in feet, between the third and fourth time it hit the ground?

ID: 100030d9 Answer

Rationale

The correct answer is 2.5. After hitting the ground once, the ball bounces to $20.0 \div 2 = 10.0$ feet. After hitting the ground a second time, the ball bounces to $10.0 \div 2 = 5.0$ feet. After hitting the ground for the third time, the ball bounces to $5.0 \div 2 = 2.5$ feet. Note that 2.5 and $5/2$ are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID d84a514a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d84a514a

The function $f(x) = 240,000(1.22)^x$ gives a company's predicted annual revenue, in dollars, x years after the company started selling jewelry online, where $0 < x \leq 10$. What is the best interpretation of the statement " $f(5)$ is approximately equal to 648,650" in this context?

- A. 5 years after the company started selling jewelry online, its predicted annual revenue is approximately 648,650 dollars.
- B. 5 years after the company started selling jewelry online, its predicted annual revenue will have increased by a total of approximately 648,650 dollars.
- C. When the company's predicted annual revenue is approximately 648,650 dollars, it is 5 times the predicted annual revenue for the previous year.
- D. When the company's predicted annual revenue is approximately 648,650 dollars, it is 5% greater than the predicted annual revenue for the previous year.

ID: d84a514a Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function f gives a company's predicted annual revenue, in dollars, x years after the company started selling jewelry online. Since the value of $f(5)$ is the value of $f(x)$ when $x = 5$, it follows that " $f(5)$ is approximately equal to 648,650" means that $f(x)$ is approximately equal to 648,650 when $x = 5$. Therefore, the best interpretation of the given statement is that 5 years after the company started selling jewelry online, its predicted annual revenue is approximately 648,650 dollars.

Choice B is incorrect. The function f gives the predicted annual revenue, not the predicted increase in annual revenue.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect. In the given function, x represents the number of years after the company started selling jewelry online, not the percent increase in revenue from the previous year.

Question Difficulty:

Easy

Question ID 5910bfff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #003366; height: 10px;"></div>

ID: 5910bfff

$$D = T - \frac{9}{25}(100 - H)$$

The formula above can be used to approximate the dew point D , in degrees Fahrenheit, given the temperature T , in degrees Fahrenheit, and the relative humidity of H percent, where $H > 50$. Which of the following expresses the relative humidity in terms of the temperature and the dew point?

A. $H = \frac{25}{9}(D - T) + 100$

B. $H = \frac{25}{9}(D - T) - 100$

C. $H = \frac{25}{9}(D + T) + 100$

D. $H = \frac{25}{9}(D + T) - 100$

ID: 5910bfff Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that $D = T - \frac{9}{25}(100 - H)$. Solving this formula for H expresses the relative humidity in terms of

the temperature and the dew point. Subtracting T from both sides of this equation yields $D - T = -\frac{9}{25}(100 - H)$. Multiplying

both sides by $-\frac{25}{9}$ yields $-\frac{25}{9}(D - T) = 100 - H$. Subtracting 100 from both sides yields $-\frac{25}{9}(D - T) - 100 = -H$.

Multiplying both sides by -1 results in the formula $\frac{25}{9}(D - T) + 100 = H$.

Choices B, C, and D are incorrect and may result from errors made when rewriting the given formula.

Question Difficulty:
Hard

Question ID 6e06a0a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e06a0a7

Which of the following expressions is equivalent to $2a^2(a+3)$?

- A. $5a^3$
- B. $8a^5$
- C. $2a^3 + 3$
- D. $2a^3 + 6a^2$

ID: 6e06a0a7 Answer

Correct Answer:

D

Rationale

Choice D is correct. Expanding the given expression using the distributive property yields $2a^2(a) + 2a^2(3)$. Combining like terms yields $2a^2(a^1) + (2 \times 3)(a^2)$, or $2a^{2+1} + 6a^2$, which is equivalent to $2a^3 + 6a^2$.

Choices A and B are incorrect and may result from incorrectly combining like terms. Choice C is incorrect and may result from distributing $2a^2$ only to a , and not to 3, in the given expression.

Question Difficulty:

Easy

Question ID ad038c19

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: ad038c19

Which of the following is

equivalent to $\left(a + \frac{b}{2}\right)^2$?

A. $a^2 + \frac{b^2}{2}$

B. $a^2 + \frac{b^2}{4}$

C. $a^2 + \frac{ab}{2} + \frac{b^2}{2}$

D. $a^2 + ab + \frac{b^2}{4}$

ID: ad038c19 Answer

Correct Answer:

D

Rationale

Choice D is correct. The expression $\left(a + \frac{b}{2}\right)^2$ can be rewritten as $\left(a + \frac{b}{2}\right)\left(a + \frac{b}{2}\right)$. Using the distributive property, the

expression yields $\left(a + \frac{b}{2}\right)\left(a + \frac{b}{2}\right) = a^2 + \frac{ab}{2} + \frac{ab}{2} + \frac{b^2}{4}$. Combining like terms gives $a^2 + ab + \frac{b^2}{4}$.

Choices A, B, and C are incorrect and may result from errors using the distributive property on the given expression or combining like terms.

Question Difficulty:

Hard

Question ID c7a187a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: c7a187a7

$$f(x) = x^2 - 18x - 360$$

If the given function f is graphed in the xy -plane, where $y = f(x)$, what is an x -intercept of the graph?

- A. $(-12, 0)$
- B. $(-30, 0)$
- C. $(-360, 0)$
- D. $(12, 0)$

ID: c7a187a7 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that $y = fx$. The x -intercepts of a graph in the xy -plane are the points where $y = 0$. Thus, for an x -intercept of the graph of function f , $0 = fx$. Substituting 0 for fx in the equation $fx = x^2 - 18x - 360$ yields $0 = x^2 - 18x - 360$. Factoring the right-hand side of this equation yields $0 = x + 12x - 30$. By the zero product property, $x + 12 = 0$ and $x - 30 = 0$. Subtracting 12 from both sides of the equation $x + 12 = 0$ yields $x = -12$. Adding 30 to both sides of the equation $x - 30 = 0$ yields $x = 30$. Therefore, the x -intercepts of the graph of $y = fx$ are $-12, 0$ and $30, 0$. Of these two x -intercepts, only $-12, 0$ is given as a choice.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

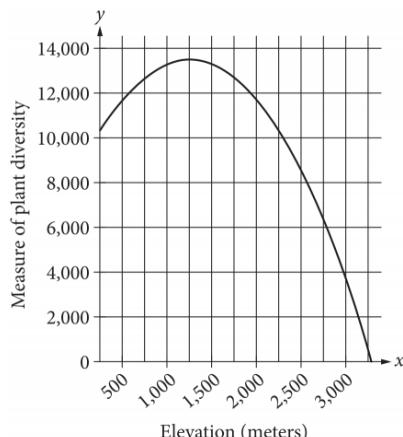
Question Difficulty:

Medium

Question ID ebe4bde0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: ebe4bde0



The quadratic function graphed above models a particular measure of plant diversity as a function of the elevation in a region of Switzerland. According to the model, which of the following is closest to the elevation, in meters, at which plant diversity is greatest?

- A. 13,500
- B. 3,000
- C. 1,250
- D. 250

ID: ebe4bde0 Answer

Correct Answer:

C

Rationale

Choice C is correct. Each point (x, y) on the graph represents the elevation x , in meters, and the corresponding measure of plant diversity y in a region of Switzerland. Therefore, the point on the graph with the greatest y -coordinate represents the location that has the greatest measure of plant diversity in the region. The greatest y -coordinate of any point on the graph is approximately 13,500. The x -coordinate of that point is approximately 1,250. Therefore, the closest elevation at which the plant diversity is the greatest is 1,250 meters.

Choice A is incorrect. This value is closest to the greatest y -coordinate of any point on the graph and therefore represents the greatest measure of plant diversity, not the elevation where the greatest measure of plant diversity occurs. Choice B is incorrect. At an elevation of 3,000 meters the measure of plant diversity is approximately 4,000. Because there are points on the graph with greater y -coordinates, 4,000 can't be the greatest measure of plant diversity, and 3,000 meters isn't the elevation at which the greatest measure of plant diversity occurs. Choice D is incorrect. At an elevation of 250 meters, the measure of plant diversity is approximately 11,000. Because there are points on the graph with greater y -coordinates, 11,000 can't be the greatest measure of plant diversity and 250 meters isn't the elevation at which the greatest measure of plant diversity occurs.

Question Difficulty:

Easy

Question ID 635f54ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 635f54ee

$$6\left(\frac{a}{4}\right)^2$$

The surface area of a cube is $6\left(\frac{a}{4}\right)^2$, where a is a positive constant. Which of the following gives the perimeter of one face of the cube?

A. $\frac{a}{4}$

B. a

C. $4a$

D. $6a$

ID: 635f54ee Answer

Correct Answer:

B

Rationale

Choice B is correct. A cube has 6 faces of equal area, so if the total surface area of a cube is $6\left(\frac{a}{4}\right)^2$, then the area of one face is $\left(\frac{a}{4}\right)^2$. Likewise, the area of one face of a cube is the square of one of its edges; therefore, if the area of one face is $\left(\frac{a}{4}\right)^2$, then the length of one edge of the cube is $\frac{a}{4}$. Since the perimeter of one face of a cube is four times the length of one edge, the perimeter is $4\left(\frac{a}{4}\right) = a$.

Choice A is incorrect because if the perimeter of one face of the cube is $\frac{a}{4}$, then the total surface area of the cube is

$6\left(\frac{a}{4}\right)^2 = 6\left(\frac{a}{16}\right)^2$, which is not $6\left(\frac{a}{4}\right)^2$. Choice C is incorrect because if the perimeter of one face of the cube is $4a$, then the total surface area of the cube is $6\left(\frac{4a}{4}\right)^2 = 6a^2$, which is not $6\left(\frac{a}{4}\right)^2$. Choice D is incorrect because if the perimeter of one face of the cube is $6a$, then the total surface area of the cube is $6\left(\frac{6a}{4}\right)^2 = 6\left(\frac{3a}{2}\right)^2$, which is not $6\left(\frac{a}{4}\right)^2$.

Question Difficulty:

Hard

Question ID 0980fcdd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0980fcdd

$$\begin{aligned}x^2 &= 6x + y \\y &= -6x + 36\end{aligned}$$

A solution to the given system of equations is (x, y) . Which of the following is a possible value of xy ?

- A. 0
- B. 6
- C. 12
- D. 36

ID: 0980fcdd Answer

Correct Answer:

A

Rationale

Choice A is correct. Solutions to the given system of equations are ordered pairs (x, y) that satisfy both equations in the system. Adding the left-hand and right-hand sides of the equations in the system yields $x^2 + y = 6x + -6x + y + 36$, or $x^2 + y = y + 36$. Subtracting y from both sides of this equation yields $x^2 = 36$. Taking the square root of both sides of this equation yields $x = 6$ and $x = -6$. Therefore, there are two solutions to this system of equations, one with an x -coordinate of 6 and the other with an x -coordinate of -6 . Substituting 6 for x in the second equation yields $y = -6(6) + 36$, or $y = 0$; therefore, one solution is $(6, 0)$. Similarly, substituting -6 for x in the second equation yields $y = -6(-6) + 36$, or $y = 72$; therefore, the other solution is $(-6, 72)$. It follows then that if (x, y) is a solution to the system, then possible values of xy are $(6)(0) = 0$ and $(-6)(72) = -432$. Only 0 is among the given choices.

Choice B is incorrect. This is the x -coordinate of one of the solutions, $(6, 0)$. Choice C is incorrect and may result from conceptual or computational errors. Choice D is incorrect. This is the square of the x -coordinate of one of the solutions, $(6, 0)$.

Question Difficulty:

Medium

Question ID e1391dd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e1391dd6

According to Moore's law, the number of transistors included on microprocessors doubles every 2 years. In 1985, a microprocessor was introduced that had 275,000 transistors. Based on this information, in which of the following years does Moore's law estimate the number of transistors to reach 1.1 million?

- A. 1987
- B. 1989
- C. 1991
- D. 1994

ID: e1391dd6 Answer

Rationale

Choice B is correct. Let x be the number of years after 1985. It follows that $\frac{x}{2}$ represents the number of 2-year periods that will occur within an x -year period. According to Moore's law, every 2 years, the number of transistors included on microprocessors is estimated to double. Therefore, x years after 1985, the number of transistors will double $\frac{x}{2}$ times. Since the number of transistors included on a microprocessor was 275,000, or .275 million, in 1985, the estimated number of transistors, in millions, included x years after 1985 can be modeled as $0.275 \cdot 2^{\frac{x}{2}}$. The year in which the number of transistors is estimated to be 1.1 million is

represented by the value of x when $1.1 = 0.275 \cdot 2^{\frac{x}{2}}$. Dividing both sides of this equation by .275 yields $4 = 2^{\frac{x}{2}}$, which can be

rewritten as $2^2 = 2^{\frac{x}{2}}$. Since the exponential equation has equal bases on each side, it follows that the exponents must also be equal: $2 = \frac{x}{2}$. Multiplying both sides of the equation $2 = \frac{x}{2}$ by 2 yields $x = 4$. Therefore, according to Moore's law, 4 years after 1985, or in 1989, the number of transistors included on microprocessors is estimated to reach 1.1 million.

Alternate approach: According to Moore's law, 2 years after 1985 (in 1987), the number of transistors included on a microprocessor is estimated to be $2 \cdot 275,000$, or 550,000, and 2 years after 1987 (in 1989), the number of transistors included on microprocessors is estimated to be $2 \cdot 550,000$, or 1,100,000. Therefore, the year that Moore's law estimates the number of transistors on microprocessors to reach 1.1 million is 1989.

Choices A, C, and D are incorrect. According to Moore's law, the number of transistors included on microprocessors is estimated to reach 550,000 in 1987, 2.2 million in 1991, and about 6.2 million in 1994.

Question Difficulty:

Medium

Question ID 290cdc2c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 290cdc2c

Which expression is equivalent to $(x)^{\frac{1}{14}}$, where $x > 0$?

- A. $\frac{1}{14} \cdot x$
- B. $\sqrt[14]{x}$
- C. $14 \cdot x$
- D. $(x)^{14}$

ID: 290cdc2c Answer

Correct Answer:

B

Rationale

Choice B is correct. An expression in the form $x^{\frac{1}{k}}$, where $x > 0$ and $k > 0$, is equivalent to $\sqrt[k]{x}$. It follows that $x^{\frac{1}{14}}$, where $x > 0$, is equivalent to $\sqrt[14]{x}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 87a3de81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0070C0; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 87a3de81

$$x^2 + x - 12 = 0$$

If a is a solution of the equation above and $a > 0$, what is the value of a ?

ID: 87a3de81 Answer

Rationale

The correct answer is 3. The solution to the given equation can be found by factoring the quadratic expression. The factors can be determined by finding two numbers with a sum of 1 and a product of -12 . The two numbers that meet these constraints are 4 and -3 . Therefore, the given equation can be rewritten as $(x + 4)(x - 3) = 0$. It follows that the solutions to the equation are $x = -4$ or $x = 3$. Since it is given that $a > 0$, a must equal 3.

Question Difficulty:

Medium

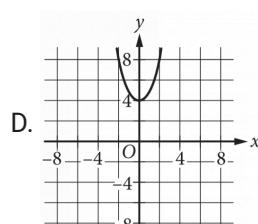
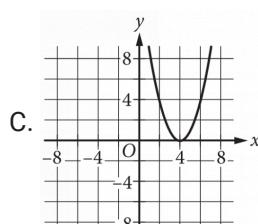
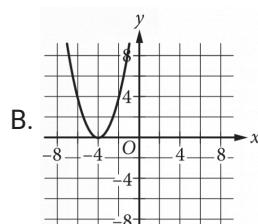
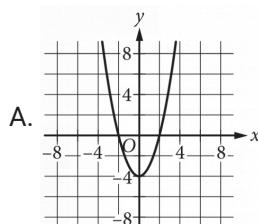
Question ID d46da42c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d46da42c

$$f(x) = x^2 + 4$$

The function f is defined as shown. Which of the following graphs in the xy -plane could be the graph of $y = f(x)$?



ID: d46da42c Answer

Correct Answer:

D

Rationale

Choice D is correct. For the quadratic function $f(x) = x^2 + 4$, the vertex of the graph is $(0, 4)$, and because the x^2 term is positive, the vertex is the minimum of the function. Choice D is the only option that meets these conditions.

Choices A, B, and C are incorrect. The vertex of each of these graphs doesn't correspond to the minimum of the given function.

Question Difficulty:

Easy

Question ID 1697ffcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1697ffcf

In the xy -plane, the graph of $y = 3x^2 - 14x$ intersects the graph of $y = x$ at the points $(0, 0)$ and (a, a) . What is the value of a ?

ID: 1697ffcf Answer

Rationale

The correct answer is 5. The intersection points of the graphs of $y = 3x^2 - 14x$ and $y = x$ can be found by solving the system consisting of these two equations. To solve the system, substitute x for y in the first equation. This gives $x = 3x^2 - 14x$. Subtracting x from both sides of the equation gives $0 = 3x^2 - 15x$. Factoring $3x$ out of each term on the left-hand side of the equation gives $0 = 3x(x - 5)$. Therefore, the possible values for x are 0 and 5. Since $y = x$, the two intersection points are $(0, 0)$ and $(5, 5)$. Therefore, $a = 5$.

Question Difficulty:

Hard

Question ID 5bf0f84a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 5bf0f84a

$$h(t) = -16t^2 + 110t + 72$$

The function above models the height h , in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

- A. The initial height, in feet, of the object
- B. The maximum height, in feet, of the object
- C. The initial speed, in feet per second, of the object
- D. The maximum speed, in feet per second, of the object

ID: 5bf0f84a Answer

Correct Answer:

A

Rationale

Choice A is correct. The variable t represents the seconds after the object is launched. Since $h(0) = 72$, this means that the height, in feet, at 0 seconds, or the initial height, is 72 feet.

Choices B, C, and D are incorrect and may be the result of misinterpreting the function in context.

Question Difficulty:

Medium

Question ID 4b6f0a3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4b6f0a3f

$$x^2 - 5x - 24 = 0$$

What is the sum of the solutions to the given equation?

ID: 4b6f0a3f Answer

Correct Answer:

5

Rationale

The correct answer is 5. The given quadratic equation can be rewritten in factored form as $(x - 8)(x + 3) = 0$. Based on the zero product property, it follows that $x - 8 = 0$ or $x + 3 = 0$. Adding 8 to both sides of the equation $x - 8 = 0$ yields $x = 8$. Subtracting 3 from both sides of the equation $x + 3 = 0$ yields $x = -3$. Therefore, the solutions to the given equation are 8 and -3. It follows that the sum of the solutions to the given equation is $8 + (-3)$, or 5.

Question Difficulty:

Medium

Question ID 70ebd3d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70ebd3d0

$$N(d) = 115(0.90)^d$$

The function N defined above can be used to model the number of species of brachiopods at various ocean depths d , where d is in hundreds of meters. Which of the following does the model predict?

- A. For every increase in depth by 1 meter, the number of brachiopod species decreases by 115.
- B. For every increase in depth by 1 meter, the number of brachiopod species decreases by 10%.
- C. For every increase in depth by 100 meters, the number of brachiopod species decreases by 115.
- D. For every increase in depth by 100 meters, the number of brachiopod species decreases by 10%.

ID: 70ebd3d0 Answer

Correct Answer:

D

Rationale

Choice D is correct. The function N is exponential, so it follows that $N(d)$ changes by a fixed percentage for each increase in d by 1. Since d is measured in hundreds of meters, it also follows that the number of brachiopod species changes by a fixed percentage for each increase in ocean depth by 100 meters. Since the base of the exponent in the model is 0.90, which is less than 1, the number of brachiopod species decreases as the ocean depth increases. Specifically, the number of brachiopod species at a depth of $d + 100$ meters is 90% of the number of brachiopod species at a depth of d meters. This means that for each increase in ocean depth by 100 meters, the number of brachiopod species decreases by 10%.

Choices A and C are incorrect. These describe situations where the number of brachiopod species are decreasing linearly rather than exponentially. Choice B is incorrect and results from interpreting the decrease in the number of brachiopod species as 10% for every 1-meter increase in ocean depth rather than for every 100-meter increase in ocean depth.

Question Difficulty:

Medium

Question ID 42f8e4b4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 42f8e4b4

One of the factors of $2x^3 + 42x^2 + 208x$ is $x + b$, where b is a positive constant. What is the smallest possible value of b ?

ID: 42f8e4b4 Answer

Correct Answer:

8

Rationale

The correct answer is 8. Since each term of the given expression, $2x^3 + 42x^2 + 208x$, has a factor of $2x$, the expression can be rewritten as $2xx^2 + 2x21x + 2x104$, or $2xx^2 + 21x + 104$. Since the values 8 and 13 have a sum of 21 and a product of 104, the expression $x^2 + 21x + 104$ can be factored as $x + 8x + 13$. Therefore, the given expression can be factored as $2xx + 8x + 13$. It follows that the factors of the given expression are 2, x , $x + 8$, and $x + 13$. Of these factors, only $x + 8$ and $x + 13$ are of the form $x + b$, where b is a positive constant. Therefore, the possible values of b are 8 and 13. Thus, the smallest possible value of b is 8.

Question Difficulty:

Hard

Question ID de39858a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: de39858a

The function h is defined by $h(x) = a^x + b$, where a and b are positive constants. The graph of $y = h(x)$ in the xy -plane passes through the points $(0, 10)$ and $(-2, \frac{325}{36})$. What is the value of ab ?

- A. $\frac{1}{4}$
- B. $\frac{1}{2}$
- C. 54
- D. 60

ID: de39858a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the function h is defined by $h(x) = a^x + b$ and that the graph of $y = h(x)$ in the xy -plane passes through the points $(0, 10)$ and $(-2, \frac{325}{36})$. Substituting 0 for x and 10 for $h(x)$ in the equation $h(x) = a^x + b$ yields $10 = a^0 + b$, or $10 = 1 + b$. Subtracting 1 from both sides of this equation yields $9 = b$. Substituting -2 for x and $\frac{325}{36}$ for $h(x)$ in the equation $h(x) = a^x + b$ yields $\frac{325}{36} = a^{-2} + 9$. Subtracting 9 from both sides of this equation yields $\frac{1}{36} = a^{-2}$, which can be rewritten as $a^2 = 36$. Taking the square root of both sides of this equation yields $a = 6$ and $a = -6$, but because it's given that a is a positive constant, a must equal 6. Because the value of a is 6 and the value of b is 9, the value of ab is $(6)(9)$, or 54.

Choice A is incorrect and may result from finding the value of $a^{-2}b$ rather than the value of ab .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from correctly finding the value of a as 6, but multiplying it by the y -value in the first ordered pair rather than by the value of b .

Question Difficulty:

Hard

Question ID 2683b5db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2683b5db

$$T = 0.01(P - 40,000)$$

In a city, the property tax T , in dollars, is calculated using the formula above, where P is the value of the property, in dollars. Which of the following expresses the value of the property in terms of the property tax?

- A. $P = 100T - 400$
- B. $P = 100T + 400$
- C. $P = 100T - 40,000$
- D. $P = 100T + 40,000$

ID: 2683b5db Answer

Correct Answer:

D

Rationale

Choice D is correct. To express the value of the property in terms of the property tax, the given equation must be solved for P . Multiplying both sides of the equation by 100 gives $100T = P - 40,000$. Adding 40,000 to both sides of the equation gives $100T + 40,000 = P$. Therefore, $P = 100T + 40,000$.

Choice A is incorrect and may result from multiplying 40,000 by 0.01, then subtracting 400 from, instead of adding 400 to, the left-hand side of the equation. Choice B is incorrect and may result from multiplying 40,000 by 0.01. Choice C is incorrect and may result from subtracting instead of adding 40,000 from the left-hand side of the equation.

Question Difficulty:

Medium

Question ID 1178f2df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1178f2df

x	y
21	-8
23	8
25	-8

The table shows three values of x and their corresponding values of y , where $y = f(x) + 4$ and f is a quadratic function. What is the y -coordinate of the y -intercept of the graph of $y = f(x)$ in the xy -plane?

ID: 1178f2df Answer

Correct Answer:

-2112

Rationale

The correct answer is -2,112. It's given that f is a quadratic function. It follows that f can be defined by an equation of the form $fx = ax - h^2 + k$, where a , h , and k are constants. It's also given that the table shows three values of x and their corresponding values of y , where $y = fx + 4$. Substituting $ax - h^2 + k$ for fx in this equation yields $y = ax - h^2 + k + 4$. This equation represents a quadratic relationship between x and y , where $k + 4$ is either the maximum or the minimum value of y , which occurs when $x = h$. For quadratic relationships between x and y , the maximum or minimum value of y occurs at the value of x halfway between any two values of x that have the same corresponding value of y . The table shows that x -values of 21 and 25 correspond to the same y -value, -8. Since 23 is halfway between 21 and 25, the maximum or minimum value of y occurs at an x -value of 23. The table shows that when $x = 23$, $y = 8$. It follows that $h = 23$ and $k + 4 = 8$. Subtracting 4 from both sides of the equation $k + 4 = 8$ yields $k = 4$. Substituting 23 for h and 4 for k in the equation $y = ax - h^2 + k + 4$ yields $y = ax - 23^2 + 4 + 4$, or $y = ax - 23^2 + 8$. The value of a can be found by substituting any x -value and its corresponding y -value for x and y , respectively, in this equation. Substituting 25 for x and -8 for y in this equation yields $-8 = a25 - 23^2 + 8$, or $-8 = a2^2 + 8$. Subtracting 8 from both sides of this equation yields $-16 = a2^2$, or $-16 = 4a$. Dividing both sides of this equation by 4 yields $-4 = a$. Substituting -4 for a , 23 for h , and 4 for k in the equation $fx = ax - h^2 + k$ yields $fx = -4x - 23^2 + 4$. The y -intercept of the graph of $y = fx$ in the xy -plane is the point on the graph where $x = 0$. Substituting 0 for x in the equation $fx = -4x - 23^2 + 4$ yields $f0 = -40 - 23^2 + 4$, or $f0 = -4-23^2 + 4$. This is equivalent to $f0 = -2,112$, so the y -intercept of the graph of $y = fx$ in the xy -plane is 0, -2,112. Thus, the y -coordinate of the y -intercept of the graph of $y = fx$ in the xy -plane is -2,112.

Question Difficulty:

Hard

Question ID 45df91ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 45df91ee

$$g(x) = 11\left(\frac{1}{12}\right)^x$$

If the given function g is graphed in the xy -plane, where $y = g(x)$, what is the y -intercept of the graph?

- A. $(0, 11)$
- B. $(0, 132)$
- C. $(0, 1)$
- D. $(0, 12)$

ID: 45df91ee Answer

Correct Answer:

A

Rationale

Choice A is correct. The x -coordinate of any y -intercept of a graph is 0. Substituting 0 for x in the given equation yields $g(0) = 11\left(\frac{1}{12}\right)^0$. Since any nonzero number raised to the 0th power is 1, this gives $g(0) = 11 \cdot 1$, or $g(0) = 11$. The y -intercept of the graph is, therefore, the point $0, 11$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 67e866b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 67e866b5

Which expression is equivalent to $9x^2 + 7x^2 + 9x$?

- A. $63x^4 + 9x$
- B. $9x^2 + 16x$
- C. $25x^5$
- D. $16x^2 + 9x$

ID: 67e866b5 Answer

Correct Answer:

D

Rationale

Choice D is correct. In the given expression, the first two terms, $9x^2$ and $7x^2$, are like terms. Combining these like terms yields $9x^2 + 7x^2$, or $16x^2$. It follows that the expression $9x^2 + 7x^2 + 9x$ is equivalent to $16x^2 + 9x$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 97158b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 97158b3a

The area A , in square centimeters, of a rectangular painting can be represented by the expression $w(w + 29)$, where w is the width, in centimeters, of the painting. Which expression represents the length, in centimeters, of the painting?

- A. w
- B. 29
- C. $(w + 29)$
- D. $w(w + 29)$

ID: 97158b3a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the expression $ww + 29$ represents the area, in square centimeters, of a rectangular painting, where w is the width, in centimeters, of the painting. The area of a rectangle can be calculated by multiplying its length by its width. It follows that the length, in centimeters, of the painting is represented by the expression $w + 29$.

Choice A is incorrect. This expression represents the width, in centimeters, of the painting, not its length, in centimeters.

Choice B is incorrect. This is the difference between the length, in centimeters, and the width, in centimeters, of the painting, not its length, in centimeters.

Choice D is incorrect. This expression represents the area, in square centimeters, of the painting, not its length, in centimeters.

Question Difficulty:

Medium

Question ID 84e8cc72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 84e8cc72

A quadratic function models the height, in feet, of an object above the ground in terms of the time, in seconds, after the object is launched off an elevated surface. The model indicates the object has an initial height of 10 feet above the ground and reaches its maximum height of 1,034 feet above the ground 8 seconds after being launched. Based on the model, what is the height, in feet, of the object above the ground 10 seconds after being launched?

- A. 234
- B. 778
- C. 970
- D. 1,014

ID: 84e8cc72 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that a quadratic function models the height, in feet, of an object above the ground in terms of the time, in seconds, after the object is launched off an elevated surface. This quadratic function can be defined by an equation of the form $f(x) = ax^2 + bx + c$, where $f(x)$ is the height of the object x seconds after it was launched, and a , b , and c are constants such that the function reaches its maximum value, k , when $x = h$. Since the model indicates the object reaches its maximum height of 1,034 feet above the ground 8 seconds after being launched, $f(x)$ reaches its maximum value, 1,034, when $x = 8$. Therefore, $k = 1,034$ and $h = 8$. Substituting 8 for h and 1,034 for k in the function $f(x) = ax^2 + bx + c$ yields $f(x) = ax^2 + 1,034$. Since the model indicates the object has an initial height of 10 feet above the ground, the value of $f(x)$ is 10 when $x = 0$. Substituting 0 for x and 10 for $f(x)$ in the equation $f(x) = ax^2 + 1,034$ yields $10 = a(0)^2 + 1,034$, or $10 = 1,034$. Subtracting 1,034 from both sides of this equation yields $64a = -1,024$. Dividing both sides of this equation by 64 yields $a = -16$. Therefore, the model can be represented by the equation $f(x) = -16x^2 + 1,034$. Substituting 10 for x in this equation yields $f(10) = -16(10)^2 + 1,034$, or $f(10) = 970$. Therefore, based on the model, 10 seconds after being launched, the height of the object above the ground is 970 feet.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 0ad5012e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0ad5012e

$$y = -\frac{1}{4}x^2 + 2x + 29$$

The given equation models a company's scheduled deliveries over 8 months, where y is the estimated number of scheduled deliveries x months after the end of May 2012, where $0 \leq x \leq 8$. Which statement is the best interpretation of the y -intercept of the graph of this equation in the xy -plane?

- A. At the end of May 2012, the estimated number of scheduled deliveries was 0.
- B. At the end of May 2012, the estimated number of scheduled deliveries was 29.
- C. At the end of June 2012, the estimated number of scheduled deliveries was 0.
- D. At the end of June 2012, the estimated number of scheduled deliveries was 29.

ID: 0ad5012e Answer

Correct Answer:

B

Rationale

Choice B is correct. The y -intercept of a graph in the xy -plane is the point where $x = 0$. For the given equation, the y -intercept of the graph in the xy -plane can be found by substituting 0 for x in the equation, which yields $y = -\frac{1}{4}(0)^2 + 20 + 29$, or $y = 29$.

Therefore, the y -intercept of the graph is $(0, 29)$. It's given that y is the estimated number of scheduled deliveries x months after the end of May 2012. Therefore, $x = 0$ represents 0 months after the end of May 2012, or the end of May 2012. Thus, the best interpretation of the y -intercept of the graph of this equation in the xy -plane is that at the end of May 2012, the estimated number of scheduled deliveries was 29.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 12e7faf8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 12e7faf8

The equation $\frac{x^2+6x-7}{x+7} = ax+d$ is true for all $x \neq -7$, where a and d are integers. What is the value of $a+d$?

- A. -6
- B. -1
- C. 0
- D. 1

ID: 12e7faf8 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since the expression x^2+6x-7 can be factored as $(x+7)(x-1)$, the given equation can be rewritten as $\frac{(x+7)(x-1)}{x+7} = ax+d$. Since $x \neq -7$, $x+7$ is also not equal to 0, so both the numerator and denominator of $\frac{(x+7)(x-1)}{x+7}$ can be divided by $x+7$. This gives $x-1 = ax+d$. Equating the coefficient of x on each side of the equation gives $a=1$. Equating the constant terms gives $d=-1$. The sum is $1+(-1)=0$.

Choice A is incorrect and may result from incorrectly simplifying the equation. Choices B and D are incorrect. They are the values of d and a , respectively, not $a+d$.

Question Difficulty:

Hard

Question ID 89fc23af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 89fc23af

Which of the following expressions is

$$\frac{x^2 - 2x - 5}{x - 3}$$

equivalent to ?

A. $x - 5 - \frac{20}{x-3}$

B. $x - 5 - \frac{10}{x-3}$

C. $x + 1 - \frac{8}{x-3}$

D. $x + 1 - \frac{2}{x-3}$

ID: 89fc23af Answer

Correct Answer:

D

Rationale

Choice D is correct. The numerator of the given expression can be rewritten in terms of the denominator, $x - 3$, as follows:

$$x^2 - 2x - 5 = x^2 - 3x + x - 3 - 2, \text{ which is equivalent to } x(x-3) + (x-3) - 2.$$

So the given expression is equivalent to $\frac{x(x-3) + (x-3) - 2}{x-3} = \frac{x(x-3)}{x-3} + \frac{x-3}{x-3} - \frac{2}{x-3}$. Since the given expression is defined for $x \neq 3$, the expression can be

rewritten as $x + 1 - \frac{2}{x-3}$.

Long division can also be used as an alternate approach. Choices A, B, and C are incorrect and may result from errors made when dividing the two polynomials or making use of structure.

Question Difficulty:

Hard

Question ID c3a72da5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #005a7a; height: 10px;"></div> <div style="width: 20%; background-color: #005a7a; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c3a72da5

Which of the following is equivalent to the sum of $3x^4 + 2x^3$ and $4x^4 + 7x^3$?

- A. $16x^{14}$
- B. $7x^8 + 9x^6$
- C. $12x^4 + 14x^3$
- D. $7x^4 + 9x^3$

ID: c3a72da5 Answer

Correct Answer:

D

Rationale

Choice D is correct. Adding the two expressions yields $3x^4 + 2x^3 + 4x^4 + 7x^3$. Because the pair of terms $3x^4$ and $4x^4$ and the pair of terms $2x^3$ and $7x^3$ each contain the same variable raised to the same power, they are like terms and can be combined as $7x^4$ and $9x^3$, respectively. The sum of the given expressions therefore simplifies to $7x^4 + 9x^3$.

Choice A is incorrect and may result from adding the coefficients and the exponents in the given expressions. Choice B is incorrect and may result from adding the exponents as well as the coefficients of the like terms in the given expressions. Choice C is incorrect and may result from multiplying, rather than adding, the coefficients of the like terms in the given expressions.

Question Difficulty:

Medium

Question ID 911c415b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 911c415b

$$(7532 + 100y^2) + 10(10y^2 - 110)$$

The expression above can be written in the form $ay^2 + b$, where a and b are constants. What is the value of $a + b$?

ID: 911c415b Answer

Rationale

The correct answer is 6632. Applying the distributive property to the expression yields $(7532 + 100y^2) + (100y^2 - 1100)$. Then adding together $7532 + 100y^2$ and $100y^2 - 1100$ and collecting like terms results in $200y^2 + 6432$. This is written in the form $ay^2 + b$, where $a = 200$ and $b = 6432$. Therefore $a + b = 200 + 6432 = 6632$.

Question Difficulty:

Hard

Question ID dba7432e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: dba7432e

x	f(x)
0	5
1	$\frac{5}{2}$
2	$\frac{5}{4}$
3	$\frac{5}{8}$

The table above gives the values of the function f for some values of x . Which of the following equations could define f ?

A. $f(x) = 5(2^{x+1})$

B. $f(x) = 5(2^x)$

C. $f(x) = 5(2^{-(x+1)})$

D. $f(x) = 5(2^{-x})$

ID: dba7432e Answer

Correct Answer:

D

Rationale

Choice D is correct. Each choice has a function with coefficient 5 and base 2, so the exponents must be analyzed. When the input value of x increases, the output value of $f(x)$ decreases, so the exponent must be negative. An exponent of $-x$ yields the values in the table: $5 = 5(2^0)$, $\frac{5}{2} = 5(2^{-1})$, $\frac{5}{4} = 5(2^{-2})$, and $\frac{5}{8} = 5(2^{-3})$.

Choices A and B are incorrect and may result from choosing equations that yield an increasing, rather than decreasing, output value of $f(x)$ when the input value of x increases. Choice C is incorrect and may result from choosing an equation that doesn't yield the values in the table.

Question Difficulty:

Medium

Question ID 16de54c7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 16de54c7

$$2x^2 + 5x - 12$$

If the given expression is rewritten in the form $(2x - 3)(x + k)$, where k is a constant, what is the value of k ?

ID: 16de54c7 Answer

Rationale

The correct answer is 4. It's given that $2x^2 + 5x - 12$ can be rewritten as $(2x - 3)(x + k)$; it follows that $(2x - 3)(x + k) = 2x^2 + 5x - 12$. Expanding the left-hand side of this equation yields $2x^2 + 2kx - 3x - 3k = 2x^2 + 5x - 12$. Subtracting $2x^2$ from both sides of this equation yields $2kx - 3x - 3k = 5x - 12$. Using properties of equality, $2kx - 3x = 5x$ and $-3k = -12$. Either equation can be solved for k . Dividing both sides of $-3k = -12$ by -3 yields $k = 4$. The equation $2kx - 3x = 5x$ can be rewritten as $x(2k - 3) = 5x$. It follows that $2k - 3 = 5$. Solving this equation for k also yields $k = 4$. Therefore, the value of k is 4.

Question Difficulty:

Medium

Question ID 2f958af9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 2f958af9

$$v^2 = \frac{LT}{m}$$

The formula above expresses the square of the speed v of a wave moving along a string in terms of tension T , mass m , and length L of the string. What is T in terms of m , v , and L ?

A. $T = \frac{mv^2}{L}$

B. $T = \frac{m}{v^2 L}$

C. $T = \frac{mL}{v^2}$

D. $T = \frac{L}{mv^2}$

ID: 2f958af9 Answer

Correct Answer:

A

Rationale

Choice A is correct. To write the formula as T in terms of m , v , and L means to isolate T on one side of the equation. First, multiply both sides of the equation by m , which gives $mv^2 = \frac{mLT}{m}$, which simplifies to $mv^2 = LT$. Next, divide both sides of the equation

by L , which gives $\frac{mv^2}{L} = \frac{LT}{L}$, which simplifies to $T = \frac{mv^2}{L}$.

Choices B, C, and D are incorrect and may be the result of incorrectly applying operations to each side of the equation.

Question Difficulty:

Medium

Question ID c7789423

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: c7789423

$$|x - 2| = 9$$

What is one possible solution to the given equation?

ID: c7789423 Answer

Correct Answer:

11, -7

Rationale

The correct answer is 11 or -7. By the definition of absolute value, if $x - 2 = 9$, then $x - 2 = 9$ or $x - 2 = -9$. Adding 2 to both sides of the equation $x - 2 = 9$ yields $x = 11$. Adding 2 to both sides of the equation $x - 2 = -9$ yields $x = -7$. Thus, the given equation, $x - 2 = 9$, has two possible solutions, 11 and -7. Note that 11 and -7 are examples of ways to enter a correct answer.

Question Difficulty:

Easy

Question ID d9137a84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: d9137a84

Which expression represents the product of $(x^{-6}y^3z^5)$ and $(x^4z^5 + y^8z^{-7})$?

- A. $x^{-2}z^{10} + y^{11}z^{-2}$
- B. $x^{-2}z^{10} + x^{-6}z^{-2}$
- C. $x^{-2}y^3z^{10} + y^8z^{-7}$
- D. $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$

ID: d9137a84 Answer

Correct Answer:

D

Rationale

Choice D is correct. The product of $x^{-6}y^3z^5$ and $x^4z^5 + y^8z^{-7}$ can be represented by the expression $x^{-6}y^3z^5x^4z^5 + y^8z^{-7}$. Applying the distributive property to this expression yields $x^{-6}y^3z^5x^4z^5 + x^{-6}y^3z^5y^8z^{-7}$, or $x^{-6}x^4y^3z^5z^5 + x^{-6}y^3y^8z^5z^{-7}$. This expression is equivalent to $x^{-6+4}y^{3+5+5} + x^{-6+8+8-7}$, or $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 876a731c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 876a731c

$$\begin{aligned}y &= x^2 \\2y + 6 &= 2(x + 3)\end{aligned}$$

If (x, y) is a solution of the system of equations above and $x > 0$, what is the value of xy ?

- A. 1
- B. 2
- C. 3
- D. 9

ID: 876a731c Answer

Correct Answer:

A

Rationale

Choice A is correct. Substituting x^2 for y in the second equation gives $2(x^2) + 6 = 2(x + 3)$. This equation can be solved as follows:

$2x^2 + 6 = 2x + 6$	Apply the distributive property.
$2x^2 + 6 - 2x - 6 = 0$	Subtract $2x$ and 6 from both sides of the equation.
$2x^2 - 2x = 0$	Combine like terms.
$2x(x - 1) = 0$	Factor both terms on the left side of the equation by $2x$.

Thus, $x = 0$ and $x = 1$ are the solutions to the system. Since $x > 0$, only $x = 1$ needs to be considered. The value of y when $x = 1$ is $y = x^2 = 1^2 = 1$. Therefore, the value of xy is $(1)(1) = 1$.

Choices B, C, and D are incorrect and likely result from a computational or conceptual error when solving this system of equations.

Question Difficulty:

Medium

Question ID f89e1d6f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f89e1d6f

If $a = c + d$, which of the following is equivalent to the expression $x^2 - c^2 - 2cd - d^2$?

- A. $(x + a)^2$
- B. $(x - a)^2$
- C. $(x + a)(x - a)$
- D. $x^2 - ax - a^2$

ID: f89e1d6f Answer

Correct Answer:

C

Rationale

Choice C is correct. Factoring -1 from the second, third, and fourth terms gives $x^2 - c^2 - 2cd - d^2 = x^2 - (c^2 + 2cd + d^2)$. The expression $c^2 + 2cd + d^2$ is the expanded form of a perfect square: $c^2 + 2cd + d^2 = (c + d)^2$. Therefore, $x^2 - (c^2 + 2cd + d^2) = x^2 - (c + d)^2$. Since $a = c + d$, $x^2 - (c + d)^2 = x^2 - a^2$. Finally, because $x^2 - a^2$ is the difference of squares, it can be expanded as $x^2 - a^2 = (x + a)(x - a)$.

Choices A and B are incorrect and may be the result of making an error in factoring the difference of squares $x^2 - a^2$. Choice D is incorrect and may be the result of incorrectly combining terms.

Question Difficulty:

Hard

Question ID df0ef054

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: df0ef054

$$(2x^3 + 3x)(x^3 - 2x)$$

Which of the following is equivalent to the expression above?

A. $x^3 + 5x$

B. $3x^3 + x$

C. $2x^6 - x^4 - 6x^2$

D. $3x^6 - x^4 - 6x^2$

ID: df0ef054 Answer

Correct Answer:

C

Rationale

Choice C is correct. Using the distributive property to multiply the terms in the parentheses yields $(2x^3 \cdot x^3) + (2x^3 \cdot -2x) + (3x \cdot x^3) + (3x \cdot -2x)$, which is equivalent to $2x^6 - 4x^4 + 3x^4 - 6x^2$. Combining like terms results in $2x^6 - x^4 - 6x^2$.

Choices A and D are incorrect and may result from conceptual errors when multiplying the terms in the given expression. Choice B is incorrect and may result from adding, instead of multiplying, $(2x^3 + 3x)$ and $(x^3 - 2x)$.

Question Difficulty:

Easy

Question ID bef4b1c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: bef4b1c6

$$\frac{55}{x+6} = x$$

What is the positive solution to the given equation?

ID: bef4b1c6 Answer

Correct Answer:

5

Rationale

The correct answer is 5. Multiplying both sides of the given equation by $x + 6$ results in $55 = xx + 6$. Applying the distributive property of multiplication to the right-hand side of this equation results in $55 = x^2 + 6x$. Subtracting 55 from both sides of this equation results in $0 = x^2 + 6x - 55$. The right-hand side of this equation can be rewritten by factoring. The two values that multiply to -55 and add to 6 are 11 and -5. It follows that the equation $0 = x^2 + 6x - 55$ can be rewritten as $0 = x + 11x - 5$. Setting each factor equal to 0 yields two equations: $x + 11 = 0$ and $x - 5 = 0$. Subtracting 11 from both sides of the equation $x + 11 = 0$ results in $x = -11$. Adding 5 to both sides of the equation $x - 5 = 0$ results in $x = 5$. Therefore, the positive solution to the given equation is 5.

Question Difficulty:

Medium

Question ID 3e9cc0c2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3e9cc0c2

Which of the following is equivalent to $(1-p)(1+p+p^2+p^3+p^4+p^5+p^6)$?

- A. $1-p^8$
- B. $1-p^7$
- C. $1-p^6$
- D. $1-p^5$

ID: 3e9cc0c2 Answer

Correct Answer:

B

Rationale

Choice B is correct. Multiplying $(1 - p)$ by each term of the polynomial within the second pair of parentheses gives $(1 - p)1 = 1 - p$; $(1 - p)p = p - p^2$; $(1 - p)p^2 = p^2 - p^3$; $(1 - p)p^3 = p^3 - p^4$; $(1 - p)p^4 = p^4 - p^5$; $(1 - p)p^5 = p^5 - p^6$; and $(1 - p)p^6 = p^6 - p^7$. Adding these seven expressions together and combining like terms gives $1 + (p - p) + (p^2 - p^2) + (p^3 - p^3) + (p^4 - p^4) + (p^5 - p^5) + (p^6 - p^6) - p^7$, which can be simplified to $1 - p^7$.

Choices A, C, and D are incorrect and may result from incorrectly identifying the highest power of p in the expressions or incorrectly combining like terms.

Question Difficulty:

Medium

Question ID 2c5c22d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c5c22d0

$$y = x^2 + 3x - 7$$

$$y - 5x + 8 = 0$$

How many solutions are there to the system of equations above?

- A. There are exactly 4 solutions.
- B. There are exactly 2 solutions.
- C. There is exactly 1 solution.
- D. There are no solutions.

ID: 2c5c22d0 Answer

Correct Answer:

C

Rationale

Choice C is correct. The second equation of the system can be rewritten as $y = 5x - 8$. Substituting $5x - 8$ for y in the first equation gives $5x - 8 = x^2 + 3x - 7$. This equation can be solved as shown below:

$$x^2 + 3x - 7 - 5x + 8 = 0$$

$$x^2 - 2x + 1 = 0$$

$$(x - 1)^2 = 0$$

$$x = 1$$

Substituting 1 for x in the equation $y = 5x - 8$ gives $y = -3$. Therefore, $(1, -3)$ is the only solution to the system of equations.

Choice A is incorrect. In the xy -plane, a parabola and a line can intersect at no more than two points. Since the graph of the first equation is a parabola and the graph of the second equation is a line, the system cannot have more than 2 solutions. Choice B is incorrect. There is a single ordered pair (x, y) that satisfies both equations of the system. Choice D is incorrect because the ordered pair $(1, -3)$ satisfies both equations of the system.

Question Difficulty:

Hard

Question ID 7348f046

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7348f046

$$(2x + 3) - (x - 7)$$

Which of the following is equivalent to the given expression?

- A. $x - 4$
- B. $3x - 4$
- C. $x + 10$
- D. $2x^2 + 21$

ID: 7348f046 Answer

Correct Answer:

C

Rationale

Choice C is correct. Distributing the negative sign to the terms in the second parentheses yields $(2x + 3) - x + 7$. This expression can be rewritten as $2x - x + 3 + 7$. Combining like terms results in $x + 10$.

Choice A is incorrect and may result from not distributing the negative sign to the 7. Choice B is incorrect and may result from adding $(x - 7)$ to $2x + 3$ instead of subtracting $(x - 7)$. Choice D is incorrect and may result from adding the product of $2x$ and x to the product of 3 and 7.

Question Difficulty:

Medium

Question ID 0aaef7aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0aaef7aa

The function p is defined by $p(n) = 7n^3$. What is the value of n when $p(n)$ is equal to 56?

- A. 2
- B. $\frac{8}{3}$
- C. 7
- D. 8

ID: 0aaef7aa Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that $pn = 7n^3$. Substituting 56 for pn in this equation yields $56 = 7n^3$. Dividing each side of this equation by 7 yields $8 = n^3$. Taking the cube root of each side of this equation yields $2 = n$. Therefore, when pn is equal to 56, the value of n is 2.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 928498f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 928498f3

$$6x^2 + 5x - 7 = 0$$

What are the solutions to the given equation?

A. $\frac{-5 \pm \sqrt{25 + 168}}{12}$

B. $\frac{-6 \pm \sqrt{25 + 168}}{12}$

C. $\frac{-5 \pm \sqrt{36 - 168}}{12}$

D. $\frac{-6 \pm \sqrt{36 - 168}}{12}$

ID: 928498f3 Answer

Correct Answer:

A

Rationale

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Choice A is correct. The quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, can be used to find the solutions to an equation in the form $ax^2 + bx + c = 0$. In the given equation, $a = 6$, $b = 5$, and $c = -7$. Substituting these values into the quadratic formula gives

$$\frac{-5 \pm \sqrt{5^2 - 4(6)(-7)}}{2(6)} \text{, or } \frac{-5 \pm \sqrt{25 + 168}}{12}.$$

$$\frac{-a \pm \sqrt{b^2 - 4ac}}{2a}$$

Choice B is incorrect and may result from using $\frac{-b \pm \sqrt{a^2 + 4ac}}{2a}$ as the quadratic formula. Choice C is incorrect and may result

from using $\frac{-b \pm \sqrt{a^2 + 4ac}}{2a}$ as the quadratic formula. Choice D is incorrect and may result from using $\frac{-a \pm \sqrt{a^2 + 4ac}}{2a}$ as the quadratic formula.

Question Difficulty:

Medium

Question ID b7cd6ca6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b7cd6ca6

The equation $E(t) = 5(1.8)^t$ gives the estimated number of employees at a restaurant, where t is the number of years since the restaurant opened. Which of the following is the best interpretation of the number 5 in this context?

- A. The estimated number of employees when the restaurant opened
- B. The increase in the estimated number of employees each year
- C. The number of years the restaurant has been open
- D. The percent increase in the estimated number of employees each year

ID: b7cd6ca6 Answer

Correct Answer:

A

Rationale

Choice A is correct. For an exponential function of the form $E_t = ab^t$, where a and b are constants, the initial value of the function—that is, the value of the function when $t = 0$ —is a and the value of the function increases by a factor of b each time t increases by 1. Since the function $E_t = 51.8^t$ gives the estimated number of employees at a restaurant and t is the number of years since the restaurant opened, the best interpretation of the number 5 in this context is the estimated number of employees when $t = 0$, or when the restaurant opened.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID b47419f4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: b47419f4

$$\left(\frac{1}{2}x + 3\right) - \left(\frac{2}{3}x - 5\right)$$

Which of the following is equivalent to the expression above?

A. $-\frac{1}{6}x + 8$

B. $-\frac{1}{6}x - 2$

C. $-\frac{1}{3}x^2 + \frac{1}{2}x + 15$

D. $-\frac{1}{3}x^2 - \frac{9}{2}x - 15$

ID: b47419f4 Answer

Correct Answer:

A

Rationale

Choice A is correct. By distributing the minus sign through the expression $\left(\frac{2}{3}x - 5\right)$, the given expression can be rewritten as $\left(\frac{1}{2}x + 3\right) - \frac{2}{3}x + 5$, which is equivalent to $\frac{1}{2}x - \frac{2}{3}x + 3 + 5$. Combining like terms gives $\left(\frac{1}{2} - \frac{2}{3}\right)x + (3 + 5)$, or $-\frac{1}{6}x + 8$.

Choice B is incorrect and may be the result of failing to distribute the minus sign appropriately through the second term and simplifying the expression $\frac{1}{2}x + 3 - \frac{2}{3}x - 5$. Choice C is incorrect and may be the result of multiplying the expressions $\left(\frac{1}{2}x + 3\right)$ and $\left(-\frac{2}{3}x + 5\right)$. Choice D is incorrect and may be the result of multiplying the expressions $\left(\frac{1}{2}x + 3\right)$ and $\left(-\frac{2}{3}x - 5\right)$.

Question Difficulty:

Medium

Question ID fc3dfa26

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fc3dfa26

$$\frac{4x^2}{x^2-9} - \frac{2x}{x+3} = \frac{1}{x-3}$$

What value of x satisfies the equation above?

A. -3

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. 3

ID: fc3dfa26 Answer

Correct Answer:

C

Rationale

Choice C is correct. Each fraction in the given equation can be expressed with the common denominator x^2-9 . Multiplying

$\frac{2x}{x+3}$ by $\frac{x-3}{x-3}$ yields $\frac{2x^2-6x}{x^2-9}$, and multiplying $\frac{1}{x-3}$ by $\frac{x+3}{x+3}$ yields $\frac{x+3}{x^2-9}$. Therefore, the given equation can be written

$$\frac{4x^2}{x^2-9} - \frac{2x^2-6x}{x^2-9} = \frac{x+3}{x^2-9}$$

as $\frac{4x^2}{x^2-9} - \frac{2x^2-6x}{x^2-9} = \frac{x+3}{x^2-9}$. Multiplying each fraction by the denominator results in the equation $4x^2 - (2x^2 - 6x) = x + 3$, or $2x^2 + 6x = x + 3$. This equation can be solved by setting a quadratic expression equal to 0, then solving for x . Subtracting $x + 3$ from both sides of this equation yields $2x^2 + 5x - 3 = 0$. The expression $2x^2 + 5x - 3$ can be factored, resulting in the equation $(2x - 1)(x + 3) = 0$. By the zero product property, $2x - 1 = 0$ or $x + 3 = 0$. To solve for x in $2x - 1 = 0$, 1 can be added to both

sides of the equation, resulting in $2x = 1$. Dividing both sides of this equation by 2 results in $x = \frac{1}{2}$. Solving for x in $x + 3 = 0$ yields $x = -3$. However, this value of x would result in the second fraction of the original equation having a denominator of 0.

Therefore, $x = -3$ is an extraneous solution. Thus, the only value of x that satisfies the given equation is $x = \frac{1}{2}$.

Choice A is incorrect and may result from solving $x + 3 = 0$ but not realizing that this solution is extraneous because it would result in a denominator of 0 in the second fraction. Choice B is incorrect and may result from a sign error when solving $2x - 1 = 0$ for x. Choice D is incorrect and may result from a calculation error.

Question Difficulty:

Hard

Question ID 8838a672

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 8838a672

$$(4x^3 - 5x^2 + 3) - (6x^3 + 2x^2 - x)$$

Which of the following expressions is equivalent to the expression above?

- A. $-10x^3 - 3x^2 + x + 3$
- B. $-2x^3 - 7x^2 + x + 3$
- C. $-2x^3 - 3x^2 + x + 3$
- D. $10x^3 - 7x^2 - x + 3$

ID: 8838a672 Answer

Correct Answer:

B

Rationale

Choice B is correct. Using the distributive property, the given expression can be rewritten as $4x^3 - 5x^2 + 3 - 6x^3 - 2x^2 + x$. Combining like terms, this expression can be rewritten as $(4 - 6)x^3 + (-5 - 2)x^2 + x + 3$, which is equivalent to $-2x^3 - 7x^2 + x + 3$.

Choices A, C, and D are incorrect and may result from an error when applying the distributive property or an error when combining like terms.

Question Difficulty:

Medium

Question ID eb268057

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: eb268057

$$x^2 = 64$$

Which of the following values of x satisfies the given equation?

- A. -8
- B. 4
- C. 32
- D. 128

ID: eb268057 Answer

Correct Answer:

A

Rationale

Choice A is correct. Solving for x by taking the square root of both sides of the given equation yields $x = 8$ or $x = -8$. Of the choices given, -8 satisfies the given equation.

Choice B is incorrect and may result from a calculation error when solving for x . Choice C is incorrect and may result from dividing 64 by 2 instead of taking the square root. Choice D is incorrect and may result from multiplying 64 by 2 instead of taking the square root.

Question Difficulty:

Easy

Question ID 6d9e01a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6d9e01a2

$$f(x) = 4x^2 - 50x + 126$$

The given equation defines the function f . For what value of x does $f(x)$ reach its minimum?

ID: 6d9e01a2 Answer

Correct Answer:

25/4, 6.25

Rationale

The correct answer is $\frac{25}{4}$. The given equation can be rewritten in the form $fx = ax - h^2 + k$, where a , h , and k are constants. When $a > 0$, h is the value of x for which fx reaches its minimum. The given equation can be rewritten as $fx = 4x^2 - \frac{50}{4}x + 126$, which is equivalent to $fx = 4x^2 - \frac{50}{4}x + \frac{50^2}{8} - \frac{50^2}{8} + 126$. This equation can be rewritten as $fx = 4x - \frac{50^2}{8} - \frac{50^2}{8} + 126$, or $fx = 4x - \frac{50^2}{8} - 4\frac{50^2}{8} + 126$, which is equivalent to $fx = 4x - \frac{25^2}{4} - \frac{121}{4}$. Therefore, $h = \frac{25}{4}$, so the value of x for which fx reaches its minimum is $\frac{25}{4}$. Note that 25/4 and 6.25 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 9f2ecade

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9f2ecade

$$h(x) = x^3 + ax^2 + bx + c$$

The function h is defined above, where a , b , and c are integer constants. If the zeros of the function are -5 , 6 , and 7 , what is the value of c ?

ID: 9f2ecade Answer

Rationale

The correct answer is 210. Since -5 , 6 , and 7 are zeros of the function, the function can be rewritten as

$$h(x) = (x + 5)(x - 6)(x - 7)$$
. Expanding the function yields $h(x) = x^3 - 8x^2 - 23x + 210$. Thus, $a = -8$, $b = -23$, and $c = 210$.

Therefore, the value of c is 210.

Question Difficulty:

Hard

Question ID 0b3d25c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0b3d25c5

Which of the following is equivalent to

$$\sqrt[4]{x^2 + 8x + 16}, \text{ where } x > 0?$$

A. $(x+4)^4$

B. $(x+4)^2$

C. $(x+4)$

D. $(x+4)^{\frac{1}{2}}$

ID: 0b3d25c5 Answer

Correct Answer:

D

Rationale

$$(x^2 + 8x + 16)^{\frac{1}{4}}$$

Choice D is correct. The given expression can also be written as

. The trinomial $x^2 + 8x + 16$ can be rewritten in

$$((x+4)^2)^{\frac{1}{4}}$$

$$(x+4)^{\frac{1}{2}}$$

factored form as $(x+4)^2$. Thus, the entire expression can be rewritten as

. Simplifying the exponents yields

$$((x+4)^2)^{\frac{1}{4}}$$

Choices A, B, and C are incorrect and may result from errors made when simplifying the exponents in the expression

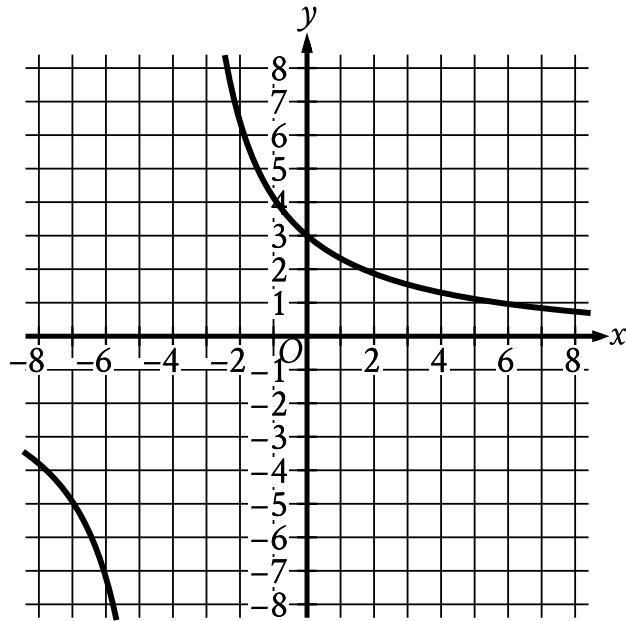
Question Difficulty:

Medium

Question ID d45572cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: d45572cc



The graph of $y = f(x)$ is shown in the xy -plane. The value of $f(0)$ is an integer. What is the value of $f(0)$?

ID: d45572cc Answer

Correct Answer:

3

Rationale

The correct answer is 3. The value of $f(0)$ is the value of y on the graph of $y = f(x)$ in the xy -plane that corresponds with $x = 0$. It's given that the value of $f(0)$ is an integer. For the graph of $y = f(x)$ shown, when $x = 0$, the corresponding integer value of y is 3. Therefore, the value of $f(0)$ is 3.

Question Difficulty:

Easy

Question ID 6011a3f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 6011a3f8

$$64x^2 + bx + 25 = 0$$

In the given equation, b is a constant. For which of the following values of b will the equation have more than one real solution?

- A. -91
- B. -80
- C. 5
- D. 40

ID: 6011a3f8 Answer

Correct Answer:

A

Rationale

Choice A is correct. A quadratic equation of the form $ax^2 + bx + c = 0$, where a , b , and c are constants, has either no real solutions, exactly one real solution, or exactly two real solutions. That is, for the given equation to have more than one real solution, it must have exactly two real solutions. When the value of the discriminant, or $b^2 - 4ac$, is greater than 0, the given equation has exactly two real solutions. In the given equation, $64x^2 + bx + 25 = 0$, $a = 64$ and $c = 25$. Therefore, the given equation has exactly two real solutions when $b^2 - 46425 > 0$, or $b^2 - 6,400 > 0$. Adding 6,400 to both sides of this inequality yields $b^2 > 6,400$. Taking the square root of both sides of $b^2 > 6,400$ yields two possible inequalities: $b < -80$ or $b > 80$. Of the choices, only choice A satisfies $b < -80$ or $b > 80$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID e117d3b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e117d3b8

If a and c are positive numbers, which of the following is equivalent to $\sqrt{(a+c)^3} \cdot \sqrt{a+c}$?

- A. $a+c$
- B. a^2+c^2
- C. $a^2+2ac+c^2$
- D. a^2c^2

ID: e117d3b8 Answer

Correct Answer:

C

Rationale

Choice C is correct. Using the property that $\sqrt{x}\sqrt{y} = \sqrt{xy}$ for positive numbers x and y , with $x = (a+c)^3$ and $y = a+c$, it follows that $\sqrt{(a+c)^3} \cdot \sqrt{a+c} = \sqrt{(a+c)^4}$. By rewriting $(a+c)^4$ as $((a+c)^2)^2$, it is possible to simplify the square root expression as follows: $\sqrt{((a+c)^2)^2} = (a+c)^2 = a^2+2ac+c^2$.

Choice A is incorrect and may be the result of $\sqrt{(a+c)^3} \div \sqrt{(a+c)}$. Choice B is incorrect and may be the result of incorrectly rewriting $(a+c)^2$ as $a^2 + c^2$. Choice D is incorrect and may be the result of incorrectly applying properties of exponents.

Question Difficulty:

Hard

Question ID 50338a48

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 50338a48

Which expression is equivalent to $15w^2 + 8w$?

- A. $w(15w + 8)$
- B. $8w(15w + 1)$
- C. $15w^2(8w + 1)$
- D. $23(w^2 + w)$

ID: 50338a48 Answer

Correct Answer:

A

Rationale

Choice A is correct. Since each term of the given expression has a common factor of w , it may be rewritten as $w(15w + 8)$. Therefore, the expression $w(15w + 8)$ is equivalent to $15w^2 + 8w$.

Choice B is incorrect. This expression is equivalent to $120w^2 + 8w$, not $15w^2 + 8w$.

Choice C is incorrect. This expression is equivalent to $120w^3 + 15w^2$, not $15w^2 + 8w$.

Choice D is incorrect. This expression is equivalent to $23w^2 + 23w$, not $15w^2 + 8w$.

Question Difficulty:

Easy

Question ID 98f735f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 98f735f2

The total revenue from sales of a product can be calculated using the formula $T = PQ$

, where T is the total revenue, P is the price of the product, and Q is the quantity of the product sold. Which of the following equations gives the quantity of product sold in terms of P and T ?

A. $Q = \frac{P}{T}$

B. $Q = \frac{T}{P}$

C. $Q = PT$

D. $Q = T - P$

ID: 98f735f2 Answer

Correct Answer:

B

Rationale

Choice B is correct. Solving the given equation for Q gives the quantity of the product sold in terms of P and T . Dividing both sides of the given equation by P yields $\frac{T}{P} = Q$, or $Q = \frac{T}{P}$. Therefore, $Q = \frac{T}{P}$ gives the quantity of product sold in terms of P and T .

Choice A is incorrect and may result from an error when dividing both sides of the given equation by P . Choice C is incorrect and may result from multiplying, rather than dividing, both sides of the given equation by P . Choice D is incorrect and may result from subtracting P from both sides of the equation rather than dividing both sides by P .

Question Difficulty:

Easy

Question ID 79ba511a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 79ba511a

The function f is defined by $f(x) = x^3 + 15$. What is the value of $f(2)$?

- A. 20
- B. 21
- C. 23
- D. 24

ID: 79ba511a Answer

Correct Answer:

C

Rationale

Choice C is correct. The value of $f(2)$ is the value of $f(x)$ when $x = 2$. Substituting 2 for x in the given function yields $f(2) = 2^3 + 15$, or $f(2) = 8 + 15$, which is equivalent to $f(2) = 23$. Therefore, the value of $f(2)$ is 23.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of $f(2)$ when $f(x) = x^3 + 15$, rather than $f(x) = x^3 + 15$.

Choice D is incorrect and may result from conceptual or calculation errors.

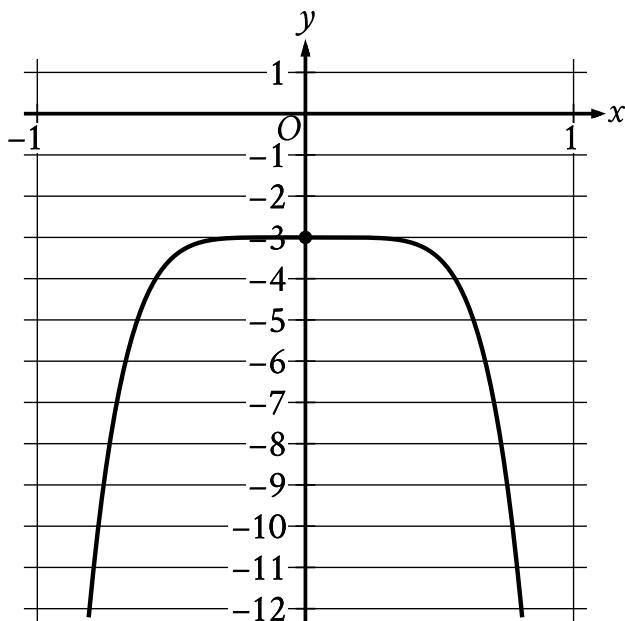
Question Difficulty:

Easy

Question ID 50418728

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 50418728



The graph of the polynomial function f , where $y = f(x)$, is shown. The y -intercept of the graph is $(0, y)$. What is the value of y ?

ID: 50418728 Answer

Correct Answer:

-3

Rationale

The correct answer is -3. The y -intercept of the graph of a function in the xy -plane is the point where the graph crosses the y -axis. The graph of the polynomial function shown crosses the y -axis at the point $0, -3$. It's given that the y -intercept of the graph is $0, y$. Thus, the value of y is -3.

Question Difficulty:

Easy

Question ID f5e8ccf1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: f5e8ccf1

$$f(x) = (x+4)(x-1)(2x-3)$$

The function f is defined above. Which of the following is NOT an x -intercept of the graph of the function in the xy -plane?

- A. $(-4, 0)$
- B. $\left(-\frac{2}{3}, 0\right)$
- C. $(1, 0)$
- D. $\left(\frac{3}{2}, 0\right)$

ID: f5e8ccf1 Answer

Correct Answer:

B

Rationale

Choice B is correct. The graph of the function f in the xy -plane has x -intercepts at the points (x, y) , where $y = f(x) = 0$.

Substituting 0 for $f(x)$ in the given equation yields $0 = (x+4)(x-1)(2x-3)$. By the zero product property, if $0 = (x+4)(x-1)(2x-3)$, then $x+4 = 0$, $x-1 = 0$, or $2x-3 = 0$. Solving each of these linear equations for x , it follows that

$x = -4$, $x = 1$, and $x = \frac{3}{2}$, respectively. This means that the graph of the function f in the xy -plane has three x -intercepts: $(-4, 0)$, $(1, 0)$, and $\left(\frac{3}{2}, 0\right)$. Therefore, $\left(-\frac{2}{3}, 0\right)$ isn't an x -intercept of the graph of the function f .

Alternate approach: Substitution may be used. Since by definition an x -intercept of any graph is a point in the form $(k, 0)$ where k is a constant, and since all points in the options are in this form, it need only be checked whether the points in the options lie on the

graph of the function f . Substituting $-\frac{2}{3}$ for x and 0 for $f(x)$ in the given equation yields

$0 = \left(-\frac{2}{3} + 4\right)\left(-\frac{2}{3} - 1\right)\left(2\left(-\frac{2}{3}\right) - 3\right)$, or $0 = \frac{650}{27}$. Therefore, the point $\left(-\frac{2}{3}, 0\right)$ doesn't lie on the graph of the function f and can't be an x -intercept of the graph.

Choices A, C, and D are incorrect because each of these points is an x -intercept of the graph of the function f in the xy -plane. By definition, an x -intercept is a point on the graph of the form $(k, 0)$, where k is a constant. Substituting -4 for x and 0 for $f(x)$ in the given equation yields $0 = (-4+4)(-4-1)(2(-4)-3)$, or $0 = 0$. Since this is a true statement, the point $(-4, 0)$ lies on the graph.

of the function f and is an x -intercept of the graph. Performing similar substitution using the points $(1, 0)$ and $\left(\frac{3}{2}, 0\right)$ also yields the true statement $0 = 0$, illustrating that these points also lie on the graph of the function f and are x -intercepts of the graph.

Question Difficulty:

Medium

Question ID fb96a5b3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: fb96a5b3

Which of the following expressions is equivalent to $2(ab - 3) + 2$?

- A. $2ab - 1$
- B. $2ab - 4$
- C. $2ab - 5$
- D. $2ab - 8$

ID: fb96a5b3 Answer

Correct Answer:

B

Rationale

Choice B is correct. Applying the distributive property to the given expression yields $2(ab) + 2(-3) + 2$, or $2ab - 6 + 2$. Adding the like terms -6 and 2 results in the expression $2ab - 4$.

Choice A is incorrect and may result from multiplying ab by 2 without multiplying -3 by 2 when applying the distributive property. Choices C and D are incorrect and may result from computational or conceptual errors.

Question Difficulty:

Easy

Question ID 09e5e4d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 09e5e4d3

If $\frac{42}{x} = 7x$, what is the value of $7x^2$?

- A. 6
- B. 7
- C. 42
- D. 294

ID: 09e5e4d3 Answer

Correct Answer:

C

Rationale

Choice C is correct. Multiplying both sides of the given equation by x yields $42 = 7x^2$. Therefore, the value of $7x^2$ is 42.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 1fe10d97

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1fe10d97

$$p(t) = 90,000(1.06)^t$$

The given function p models the population of Lowell t years after a census. Which of the following functions best models the population of Lowell m months after the census?

- A. $r(m) = \frac{90,000}{12}(1.06)^m$
- B. $r(m) = 90,000\left(\frac{1.06}{12}\right)^m$
- C. $r(m) = 90,000\left(\frac{1.06}{12}\right)^{\frac{m}{12}}$
- D. $r(m) = 90,000(1.06)^{\frac{m}{12}}$

ID: 1fe10d97 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the function p models the population of Lowell t years after a census. Since there are 12 months in a year, m months after the census is equivalent to $\frac{m}{12}$ years after the census. Substituting $\frac{m}{12}$ for t in the equation $pt = 90,000(1.06)^t$ yields $p\frac{m}{12} = 90,000(1.06)^{\frac{m}{12}}$. Therefore, the function r that best models the population of Lowell m months after the census is $rm = 90,000(1.06)^{\frac{m}{12}}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6acdcece

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 6acdcece

$$b - 72 = \frac{x}{y}$$

The given equation relates the positive numbers b , x , and y . Which equation correctly expresses x in terms of b and y ?

- A. $x = \frac{b-72}{y}$
- B. $x = by - 72$
- C. $x = \frac{by-72}{y}$
- D. $x = by - 72y$

ID: 6acdcece Answer

Correct Answer:

D

Rationale

Choice D is correct. Multiplying both sides of the given equation by y yields $y(b - 72) = x$. Distributing on the left-hand side of this equation yields $by - 72y = x$, or $x = by - 72y$. Therefore, the equation $x = by - 72y$ correctly expresses x in terms of b and y .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID b73ee6cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b73ee6cf

The population of a town is currently 50,000, and the population is estimated to increase each year by 3% from the previous year. Which of the following equations can be used to estimate the number of years, t , it will take for the population of the town to reach 60,000?

- A. $50,000 = 60,000(0.03)^t$
- B. $50,000 = 60,000(3)^t$
- C. $60,000 = 50,000(0.03)^t$
- D. $60,000 = 50,000(1.03)^t$

ID: b73ee6cf Answer

Correct Answer:

D

Rationale

Choice D is correct. Stating that the population will increase each year by 3% from the previous year is equivalent to saying that the population each year will be 103% of the population the year before. Since the initial population is 50,000, the population after t years is given by $50,000(1.03)^t$. It follows that the equation $60,000 = 50,000(1.03)^t$ can be used to estimate the number of years it will take for the population to reach 60,000.

Choice A is incorrect. This equation models how long it will take the population to decrease from 60,000 to 50,000, which is impossible given the growth factor. Choice B is incorrect and may result from misinterpreting a 3% growth as growth by a factor of 3. Additionally, this equation attempts to model how long it will take the population to decrease from 60,000 to 50,000. Choice C is incorrect and may result from misunderstanding how to model percent growth by multiplying the initial amount by a factor greater than 1.

Question Difficulty:

Hard

Question ID 3918e8bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3918e8bc

An object is kicked from a platform. The equation $h = -4.9t^2 + 7t + 9$ represents this situation, where h is the height of the object above the ground, in meters, t seconds after it is kicked. Which number represents the height, in meters, from which the object was kicked?

- A. 0
- B. 4.9
- C. 7
- D. 9

ID: 3918e8bc Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the equation $h = -4.9t^2 + 7t + 9$ represents this situation, where h is the height, in meters, of the object t seconds after it is kicked. It follows that the height, in meters, from which the object was kicked is the value of h when $t = 0$. Substituting 0 for t in the equation $h = -4.9t^2 + 7t + 9$ yields $h = -4.90^2 + 70 + 9$, or $h = 9$. Therefore, the object was kicked from a height of 9 meters.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID e597050f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e597050f

Which expression is equivalent to $9x + 6x + 2y + 3y$?

- A. $3x + 5y$
- B. $6x + 8y$
- C. $12x + 8y$
- D. $15x + 5y$

ID: e597050f Answer

Correct Answer:

D

Rationale

Choice D is correct. Combining like terms in the given expression yields $9x + 6x + 2y + 3y$, or $15x + 5y$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 7eed640d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7eed640d

$$h(x) = -16x^2 + 100x + 10$$

The quadratic function above models the height above the ground h , in feet, of a projectile x seconds after it had been launched vertically. If $y = h(x)$ is graphed in the xy -plane, which of the following represents the real-life meaning of the positive x -intercept of the graph?

- A. The initial height of the projectile
- B. The maximum height of the projectile
- C. The time at which the projectile reaches its maximum height
- D. The time at which the projectile hits the ground

ID: 7eed640d Answer

Correct Answer:

D

Rationale

Choice D is correct. The positive x -intercept of the graph of $y = h(x)$ is a point (x, y) for which $y = 0$. Since $y = h(x)$ models the height above the ground, in feet, of the projectile, a y -value of 0 must correspond to the height of the projectile when it is 0 feet above ground or, in other words, when the projectile is on the ground. Since x represents the time since the projectile was launched, it follows that the positive x -intercept, $(x, 0)$, represents the time at which the projectile hits the ground.

Choice A is incorrect and may result from misidentifying the y -intercept as a positive x -intercept. Choice B is incorrect and may result from misidentifying the y -value of the vertex of the graph of the function as an x -intercept. Choice C is incorrect and may result from misidentifying the x -value of the vertex of the graph of the function as an x -intercept.

Question Difficulty:

Hard

Question ID 2d2ab76b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0070C0; height: 10px;"></div> <div style="width: 50%; background-color: #D9E1F2; height: 10px;"></div>

ID: 2d2ab76b

$$y = x^2 - 1$$

$$y = 3$$

When the equations above are graphed in the xy -plane, what are the coordinates (x, y) of the points of intersection of the two graphs?

- A. $(2, 3)$
and $(-2, 3)$
- B. $(2, 4)$
and $(-2, 4)$
- C. $(3, 8)$
and $(-3, 8)$
- D. $(\sqrt{2}, 3)$
and $(-\sqrt{2}, 3)$

ID: 2d2ab76b Answer

Correct Answer:

A

Rationale

Choice A is correct. The two equations form a system of equations, and the solutions to the system correspond to the points of intersection of the graphs. The solutions to the system can be found by substitution. Since the second equation gives $y = 3$, substituting 3 for y in the first equation gives $3 = x^2 - 1$. Adding 1 to both sides of the equation gives $4 = x^2$. Solving by taking the square root of both sides of the equation gives $x = \pm 2$. Since $y = 3$ for all values of x for the second equation, the solutions are $(2, 3)$ and $(-2, 3)$. Therefore, the points of intersection of the two graphs are $(2, 3)$ and $(-2, 3)$.

Choices B, C, and D are incorrect and may be the result of calculation errors.

Question Difficulty:

Medium

Question ID 43926bd9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 43926bd9

x	f(x)
1	a
2	a^5
3	a^9

For the exponential function f , the table above shows several values of x and their corresponding values of $f(x)$, where a is a constant greater than 1. If k is a constant and $f(k) = a^{29}$, what is the value of k ?

ID: 43926bd9 Answer

Rationale

The correct answer is 8. The values of $f(x)$ for the exponential function f shown in the table increase by a factor of a^4 for each increase of 1 in x . This relationship can be represented by the equation $f(x) = a^{4x+b}$, where b is a constant. It's given that when $x=2, f(x) = a^5$. Substituting 2 for x and a^5 for $f(x)$ into $f(x) = a^{4x+b}$ yields $a^5 = a^{4(2)+b}$. Since $4(2)+b = 5$, it follows that $b = -3$. Thus, an equation that defines the function f is $f(x) = a^{4x-3}$. It follows that the value of k such that $f(k) = a^{29}$ can be found by solving the equation $4k - 3 = 29$, which yields $k = 8$.

Question Difficulty:

Hard

Question ID 0354c7de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0354c7de

$$5x + 15$$

Which of the following is equivalent to the given expression?

- A. $5(x + 3)$
- B. $5(x + 10)$
- C. $5(x + 15)$
- D. $5(x + 20)$

ID: 0354c7de Answer

Correct Answer:

A

Rationale

Choice A is correct. Since 5 is a factor of both terms, $5x$ and 15, the given expression can be factored and rewritten as $5(x + 3)$.

Choice B is incorrect and may result from subtracting 5 from the constant when factoring 5 from the given expression. Choice C is incorrect and may result from factoring 5 from only the first term, not both terms, of the given expression. Choice D is incorrect and may result from adding 5 to the constant when factoring 5 from the given expression.

Question Difficulty:

Easy

Question ID f25a34aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f25a34aa

The area of a triangle is equal to x^2 square centimeters. The length of the base of the triangle is $2x + 22$ centimeters, and the height of the triangle is $x - 10$ centimeters. What is the value of x ?

ID: f25a34aa Answer

Correct Answer:

110

Rationale

The correct answer is 110. The area of a triangle is equal to one half of the product of the length of the base of the triangle and the height of the triangle. It's given that the length of the base of the triangle is $2x + 22$ centimeters and the height of the triangle is $x - 10$ centimeters; therefore, its area is $\frac{1}{2}(2x + 22)(x - 10)$ square centimeters. It's also given that the area of the triangle is equal to x^2 square centimeters. Therefore, it follows that $\frac{1}{2}(2x + 22)(x - 10) = x^2$. This equation can be rewritten as $(x + 11)(x - 10) = x^2$, or $x^2 + x - 110 = x^2$. Subtracting x^2 from both sides of this equation yields $x - 110 = 0$. Adding 110 to both sides of this equation yields $x = 110$. Therefore, the value of x is 110.

Question Difficulty:

Hard

Question ID a58232b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a58232b7

The functions g and h are defined by the given equations, where $x \geq 0$. Which of the following equations displays, as a constant or coefficient, the minimum value of the function it defines, where $x \geq 0$?

- I. $g(x) = 18(1.16)(1.4)^{x+2}$
- II. $h(x) = 18(1.4)^{x+4}$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: a58232b7 Answer

Correct Answer:

D

Rationale

Choice D is correct. A function defined by an equation in the form $f(x) = ab^{x+h}$, where a , b , and h are positive constants and $x \geq 0$, has a minimum value of $f(0)$. It's given that function g is defined by $g(x) = 181.16(1.4)^{x+2}$, which is equivalent to $g(x) = 20.88(1.4)^{x+2}$. Substituting 0 for x in this equation yields $g(0) = 20.88(1.4)^{0+2}$, or $g(0) = 40.9248$. Therefore, the minimum value of $g(x)$ is 40.9248, so $g(x) = 181.16(1.4)^{x+2}$ doesn't display its minimum value as a constant or coefficient. It's also given that function h is defined by $h(x) = 181(1.4)^{x+4}$. Substituting 0 for x in this equation yields $h(0) = 181(1.4)^{0+4}$, or $h(0) = 69.1488$. Therefore, the minimum value of $h(x)$ is 69.1488, so $h(x) = 181(1.4)^{x+4}$ doesn't display its minimum value as a constant or coefficient. Therefore, neither I nor II displays, as a constant or coefficient, the minimum value of the function it defines, where $x \geq 0$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID c602140f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #005a99; height: 10px;"></div> <div style="width: 20%; background-color: #005a99; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c602140f

$$(x - 11y)(2x - 3y) - 12y(-2x + 3y)$$

Which of the following is equivalent to the expression above?

- A. $x - 23y$
- B. $2x^2 - xy - 3y^2$
- C. $2x^2 + 24xy + 36y^2$
- D. $2x^2 - 49xy + 69y^2$

ID: c602140f Answer

Correct Answer:

B

Rationale

Choice B is correct. Expanding all terms yields $(x - 11y)(2x - 3y) - 12y(-2x + 3y)$, which is equivalent to $2x^2 - 22xy - 3xy + 33y^2 + 24xy - 36y^2$. Combining like terms gives $2x^2 - xy - 3y^2$.

Choice A is incorrect and may be the result of using the sums of the coefficients of the existing x and y terms as the coefficients of the x and y terms in the new expressions. Choice C is incorrect and may be the result of incorrectly combining like terms. Choice D is incorrect and may be the result of using the incorrect sign in front of the $12y$ term.

Question Difficulty:

Medium

Question ID 4236c5a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4236c5a3

If $(x + 5)^2 = 4$, which of the following is a possible value of x ?

- A. 1
- B. -1
- C. -2
- D. -3

ID: 4236c5a3 Answer

Correct Answer:

D

Rationale

Choice D is correct. If $(x + 5)^2 = 4$, then taking the square root of each side of the equation gives $x + 5 = 2$ or $x + 5 = -2$.

Solving these equations for x gives $x = -3$ or $x = -7$. Of these, -3 is the only solution given as a choice.

Choice A is incorrect and may result from solving the equation $x + 5 = 4$ and making a sign error. Choice B is incorrect and may result from solving the equation $x + 5 = 4$. Choice C is incorrect and may result from finding a possible value of $x + 5$.

Question Difficulty:

Easy

Question ID a7711fe8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a7711fe8

What is the minimum value of the function f defined by $f(x) = (x - 2)^2 - 4$?

A. -4

B. -2

C. 2

D. 4

ID: a7711fe8 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given quadratic function f is in vertex form, $f(x) = (x - h)^2 + k$, where (h, k) is the vertex of the graph of $y = f(x)$ in the xy -plane. Therefore, the vertex of the graph of $y = f(x)$ is $(2, -4)$. In addition, the y -coordinate of the vertex represents either the minimum or maximum value of a quadratic function, depending on whether the graph of the function opens upward or downward. Since the leading coefficient of f (the coefficient of the term $(x - 2)^2$) is 1, which is positive, the graph of $y = f(x)$ opens upward. It follows that at $x = 2$, the minimum value of the function f is -4.

Choice B is incorrect and may result from making a sign error and from using the x -coordinate of the vertex. Choice C is incorrect and may result from using the x -coordinate of the vertex. Choice D is incorrect and may result from making a sign error.

Question Difficulty:

Hard

Question ID 3b4b8831

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3b4b8831

$$38x^2 = 38(9)$$

What is the negative solution to the given equation?

ID: 3b4b8831 Answer

Correct Answer:

-3

Rationale

The correct answer is -3. Dividing both sides of the given equation by 38 yields $x^2 = 9$. Taking the square root of both sides of this equation yields the solutions $x = 3$ and $x = -3$. Therefore, the negative solution to the given equation is -3.

Question Difficulty:

Medium

Question ID f5247e52

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f5247e52

$$y = ax^2 - c$$

In the equation above, a and c are positive constants. How many times does the graph of the equation above intersect the graph of the equation $y = a + c$ in the xy -plane?

- A. Zero
- B. One
- C. Two
- D. More than two

ID: f5247e52 Answer

Correct Answer:

C

Rationale

Choice C is correct. It is given that the constants a and c are both positive; therefore, the graph of the given quadratic equation is a parabola that opens up with a vertex on the y -axis at a point below the x -axis. The graph of the second equation provided is a horizontal line that lies above the x -axis. A horizontal line above the x -axis will intersect a parabola that opens up and has a vertex below the x -axis in exactly two points.

Choices A, B, and D are incorrect and are the result of not understanding the relationships of the graphs of the two equations given. Choice A is incorrect because the two graphs intersect. Choice B is incorrect because in order for there to be only one intersection point, the horizontal line would have to intersect the parabola at the vertex, but the vertex is below the x -axis and the line is above the x -axis. Choice D is incorrect because a line cannot intersect a parabola in more than two points.

Question Difficulty:

Medium

Question ID 1a722d7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1a722d7d

$$p(x) = \frac{(x-c)^2 + 160}{2c}$$

Let the function p be defined as $p(x) = \frac{(x-c)^2 + 160}{2c}$, where c is a constant. If

$p(c) = 10$, what is the value of $p(12)$?

- A. 10.00
- B. 10.25
- C. 10.75
- D. 11.00

ID: 1a722d7d Answer

Correct Answer:

D

Rationale

Choice D is correct. The value of $p(12)$ depends on the value of the constant c , so the value of c must first be determined. It is given that $p(c) = 10$. Based on the definition of p , it follows that:

$$p(c) = \frac{(c-c)^2 + 160}{2c} = 10$$

$$\frac{160}{2c} = 10$$

$$2c = 16$$

$$c = 8$$

$$p(x) = \frac{(x-8)^2 + 160}{16}$$

This means that $p(x) = \frac{(x-8)^2 + 160}{16}$ for all values of x . Therefore:

$$p(12) = \frac{(12-8)^2 + 160}{16}$$

$$= \frac{16 + 160}{16}$$

$$= 11$$

Choice A is incorrect. It is the value of $p(8)$, not $p(12)$. Choices B and C are incorrect. If one of these values were correct, then $x = 12$ and the selected value of $p(12)$ could be substituted into the equation to solve for c . However, the values of c that result from choices B and C each result in $p(c) < 10$.

Question Difficulty:

Hard

Question ID f11ffa93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: f11ffa93

$$\sqrt{x+4} = 11$$

What value of x satisfies the equation above?

ID: f11ffa93 Answer

Rationale

The correct answer is 117. Squaring both sides of the given equation gives $x+4 = 11^2$, or $x+4 = 121$. Subtracting 4 from both sides of this equation gives $x = 117$.

Question Difficulty:

Easy

Question ID ee05c84e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: ee05c84e

$$f(x) = (x + 0.25x)(50 - x)$$

The function f is defined above. What is the value of $f(20)$?

- A. 250
- B. 500
- C. 750
- D. 2,000

ID: ee05c84e Answer

Correct Answer:

C

Rationale

Choice C is correct. Adding the like terms x and $0.25x$ yields the equation $f(x) = (1.25x)(50 - x)$. Substituting 20 for x yields $f(20) = (1.25(20))(50 - 20)$. The product $1.25(20)$ is equal to 25, and the difference $50 - 20$ is equal to 30. Substituting these values in the given equation gives $f(20) = (25)(30)$, and multiplying 25 by 30 results in $f(20) = 750$.

Choices A, B, and D are incorrect and may result from conceptual or computational errors when finding the value of $f(20)$.

Question Difficulty:

Easy

Question ID 5d93c782

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5d93c782

Which expression is equivalent to $x^2 + 3x - 40$?

- A. $(x - 4)(x + 10)$
- B. $(x - 5)(x + 8)$
- C. $(x - 8)(x + 5)$
- D. $(x - 10)(x + 4)$

ID: 5d93c782 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression may be rewritten as $x^2 + 8x - 5x - 40$. Since the first two terms of this expression have a common factor of x and the last two terms of this expression have a common factor of -5 , this expression may be rewritten as $xx + x8 - 5x - 58$, or $xx + 8 - 5x + 8$. Since each term of this expression has a common factor of $x + 8$, it may be rewritten as $x - 5x + 8$.

Alternate approach: An expression of the form $x^2 + bx + c$, where b and c are constants, can be factored if there are two values that add to give b and multiply to give c . In the given expression, $b = 3$ and $c = -40$. The values of -5 and 8 add to give 3 and multiply to give -40 , so the expression can be factored as $x - 5x + 8$.

Choice A is incorrect. This expression is equivalent to $x^2 + 6x - 40$, not $x^2 + 3x - 40$.

Choice C is incorrect. This expression is equivalent to $x^2 - 3x - 40$, not $x^2 + 3x - 40$.

Choice D is incorrect. This expression is equivalent to $x^2 - 6x - 40$, not $x^2 + 3x - 40$.

Question Difficulty:

Easy

Question ID 5c00c2c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5c00c2c1

There were no jackrabbits in Australia before 1788 when 24 jackrabbits were introduced. By 1920 the population of jackrabbits had reached 10 billion. If the population had grown exponentially, this would correspond to a 16.2% increase, on average, in the population each year. Which of the following functions best models the population $p(t)$ of jackrabbits t years after 1788?

- A. $p(t) = 1.162(24)^t$
- B. $p(t) = 24(2)^{1.162t}$
- C. $p(t) = 24(1.162)^t$
- D. $p(t) = (24 \cdot 1.162)^t$

ID: 5c00c2c1 Answer

Correct Answer:

C

Rationale

Choice C is correct. This exponential growth model can be written in the form $p(t) = A(1 + r)^t$, where $p(t)$ is the population t years after 1788, A is the initial population, and r is the yearly growth rate, expressed as a decimal. Since there were 24 jackrabbits in Australia in 1788, $A = 24$. Since the number of jackrabbits increased by an average of 16.2% each year, $r = 0.162$. Therefore, the equation that best models this situation is $p(t) = 24(1.162)^t$.

Choices A, B, and D are incorrect and may result from misinterpreting the form of an exponential growth model.

Question Difficulty:

Medium

Question ID 974d33dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 974d33dc

Which of the following expressions is equivalent to the sum of $(r^3 + 5r^2 + 7)$ and $(r^2 + 8r + 12)$?

- A. $r^5 + 13r^3 + 19$
- B. $2r^3 + 13r^2 + 19$
- C. $r^3 + 5r^2 + 7r + 12$
- D. $r^3 + 6r^2 + 8r + 19$

ID: 974d33dc Answer

Correct Answer:

D

Rationale

Choice D is correct. Grouping like terms, the given expressions can be rewritten as $r^3 + (5r^2 + r^2) + 8r + (7 + 12)$. This can be rewritten as $r^3 + 6r^2 + 8r + 19$.

Choice A is incorrect and may result from adding the two sets of unlike terms, r^3 and r^2 as well as $5r^2$ and $8r$, and then adding the respective exponents. Choice B is incorrect and may result from adding the unlike terms r^3 and r^2 as if they were r^3 and r^3 and adding the unlike terms $5r^2$ and $8r$ as if they were $5r^2$ and $8r^2$. Choice C is incorrect and may result from errors when combining like terms.

Question Difficulty:

Easy

Question ID d4d513ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: d4d513ff

Which expression is equivalent to $12x + 27$?

- A. $12(9x + 1)$
- B. $27(12x + 1)$
- C. $3(4x + 9)$
- D. $3(9x + 24)$

ID: d4d513ff Answer

Correct Answer:

C

Rationale

Choice C is correct. Each term in the given expression, $12x + 27$, has a common factor of 3. Therefore, the expression can be rewritten as $34x + 39$, or $34x + 9$. Thus, the expression $34x + 9$ is equivalent to the given expression.

Choice A is incorrect. This expression is equivalent to $108x + 12$, not $12x + 27$.

Choice B is incorrect. This expression is equivalent to $324x + 27$, not $12x + 27$.

Choice D is incorrect. This expression is equivalent to $27x + 72$, not $12x + 27$.

Question Difficulty:

Easy

Question ID 58b109d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58b109d4

$$\begin{aligned}x^2 + y + 7 &= 7 \\20x + 100 - y &= 0\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of x ?

ID: 58b109d4 Answer

Correct Answer:

-10

Rationale

The correct answer is -10. Adding y to both sides of the second equation in the given system yields $20x + 100 = y$. Substituting $20x + 100$ for y in the first equation in the given system yields $x^2 + 20x + 100 + 7 = 7$. Subtracting 7 from both sides of this equation yields $x^2 + 20x + 100 = 0$. Factoring the left-hand side of this equation yields $x + 10x + 10 = 0$, or $x + 10^2 = 0$. Taking the square root of both sides of this equation yields $x + 10 = 0$. Subtracting 10 from both sides of this equation yields $x = -10$. Therefore, the value of x is -10.

Question Difficulty:

Hard

Question ID 85939da5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 85939da5

Texting behavior	Talks on cell phone daily	Does not talk on cell phone daily	Total
Light	110	146	256
Medium	139	164	303
Heavy	166	74	240
Total	415	384	799

In a study of cell phone use, 799 randomly selected US teens were asked how often they talked on a cell phone and about their texting behavior. The data are summarized in the table above. Based on the data from the study, an estimate of the percent of US teens who are heavy texters is 30% and the associated margin of error is 3%. Which of the following is a correct statement based on the given margin of error?

- A. Approximately 3% of the teens in the study who are classified as heavy texters are not really heavy texters.
- B. It is not possible that the percent of all US teens who are heavy texters is less than 27%.
- C. The percent of all US teens who are heavy texters is 33%.
- D. It is doubtful that the percent of all US teens who are heavy texters is 35%.

ID: 85939da5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The given margin of error of 3% indicates that the actual percent of all US teens who are heavy texters is likely within 3% of the estimate of 30%, or between 27% and 33%. Therefore, it is unlikely, or doubtful, that the percent of all US teens who are heavy texters would be 35%.

Choice A is incorrect. The margin of error doesn't provide any information about the accuracy of reporting in the study. Choice B is incorrect. Based on the estimate and given margin of error, it is unlikely that the percent of all US teens who are heavy texters would be less than 27%, but it is possible. Choice C is incorrect. While the percent of all US teens who are heavy texters is likely between 27% and 33%, any value within this interval is equally likely. We can't be certain that the value is exactly 33%.

Question Difficulty:

Hard

Question ID 954943a4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 954943a4

Jennifer bought a box of Crunchy Grain cereal. The nutrition facts on the box state that

a serving size of the cereal is $\frac{3}{4}$ cup and provides 210 calories, 50 of which are calories from fat. In addition, each serving of the cereal provides 180 milligrams of potassium, which is 5% of the daily allowance for adults. If p percent of an adult's daily allowance of potassium is provided by x servings of Crunchy Grain cereal per day, which of the following expresses p in terms of x ?

- A. $p = 0.5x$
- B. $p = 5x$
- C. $p = (0.05)^x$
- D. $p = (1.05)^x$

ID: 954943a4 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that each serving of Crunchy Grain cereal provides 5% of an adult's daily allowance of potassium, so x servings would provide x times 5%. The percentage of an adult's daily allowance of potassium, p , is 5 times the number of servings, x . Therefore, the percentage of an adult's daily allowance of potassium can be expressed as $p = 5x$.

Choices A, C, and D are incorrect and may result from incorrectly converting 5% to its decimal equivalent, which isn't necessary since p is expressed as a percentage. Additionally, choices C and D are incorrect because the context should be represented by a linear relationship, not by an exponential relationship.

Question Difficulty:

Hard

Question ID b1b5300b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 20%; background-color: #002B36;"></div> <div style="width: 20%; background-color: #002B36;"></div> <div style="width: 60%; background-color: #D9D9D9;"></div>

ID: b1b5300b

Prices of 14 Different Cars

Type of car	Priced at no more than \$25,000	Priced greater than \$25,000	Total
Nonhybrid	5	3	8
Hybrid	2	4	6
Total	7	7	14

The table above shows information about 14 cars listed for sale on an auto dealership's website. If one of the cars listed for sale is selected at random, what is the probability that the car selected will be a hybrid car priced at no more than \$25,000?

A. $\frac{1}{7}$

B. $\frac{2}{7}$

C. $\frac{1}{3}$

D. $\frac{4}{7}$

ID: b1b5300b Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that there are 2 hybrid cars priced at no more than \$25,000. It's also given that there are 14 cars total for sale. Therefore, the probability of selecting a hybrid priced at no more than \$25,000 when one car is chosen at random is

$$\frac{2}{14} = \frac{1}{7}.$$

Choice B is incorrect. This is the probability of selecting a hybrid car priced greater than \$25,000 when choosing one car at random. Choice C is incorrect. This is the probability, when choosing randomly from only the hybrid cars, of selecting one priced at no more than \$25,000. Choice D is incorrect. This is the probability of selecting a hybrid car when selecting at random from only the cars priced greater than \$25,000.

Question Difficulty:

Medium

Question ID d28c29e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d28c29e1

The International Space Station orbits Earth at an average speed of 4.76 miles per second. What is the space station's average speed in miles per hour?

- A. 285.6
- B. 571.2
- C. 856.8
- D. 17,136.0

ID: d28c29e1 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since 1 minute = 60 seconds and 1 hour = 60 minutes, it follows that 1 hour = (60)(60), or 3,600 seconds.

Using this conversion factor, the space station's average speed of 4.76 miles per second is equal to an average speed of

$$\frac{4.76 \text{ miles}}{\text{second}} \times \frac{3,600 \text{ seconds}}{\text{hour}} = \frac{17,136 \text{ miles}}{\text{hour}}, \text{ or } 17,136 \text{ miles per hour.}$$

Choice A is incorrect. This is the space station's average speed in miles per minute. Choice B is incorrect. This is double the space station's average speed in miles per minute, or the number of miles the space station travels on average in 2 minutes. Choice C is incorrect. This is triple the space station's average speed in miles per minute, or the number of miles the space station travels on average in 3 minutes.

Question Difficulty:

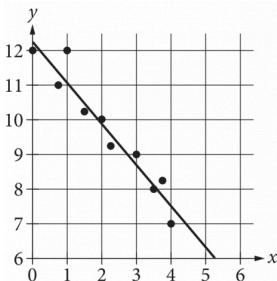
Medium

Question ID 1adb39f0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1adb39f0

The scatterplot shows the relationship between two variables, x and y . A line of best fit for the data is also shown. Which of the following is closest to the difference between the y -coordinate of the data point with $x = 1$ and the y -value predicted by the line of best fit at $x = 1$?



- A. 1
- B. 2
- C. 5
- D. 12

ID: 1adb39f0 Answer

Correct Answer:

A

Rationale

Choice A is correct. The data point with $x = 1$ has a y -coordinate of 12. The y -value predicted by the line of best fit at $x = 1$ is approximately 11. The difference between the y -coordinate of the data point and the y -value predicted by the line of best fit at $x = 1$ is $12 - 11$, or 1.

Choices B and C are incorrect and may result from incorrectly reading the scatterplot. Choice D is incorrect. This is the y -coordinate of the data point at $x = 1$.

Question Difficulty:

Medium

Question ID 3f5398a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 3f5398a6

For a person m miles from a flash of lightning, the length of the time interval from the moment the person sees the lightning to the moment the person hears the thunder is k seconds. The ratio of m to k can be estimated to be 1 to 5. According to this estimate, the person is how many miles from a flash of lightning if the time interval is 25 seconds?

- A. 10
- B. 9
- C. 6
- D. 5

ID: 3f5398a6 Answer

Rationale

Choice D is correct. It's given that the ratio of m to k is estimated to be 1 to 5. Therefore, when $k = 25$, the relationship between

these ratios can be expressed by the proportion $\frac{m}{25} = \frac{1}{5}$. Multiplying both sides of this equation by 25 yields $m = 5$.

Choices A, B, and C are incorrect and may result from calculation errors.

Question Difficulty:

Easy

Question ID b4912cc5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4912cc5

The population density of Iceland, in people per square kilometer of land area, increased from 2.5 in 1990 to 3.3 in 2014. During this time period, the land area of Iceland was 100,250 square kilometers. By how many people did Iceland's population increase from 1990 to 2014?

- A. 330,825
- B. 132,330
- C. 125,312
- D. 80,200

ID: b4912cc5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The increase in Iceland's population can be found by multiplying the increase in population density, in people per square kilometer, by the area, in square kilometers. It's given that the population density of Iceland was 2.5 people per square kilometer in 1990 and 3.3 people per square kilometer in 2014. The increase in population density can be found by subtracting 2.5 from 3.3, which yields 0.8. It's given that the land area of Iceland was 100,250 square kilometers. Thus, the increase in population is $0.8(100,250)$, or 80,200.

Alternate approach: It's given that the population density of Iceland, in people per square kilometer of land area, in 1990 was 2.5. Since the land area of Iceland was 100,250 square kilometers, it follows that the population of Iceland in 1990 was $2.5(100,250)$, or 250,625. Similarly, the population of Iceland in 2014 was $3.3(100,250)$, or 330,825. The population increase is the difference in the population from 1990 to 2014, or $330,825 - 250,625$, which yields 80,200. Therefore, Iceland's population increased by 80,200 from 1990 to 2014.

Choice A is incorrect. This is the population of Iceland in 2014. Choice B is incorrect and may result from dividing 3.3 by 2.5, instead of subtracting 2.5 from 3.3. Choice C is incorrect and may result from dividing the population of Iceland in 1990 by 2.

Question Difficulty:

Medium

Question ID f890dc20

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: f890dc20

2, 2, 2, 3, 4, 4, 11

What is the median of the seven data values shown?

- A. 2
- B. 3
- C. 4
- D. 9

ID: f890dc20 Answer

Correct Answer:

B

Rationale

Choice B is correct. When a data set has an odd number of values, the median can be found by ordering the values from least to greatest and determining the value in the middle. Since the values are already presented in order from least to greatest and there are 7 values, the median is the fourth value in the list. Therefore, the median is 3.

Choice A is incorrect. This is the mode. Choice C is incorrect. This is the mean. Choice D is incorrect. This is the range.

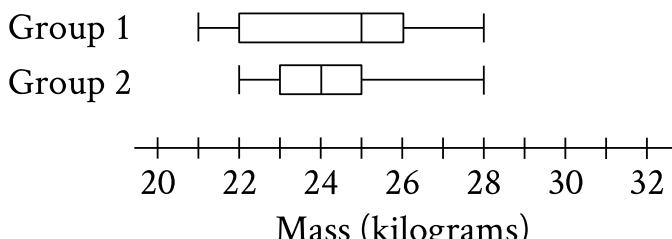
Question Difficulty:

Easy

Question ID d3b9c8d8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div>

ID: d3b9c8d8



The box plots summarize the masses, in kilograms, of two groups of gazelles. Based on the box plots, which of the following statements must be true?

- A. The mean mass of group 1 is greater than the mean mass of group 2.
- B. The mean mass of group 1 is less than the mean mass of group 2.
- C. The median mass of group 1 is greater than the median mass of group 2.
- D. The median mass of group 1 is less than the median mass of group 2.

ID: d3b9c8d8 Answer

Correct Answer:

C

Rationale

Choice C is correct. The median of a data set represented in a box plot is represented by the vertical line within the box. It follows that the median mass of the gazelles in group 1 is 25 kilograms, and the median mass of the gazelles in group 2 is 24 kilograms. Since 25 kilograms is greater than 24 kilograms, the median mass of group 1 is greater than the median mass of group 2.

Choice A is incorrect. The mean mass of each of the two groups cannot be determined from the box plots.

Choice B is incorrect. The mean mass of each of the two groups cannot be determined from the box plots.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 65c49824

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 65c49824

A school district is forming a committee to discuss plans for the construction of a new high school. Of those invited to join the committee, 15% are parents of students, 45% are teachers from the current high school, 25% are school and district administrators, and the remaining 6 individuals are students. How many more teachers were invited to join the committee than school and district administrators?

ID: 65c49824 Answer

Rationale

The correct answer is 8. The 6 students represent $(100 - 15 - 45 - 25)\% = 15\%$ of those invited to join the committee. If x

people were invited to join the committee, then $0.15x = 6$. Thus, there were $\frac{6}{0.15} = 40$ people invited to join the committee. It follows that there were $0.45(40) = 18$ teachers and $0.25(40) = 10$ school and district administrators invited to join the committee. Therefore, there were 8 more teachers than school and district administrators invited to join the committee.

Question Difficulty:

Hard

Question ID 1ea09200

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 1ea09200

A sample of 40 fourth-grade students was selected at random from a certain school. The 40 students completed a survey about the morning announcements, and 32 thought the announcements were helpful. Which of the following is the largest population to which the results of the survey can be applied?

- A. The 40 students who were surveyed
- B. All fourth-grade students at the school
- C. All students at the school
- D. All fourth-grade students in the county in which the school is located

ID: 1ea09200 Answer

Correct Answer:

B

Rationale

Choice B is correct. Selecting a sample of a reasonable size at random to use for a survey allows the results from that survey to be applied to the population from which the sample was selected, but not beyond this population. In this case, the population from which the sample was selected is all fourth-grade students at a certain school. Therefore, the results of the survey can be applied to all fourth-grade students at the school.

Choice A is incorrect. The results of the survey can be applied to the 40 students who were surveyed. However, this isn't the largest group to which the results of the survey can be applied. Choices C and D are incorrect. Since the sample was selected at random from among the fourth-grade students at a certain school, the results of the survey can't be applied to other students at the school or to other fourth-grade students who weren't represented in the survey results. Students in other grades in the school or other fourth-grade students in the country may feel differently about announcements than the fourth-grade students at the school.

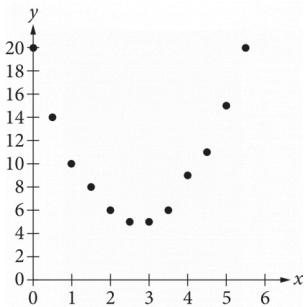
Question Difficulty:

Hard

Question ID 82aaa0a1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 82aaa0a1



Of the following, which is the best model for the data in the scatterplot?

- A. $y = 2x^2 - 11x - 20$
- B. $y = 2x^2 - 11x + 20$
- C. $y = 2x^2 - 5x - 3$
- D. $y = 2x^2 - 5x + 3$

ID: 82aaa0a1 Answer

Correct Answer:

B

Rationale

Choice B is correct. The graphical model that most closely fits the data in the scatterplot is a model in which the number of data points above and below the model are approximately balanced. Fitting a graphical model to the data shown results in an upward-facing parabola with a y-intercept near $(0, 20)$ and a vertex with an approximate x-value of 2.5. Of the given choices, only choice B gives an equation of an upward-facing parabola with a y-intercept at $(0, 20)$. Furthermore, substituting 2.5 for x into the equation in choice B yields $y = 5$. This is approximately the y-value of the vertex of the model.

Choices A, C, and D are incorrect. These equations don't give a graphical model that best fits the data. At $x = 0$, they have y-values of -20 , -3 , and 3 , respectively. At $x = 2.5$, they have y-values of -35 , -3 , and 3 , respectively.

Question Difficulty:

Easy

Question ID 37930b2a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 37930b2a

Residents of a town were surveyed to determine whether they are satisfied with the concession stand at the local park. A random sample of 200 residents was selected. All 200 responded, and 87% said they are satisfied. Based on this information, which of the following statements must be true?

- I. Of all the town residents, 87% would say they are satisfied with the concession stand at the local park.
 - II. If another random sample of 200 residents were surveyed, 87% would say they are satisfied.
- A. Neither
- B. I only
- C. II only
- D. I and II

ID: 37930b2a Answer

Correct Answer:

A

Rationale

Choice A is correct. The purpose of surveying a random sample of residents is to approximate the percent of the town residents that are satisfied with the concession stand. The sample doesn't necessarily get the same result as surveying every resident of the town, nor would another sample necessarily have identical results. Therefore, although it's possible that either statement I or statement II could prove true by surveying every resident of the town, these statements cannot be proven true solely based on the results of the sample.

Choice B is incorrect because surveying a sample of the town residents may not have the same result as surveying all the town residents. Choices C and D are incorrect because surveying a different sample of residents could yield different results.

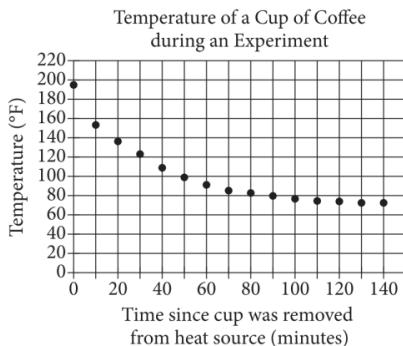
Question Difficulty:

Medium

Question ID 83272c51

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 83272c51



In an experiment, a heated cup of coffee is removed from a heat source, and the cup of coffee is then left in a room that is kept at a constant temperature. The graph above shows the temperature, in degrees Fahrenheit (°F), of the coffee immediately after being removed from the heat source and at 10-minute intervals thereafter. During which of the following 10-minute intervals does the temperature of the coffee decrease at the greatest average rate?

- A. Between 0 and 10 minutes
- B. Between 30 and 40 minutes
- C. Between 50 and 60 minutes
- D. Between 90 and 100 minutes

ID: 83272c51 Answer

Correct Answer:

A

Rationale

Choice A is correct. The average rate of change in temperature of the coffee in degrees Fahrenheit per minute is calculated by dividing the difference between two recorded temperatures by the number of minutes in the corresponding interval of time. Since the time intervals given are all 10 minutes, the average rate of change is greatest for the points with the greatest difference in temperature. Of the choices, the greatest difference in temperature occurs between 0 and 10 minutes.

Choices B, C, and D are incorrect and may result from misinterpreting the average rate of change from the graph.

Question Difficulty:

Easy

Question ID 4c774b00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 4c774b00

Ages of 20 Students Enrolled in a College Class

Age	Frequency
18	6
19	5
20	4
21	2
22	1
23	1
30	1

The table above shows the distribution of ages of the 20 students enrolled in a college class. Which of the following gives the correct order of the mean, median, and mode of the ages?

- A. mode < median < mean
- B. mode < mean < median
- C. median < mode < mean
- D. mean < mode < median

ID: 4c774b00 Answer

Correct Answer:

A

Rationale

Choice A is correct. The mode is the data value with the highest frequency. So for the data shown, the mode is 18. The median is the middle data value when the data values are sorted from least to greatest. Since there are 20 ages ordered, the median is the average of the two middle values, the 10th and 11th, which for these data are both 19. Therefore, the median is 19. The mean is the sum of the data values divided by the number of the data values. So for these data, the mean is

$$\frac{(18 \times 6) + (19 \times 5) + (20 \times 4) + (21 \times 2) + (22 \times 1) + (23 \times 1) + (30 \times 1)}{20} = 20$$

Since the mode is 18, the median is 19, and the mean is 20, mode < median < mean.

Choices B and D are incorrect because the mean is greater than the median. Choice C is incorrect because the median is greater than the mode.

Alternate approach: After determining the mode, 18, and the median, 19, it remains to determine whether the mean is less than 19 or more than 19. Because the mean is a balancing point, there is as much deviation below the mean as above the mean. It is possible to compare the data to 19 to determine the balance of deviation above and below the mean. There is a total deviation of only 6 below 19 (the 6 values of 18); however, the data value 30 alone deviates by 11 above 19. Thus the mean must be greater than 19.

Question Difficulty:

Medium

Question ID 1353b86e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 1353b86e

Colors of
Marbles in a
Bag

Color	Number
Red	8
Blue	10
Green	22
Total	40

The table shows the number of different colors of marbles in a bag. If a marble is chosen at random from the bag, what is the probability that the marble will be blue?

A. $\frac{30}{40}$

B. $\frac{22}{40}$

C. $\frac{18}{40}$

D. $\frac{10}{40}$

ID: 1353b86e Answer

Correct Answer:

D

Rationale

Choice D is correct. If a marble is chosen at random from the bag, the probability of choosing a marble of a certain color is the number of marbles of that color divided by the total number of marbles in the bag. Since there are 10 blue marbles in the bag, and

there are 40 total marbles in the bag, the probability that the marble chosen will be blue is $\frac{10}{40}$.

Choices A, B, and C are incorrect. These represent the probability that the marble chosen won't be blue (choice A), will be green (choice B), and won't be green (choice C).

Question Difficulty:
Easy

Question ID d89c1513

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: d89c1513

Customer Purchases at a Gas Station

	Beverage purchased	Beverage not purchased	Total
Gasoline purchased	60	25	85
Gasoline not purchased	35	15	50
Total	90	40	135

On Tuesday, a local gas station had 135 customers. The table above summarizes whether or not the customers on Tuesday purchased gasoline, a beverage, both, or neither. Based on the data in the table, what is the probability that a gas station customer selected at random on that day did not purchase gasoline?

A. $\frac{15}{50}$

B. $\frac{15}{40}$

C. $\frac{35}{50}$

D. $\frac{50}{135}$

ID: d89c1513 Answer

Correct Answer:

D

Rationale

Choice D is correct. The total number of gas station customers on Tuesday was 135. The table shows that the number of customers who did not purchase gasoline was 50. Finding the ratio of the number of customers who did not purchase gasoline to the total number of customers gives the probability that a customer selected at random on that day did not purchase gasoline,

which is $\frac{50}{135}$.

Choice A is incorrect and may result from finding the probability that a customer did not purchase a beverage, given that the customer did not purchase gasoline. Choice B is incorrect and may result from finding the probability that a customer did not purchase gasoline, given that the customer did not purchase a beverage. Choice C is incorrect and may result from finding the probability that a customer did purchase a beverage, given that the customer did not purchase gasoline.

Question Difficulty:

Easy

Question ID 52f9a246

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 52f9a246

4, 4, 4, 4, 8, 8, 8, 13, 13

Which frequency table correctly represents the data listed?

A.

Number	Frequency
4	4
8	3
13	2

B.

Number	Frequency
4	4
3	8
2	13

C.

Number	Frequency
4	16
8	24
13	26

D.

Number	Frequency
16	4
24	8
26	13

ID: 52f9a246 Answer

Correct Answer:

A

Rationale

Choice A is correct. A frequency table is a table that lists the data value and shows the number of times the data value occurs. In the data listed, the number 4 occurs four times, the number 8 occurs three times, and the number 13 occurs two times. This corresponds to the table in choice A.

Choice B is incorrect. This table has the values for number and frequency reversed.

Choice C is incorrect because the frequency values don't represent the data listed.

Choice D is incorrect. This table represents the listed number values as the frequency values.

Question Difficulty:

Easy

Question ID 000259aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 000259aa

A group of monarch butterflies migrated from Chicago, Illinois, to Michoacán, Mexico, flying a total of 2,100 miles. It took a single butterfly in the group 120 days to travel this route one way. On average, how many miles did the butterfly travel per day?

- A. 0.057
- B. 0.729
- C. 17.5
- D. 24

ID: 000259aa Answer

Rationale

Choice C is correct. If the butterfly traveled 2,100 miles in 120 days, then it traveled, on average, $\frac{2,100 \text{ miles}}{120 \text{ days}} = 17.5$ miles per day.

Choice A is incorrect. This is approximately the average amount of time, in days, it took the butterfly to fly one mile:

$\frac{120 \text{ days}}{2,100 \text{ miles}} = 0.057$ days per mile. Choice B is incorrect and may result from an arithmetic error. Choice D is incorrect. This is the number of hours in a day rather than the number of miles flown per day.

Question Difficulty:

Easy

Question ID e1ad3d41

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: e1ad3d41

Coat color	Eye color		
	Deep blue	Light brown	Total
Cream-tortoiseshell	16	16	32
Chocolate	12	4	16
Total	28	20	48

The data on the coat color and eye color for 48 Himalayan kittens available for adoption were collected and summarized in the table above. What fraction of the chocolate-colored kittens has deep blue eyes?

A. $\frac{12}{48}$

B. $\frac{12}{28}$

C. $\frac{16}{32}$

D. $\frac{12}{16}$

ID: e1ad3d41 Answer

Correct Answer:

D

Rationale

Choice D is correct. The table shows that there are a total of 16 kittens that have a chocolate-colored coat. Of the 16 with a chocolate-colored coat, 12 have deep blue eyes. Therefore, the fraction of chocolate-colored kittens with deep blue eyes is simply the ratio of those two numbers, or $\frac{12}{16}$.

Choice A is incorrect; this is the fraction of all chocolate-colored kittens. Choice B is incorrect; this is the fraction of kittens with deep blue eyes that have a chocolate-colored coat. Choice C is incorrect; this is the fraction of cream-tortoiseshell-colored kittens with deep blue eyes.

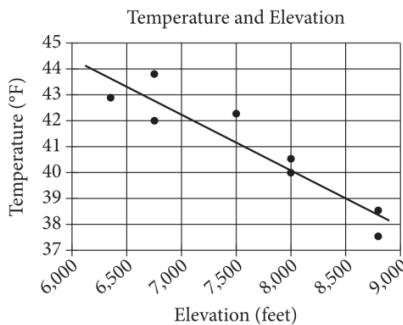
Question Difficulty:

Medium

Question ID ac5b6558

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: ac5b6558



The scatterplot above shows the high temperature on a certain day and the elevation of 8 different locations in the Lake Tahoe Basin. A line of best fit for the data is also shown. What temperature is predicted by the line of best fit for a location in the Lake Tahoe Basin with an elevation of 8,500 feet?

- A. 37°F
- B. 39°F
- C. 41°F
- D. 43°F

ID: ac5b6558 Answer

Correct Answer:

B

Rationale

Choice B is correct. The line of best fit passes through the point $(8,500, 39)$. Therefore, the line of best fit predicts a temperature of 39°F for a location in Lake Tahoe Basin with an elevation of 8,500 feet.

Choice A is incorrect. This is the lowest temperature listed on the scatterplot, and the line of best fit never crosses this value for any of the elevations shown. Choice C is incorrect. According to the line of best fit, the temperature of 41°F is predicted for an elevation of slightly greater than 7,500 feet, not an elevation of 8,500 feet. Choice D is incorrect. According to the line of best fit, the temperature of 43°F is predicted for an elevation of roughly 6,700 feet, not an elevation of 8,500 feet.

Question Difficulty:

Easy

Question ID 46545dd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 46545dd6

Number of High School Students Who Completed Summer Internships

High school	Year				
	2008	2009	2010	2011	2012
Foothill	87	80	75	76	70
Valley	44	54	65	76	82
Total	131	134	140	152	152

The table above shows the number of students from two different high schools who completed summer internships in each of five years. No student attended both schools. Of the students who completed a summer internship in 2010, which of the following represents the fraction of students who were from Valley High School?

A. $\frac{10}{140}$

B. $\frac{65}{140}$

C. $\frac{75}{140}$

D. $\frac{65}{75}$

ID: 46545dd6 Answer

Correct Answer:

B

Rationale

Choice B is correct. According to the table, 140 students from the two high schools completed summer internships in 2010. Of these, 65 were from Valley High School. Therefore, of the students who completed summer internships in 2010, $\frac{65}{140}$ represents the fraction who were from Valley High School.

Choice A is incorrect. This is the difference between the numbers of students from the two high schools who completed internships in 2010 divided by the total number of students from the two schools who completed internships that year. Choice C is incorrect. This is the fraction of students from Foothill High School who completed internships out of all the students who

completed internships in 2010. Choice D is incorrect. This is the number of students from Valley High School who completed internships in 2010 divided by the number of students from Foothill High School who completed internships in 2010.

Question Difficulty:

Easy

Question ID 16cea46c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 16cea46c

Voice type	Number of singers
Countertenor	4
Tenor	6
Baritone	10
Bass	5

A total of 25 men registered for singing lessons. The frequency table shows how many of these singers have certain voice types. If one of these singers is selected at random, what is the probability he is a baritone?

- A. 0.10
- B. 0.40
- C. 0.60
- D. 0.67

ID: 16cea46c Answer

Correct Answer:

B

Rationale

Choice B is correct. This probability is calculated by dividing the number of baritone singers by the total number of men registered for singing lessons. It's given that a total of 25 men registered for singing lessons and that there are 10 baritones. Therefore, the

$\frac{10}{25}$

probability of selecting a baritone from this group at random is $\frac{10}{25}$, which is equivalent to 0.40.

Choice A is incorrect. This would be the probability of selecting a baritone at random if there were 100 total men who registered for singing lessons. Choice C is incorrect. This is the probability of selecting a singer at random who isn't a baritone. Choice D is incorrect. This would be the probability of selecting a baritone at random if there were 15 total men registered for singing lessons.

Question Difficulty:

Easy

Question ID bd90f87e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: bd90f87e

A table of the US minimum wage for 6 different years is shown below.

Year	US minimum wage (dollars per hour)
1960	1.00
1970	1.60
1980	3.10
1990	3.80
2000	5.15
2010	7.25

What was the percent increase of the minimum wage from 1960 to 1970?

- A. 30%
- B. 60%
- C. 62.5%
- D. 120%

ID: bd90f87e Answer

Correct Answer:

B

Rationale

Choice B is correct. According to the table, the minimum wage in 1960 was \$1.00 per hour, and in 1970 it was \$1.60 per hour. The

$$\text{percentage change is therefore } 100 \left(\frac{1.60 - 1.00}{1.00} \right) = 60\%.$$

Choice A is incorrect and may result from averaging the two wages before calculating the percentage change. Choice C is incorrect. This is the 1960 wage expressed as a percentage of the 1970 wage, not the percentage change between the two. Choice D is incorrect and may result from a calculation error.

Question Difficulty:
Easy

Question ID 0ea56bb2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 0ea56bb2

Year	Subscriptions sold
2012	5,600
2013	5,880

The manager of an online news service received the report above on the number of subscriptions sold by the service. The manager estimated that the percent increase from 2012 to 2013 would be double the percent increase from 2013 to 2014. How many subscriptions did the manager expect would be sold in 2014?

- A. 6,020
- B. 6,027
- C. 6,440
- D. 6,468

ID: 0ea56bb2 Answer

Correct Answer:

B

Rationale

Choice B is correct. The percent increase from 2012 to 2013 was $\frac{5,880 - 5,600}{5,600} = 0.05$, or 5%. Since the percent increase from 2012 to 2013 was estimated to be double the percent increase from 2013 to 2014, the percent increase from 2013 to 2014 was expected to be 2.5%.

Therefore, the number of subscriptions sold in 2014 is expected to be the number of subscriptions sold in 2013 multiplied by $(1 + 0.025)$, or $5,880(1.025) = 6,027$.

Choice A is incorrect and is the result of adding half of the value of the increase from 2012 to 2013 to the 2013 result. Choice C is incorrect and is the result adding twice the value of the increase from 2012 to 2013 to the 2013 result. Choice D is incorrect and is the result of interpreting the percent increase from 2013 to 2014 as double the percent increase from 2012 to 2013.

Question Difficulty:

Hard

Question ID 90eed2e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 90eed2e5

A city has 50 city council members. A reporter polled a random sample of 20 city council members and found that 6 of those polled supported a specific bill. Based on the sample, which of the following is the best estimate of the number of city council members in the city who support the bill?

- A. 6
- B. 9
- C. 15
- D. 30

ID: 90eed2e5 Answer

Rationale

Choice C is correct. Because a random sample of the city council was polled, the proportion of the sample who supported the bill is expected to be approximately equal to the proportion of the total city council who supports the bill. Since 6 of the 20 polled, or 30%, supported the bill, it can be estimated that 50×0.3 , or 15, city council members support the bill.

Choice A is incorrect. This is the number of city council members in the sample who supported the bill. Choice B is incorrect and may result from a computational error. Choice D is incorrect. This is the number of city council members in the sample of city council members who were not polled.

Question Difficulty:

Easy

Question ID 8e528129

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 8e528129

Pure beeswax has a density of 0.555 ounce per cubic inch. An online company sells pure beeswax at a price of \$8.00 per ounce. What is the selling price, in dollars per cubic inch, for pure beeswax purchased from this company?

ID: 8e528129 Answer

Rationale

The correct answer is 4.44. The selling price, in dollars per cubic inch, is found by multiplying the density, in ounces per cubic inch, by the unit price, in dollars per ounce: $\left(\frac{0.555 \text{ ounce}}{1 \text{ cubic inch}}\right)\left(\frac{\$8.00}{1 \text{ ounce}}\right) = \frac{\$4.44}{1 \text{ cubic inch}}$. Thus, the selling price, in dollars per cubic inch, is 4.44.

Question Difficulty:

Medium

Question ID 8736334b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8736334b

Data set A: 72,73,73,76,76

Data set B: 61,64,74,85,x

Data set A and data set B each contain 5 numbers. If the mean of data set A is equal to the mean of data set B, what is the value of x ?

- A. 77
- B. 85
- C. 86
- D. 95

ID: 8736334b Answer

Correct Answer:

C

Rationale

Choice C is correct. The mean of a data set is found by dividing the sum of the values in the data set by the number of values in

$$\frac{72+73+73+76+76}{5}$$

the data set. Therefore, the mean of data set A is $\frac{72+73+73+76+76}{5}$, which simplifies to 74. The mean of data set B is

$$\frac{61+64+74+85+x}{5}$$

represented by the equation $\frac{61+64+74+85+x}{5}$, or $\frac{284+x}{5}$. It's given that the mean of data set A is equal to the mean of

$$74 = \frac{284+x}{5}$$

data set B. Therefore, the equation $74 = \frac{284+x}{5}$ can be used to solve for x. Multiplying both sides of this equation by 5 yields

$$370 = 284 + x.$$

Subtracting 284 from both sides of this equation yields $86 = x$.

Choices A, B, and D are incorrect and may result from calculation errors.

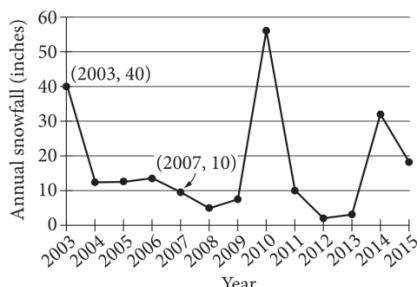
Question Difficulty:

Easy

Question ID 0231050d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: 0231050d



The line graph shows the total amount of snow, in inches, recorded each year in Washington, DC, from 2003 to 2015. If $p\%$ is the percent decrease in the annual snowfall from 2003 to 2007, what is the value of p ?

ID: 0231050d Answer

Rationale

The correct answer is 75. The percent decrease between two values is found by dividing the difference between the two values by the original value and multiplying by 100. The line graph shows that the annual snowfall in 2003 was 40 inches, and the annual snowfall in 2007 was 10 inches. Therefore, the percent decrease in the annual snowfall from 2003 to 2007 is $\left(\frac{40-10}{40}\right)(100)$, or 75. It's given that this is equivalent to $p\%$, so the value of p is 75.

Question Difficulty:

Hard

Question ID be35c117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: be35c117

A wind turbine completes 900 revolutions in 50 minutes. At this rate, how many revolutions per minute does this turbine complete?

- A. 18
- B. 850
- C. 950
- D. 1,400

ID: be35c117 Answer

Correct Answer:

A

Rationale

Choice A is correct. Dividing the number of revolutions by the number of minutes gives the number of revolutions the turbine completes per minute. It's given that the wind turbine completes 900 revolutions in 50 minutes. Therefore, at this rate, this turbine completes $\frac{900}{50}$, or 18, revolutions per minute.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID b680e76d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: b680e76d

A survey taken by 1,000 students at a school asked whether they played school sports. The table below summarizes all 1,000 responses from the students surveyed.

	Males	Females
Play a school sport	312	220
Do not play a school sport	?	216

How many of the males surveyed responded that they do not play a school sport?

- A. 109
- B. 252
- C. 468
- D. 688

ID: b680e76d Answer

Correct Answer:

B

Rationale

Choice B is correct. The table summarizes all 1,000 responses from the students surveyed. If 312 are males who play a sport, 220 are females who play a sport, and 216 are females who do not play a sport, then $1,000 - 312 - 220 - 216 = 252$ males who do not play a sport.

Choices A, C, and D are incorrect. If 109 males who do not play a sport responded, then the table summary would be $109 + 312 + 220 + 216 = 857$ total student responses rather than 1,000. If 468 males who do not play a sport responded, then the table summary would be $468 + 312 + 220 + 216 = 1,216$ total student responses rather than 1,000. If 688 males who do not play a sport responded, then the table summary would be $688 + 312 + 220 + 216 = 1,436$ total student responses rather than 1,000.

Question Difficulty:

Easy

Question ID 53d97af5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 53d97af5

A study was done on the weights of different types of fish in a pond. A random sample of fish were caught and marked in order to ensure that none were weighed more than once. The sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds. Which of the following conclusions is best supported by the sample data?

- A. The majority of all fish in the pond weigh less than 2 pounds.
- B. The average weight of all fish in the pond is approximately 2 pounds.
- C. Approximately 30% of all fish in the pond weigh more than 2 pounds.
- D. Approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

ID: 53d97af5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sample of 150 largemouth bass was selected at random from all the largemouth bass in the pond, and since 30% of the fish in the sample weighed more than 2 pounds, it can be concluded that approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

Choices A, B, and C are incorrect. Since the sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds, this result can be generalized only to largemouth bass in the pond, not to all fish in the pond.

Question Difficulty:

Medium

Question ID d4413871

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d4413871

	Blood type			
Rhesus factor	A	B	AB	O
+	33	9	3	37
-	7	2	1	x

Human blood can be classified into four common blood types—A, B, AB, and O. It is also characterized by the presence (+) or absence (−) of the rhesus factor. The table above shows the distribution of blood type and rhesus factor for a group of people. If one of these people who is rhesus negative (−) is chosen at random, the probability

that the person has blood type B is $\frac{1}{9}$. What is the value of x ?

ID: d4413871 Answer

Rationale

The correct answer is 8. In this group, $\frac{1}{9}$ of the people who are rhesus negative have blood type B. The total number of people who are rhesus negative in the group is $7 + 2 + 1 + x$, and there are 2 people who are rhesus negative with blood type B. Therefore,

$$\frac{2}{(7+2+1+x)} = \frac{1}{9}$$
 . Combining like terms on the left-hand side of the equation yields $\frac{2}{(10+x)} = \frac{1}{9}$. Multiplying both sides of this equation by 9 yields $\frac{18}{(10+x)} = 1$, and multiplying both sides of this equation by $(10+x)$ yields $18 = 10 + x$. Subtracting 10 from both sides of this equation yields $8 = x$.

Question Difficulty:

Hard

Question ID 0301c5dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 0301c5dc

The table below shows the number of state parks in a certain state that contain camping facilities and bicycle paths.

	Has bicycle paths	Does not have bicycle paths
Has camping facilities	20	5
Does not have camping facilities	8	4

If one of these state parks is selected at random, what is the probability that it has camping facilities but does not have bicycle paths?

- A. $\frac{5}{37}$
- B. $\frac{5}{25}$
- C. $\frac{8}{28}$
- D. $\frac{5}{9}$

ID: 0301c5dc Answer

Correct Answer:

A

Rationale

Choice A is correct. The total number of state parks in the state is $20 + 5 + 8 + 4 = 37$. According to the table, 5 of these have camping facilities but not bicycle paths. Therefore, if a state park is selected at random, the probability that it has camping facilities but not bicycle paths is $\frac{5}{37}$.

Choice B is incorrect. This is the probability that a state park selected at random from the state parks with camping facilities does not have bicycle paths. Choice C is incorrect. This is the probability that a state park selected at random from the state parks with bicycle paths does not have camping facilities. Choice D is incorrect. This is the probability that a state park selected at random from the state parks without bicycle paths does have camping facilities.

Question Difficulty:

Medium

Question ID c88e0663

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: c88e0663

For a school fund-raiser, 10 students sold a total of 90 boxes of cookies. Which of the following can be calculated from this information?

- A. The average number of boxes sold per student
- B. The median number of boxes sold per student
- C. The greatest number of boxes sold by one student
- D. The least number of boxes sold by one student

ID: c88e0663 Answer

Correct Answer:

A

Rationale

Choice A is correct. The average can be found by dividing the total number of boxes sold by the number of students, which is

$$\frac{90}{10} = 9$$

Choices B, C, and D are incorrect. Each results from choosing measures that require the results of individual students, which are not given.

Question Difficulty:

Easy

Question ID 3f2ee20a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 3f2ee20a

The results of two independent surveys are shown in the table below.

Men's Height

Group	Sample size	Mean (centimeters)	Standard deviation (centimeters)
A	2,500	186	12.5
B	2,500	186	19.1

Which statement is true based on the table?

- A. The Group A data set was identical to the Group B data set.
- B. Group B contained the tallest participant.
- C. The heights of the men in Group B had a larger spread than the heights of the men in Group A.
- D. The median height of Group B is larger than the median height of Group A.

ID: 3f2ee20a Answer

Correct Answer:

C

Rationale

Choice C is correct. Standard deviation is a measure of spread, so data sets with larger standard deviations tend to have larger spread. The standard deviation of the heights of the men in Group B is larger than the standard deviation of the heights of the men in Group A. Therefore, the heights of the men in Group B had a larger spread than the heights of the men in Group A.

Choice A is incorrect. If two data sets are identical, they will have equivalent means and equivalent standard deviations. Since the two data sets have different standard deviations, they cannot be identical. Choice B is incorrect. Without knowing the maximum value for each data set, it's impossible to know which group contained the tallest participant. Choice D is incorrect. Since the means of the two groups are equivalent, the medians could also be the same or could be different, but it's impossible to tell from the given information.

Question Difficulty:

Medium

Question ID d0efc1dd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: d0efc1dd

15, 14, 18, 17, x

The mean and the median of the five numbers above are equal. Which of the following is NOT a possible value of x ?

- A. 6
- B. 11
- C. 16
- D. 21

ID: d0efc1dd Answer

Correct Answer:

A

Rationale

Choice A is correct. If x is 6, then the five numbers in the given list are 15, 14, 18, 17, 6. The mean of these five numbers is the sum

$$\frac{15+14+18+17+6}{5} = \frac{70}{5} = 14$$
 of all the values divided by the number of values, or

The median of these five numbers can be found by ordering the numbers from least to greatest and determining the middle value. When ordered from least to greatest, the numbers in the given list are 6, 14, 15, 17, 18, and the middle value is 15. Since the mean is 14 and the median is 15, the mean and median aren't equal when x is 6.

Choices B, C, and D are incorrect. If any of these values is substituted for x, the mean and median of the data set would be equal.

Question Difficulty:

Medium

Question ID 190be2fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 190be2fc

Data set A consists of 10 positive integers less than 60. The list shown gives 9 of the integers from data set A.

43, 45, 44, 43, 38, 39, 40, 46, 40

The mean of these 9 integers is 42. If the mean of data set A is an integer that is greater than 42, what is the value of the largest integer from data set A?

ID: 190be2fc Answer

Correct Answer:

52

Rationale

The correct answer is 52. The mean of a data set is calculated by dividing the sum of the data values by the number of values. It's given that data set A consists of 10 values, 9 of which are shown. Let x represent the 10th data value in data set A, which isn't shown. The mean of data set A can be found using the expression $\frac{43 + 45 + 44 + 43 + 38 + 39 + 40 + 46 + 40 + x}{10}$, or $\frac{378 + x}{10}$. It's given that the mean of the 9 values shown is 42 and that the mean of all 10 numbers is greater than 42. Consequently, the 10th data value, x , is larger than 42. It's also given that the data values in data set A are positive integers less than 60. Thus, $42 < x < 60$. Finally, it's given that the mean of data set A is an integer. This means that the sum of the 10 data values, $378 + x$, is divisible by 10. Thus, $378 + x$ must have a ones digit of 0. It follows that x must have a ones digit of 2. Since $42 < x < 60$ and x has a ones digit of 2, the only possible value of x is 52. Since 52 is larger than any of the integers shown, the largest integer from data set A is 52.

Question Difficulty:

Hard

Question ID 3f236a64

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 3f236a64

x	y
1	4
3	12
5	20
40	k

In the table above, the ratio of y to x for each ordered pair is constant. What is the value of k?

- A. 28
- B. 36
- C. 80
- D. 160

ID: 3f236a64 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the ratio of y to x is constant for each ordered pair in the table, the first row can be used to determine that the ratio of y to x is 4 to 1. The proportion $\frac{4}{1} = \frac{k}{40}$ can be used to solve for k. Multiplying each side of the equation by 40 yields $160 = k$.

Choice A is incorrect. This is the value of y when the value of x is 7, not 40. Choice B is incorrect and may result from subtracting 4 from 40 instead of multiplying 40 by 4. Choice C is incorrect and may result from incorrectly setting up the proportion.

Question Difficulty:

Easy

Question ID 8705ecba

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 8705ecba

The cost of a certain shirt is \$20 before a 5% sales tax is added. What is the total cost, including sales tax, to purchase the shirt?

- A. \$20.05
- B. \$20.50
- C. \$21.00
- D. \$25.00

ID: 8705ecba Answer

Correct Answer:

C

Rationale

Choice C is correct. The total cost to purchase the shirt is the \$20 cost of the shirt plus the 5% sales tax. The value of the 5% sales tax on the \$20 shirt is equivalent to $(0.05)(\$20)$, or \$1. Therefore, the total cost to purchase the shirt is $\$20 + \1 , or \$21.

Choice A is incorrect and may result from neglecting to multiply by \$20 when finding the value of the sales tax. Choice B is incorrect and may result from dividing by 10, instead of by 100, and then neglecting to multiply by \$20 when finding the sales tax. Choice D is incorrect and may result from interpreting the sales tax of 5% as \$5.

Question Difficulty:

Easy

Question ID f8f79e11

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 50%; background-color: #D9D9D9; height: 10px;"></div>

ID: f8f79e11

A park ranger asked a random sample of visitors how far they hiked during their visit.

Based on the responses, the estimated mean was found to be 4.5 miles, with an associated margin of error of 0.5 miles. Which of the following is the best conclusion from these data?

- A. It is likely that all visitors hiked between 4 and 5 miles.
- B. It is likely that most visitors hiked exactly 4.5 miles.
- C. It is not possible that any visitor hiked less than 3 miles.
- D. It is plausible that the mean distance hiked for all visitors is between 4 and 5 miles.

ID: f8f79e11 Answer

Correct Answer:

D

Rationale

Choice D is correct. The given estimated mean has an associated margin of error because from sample data, the population mean can't be determined precisely. Rather, from the sample mean, an interval can be determined within which it's plausible that the population's mean is likely to lie. Since the estimated mean is 4.5 miles with an associated margin of error of 0.5 miles, it follows that between $4.5 - 0.5$ miles and $4.5 + 0.5$ miles, or between 4 and 5 miles, is plausibly the mean distance hiked for all visitors.

Choices A, B, and C are incorrect. Based on the estimated mean, no determination can be made about the number of miles hiked for all visitors to the park.

Question Difficulty:

Medium

Question ID c178d4da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: c178d4da

Value	Data set A frequency	Data set B frequency
30	2	9
34	4	7
38	5	5
42	7	4
46	9	2

Data set A and data set B each consist of 27 values. The table shows the frequencies of the values for each data set. Which of the following statements best compares the means of the two data sets?

- A. The mean of data set A is greater than the mean of data set B.
- B. The mean of data set A is less than the mean of data set B.
- C. The mean of data set A is equal to the mean of data set B.
- D. There is not enough information to compare the means of the data sets.

ID: c178d4da Answer

Correct Answer:

A

Rationale

Choice A is correct. The mean value of a data set is the sum of the values of the data set divided by the number of values in the data set. When a data set is represented in a frequency table, the sum of the values in the data set is the sum of the products of each value and its frequency. For data set A, the sum of products of each value and its frequency is $302 + 344 + 385 + 427 + 469$, or 1,094. It's given that there are 27 values in data set A. Therefore, the mean of data set A is $\frac{1,094}{27}$, or approximately 40.52.

Similarly, the mean of data B is $\frac{958}{27}$, or approximately 35.48. Therefore, the mean of data set A is greater than the mean of data set B.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 2c76bcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2c76bcce

A company designs and makes handbags. To estimate the mean weight of the handbags made by the company on a particular day, a sample of the handbags made by the company on that day was selected at random. Based on the sample, it is estimated that the mean weight of all handbags made by the company on that day is **27.8 ounces (oz)**, with an associated margin of error of **0.02 oz**. Based on this estimate and associated margin of error, which of the following is the most plausible conclusion?

- A. The mean weight of all handbags made by the company on that day is between **27.78 oz** and **27.82 oz**.
- B. The actual weights of all handbags made by the company on that day are between **27.78 oz** and **27.82 oz**.
- C. The actual weights of all handbags from the sample are between **27.78 oz** and **27.82 oz**.
- D. The mean weight of all handbags made by the company on that day is **27.8 oz**.

ID: 2c76bcce Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the estimated mean weight of all handbags made by the company on a particular day is 27.8 oz, with an associated margin of error of 0.02 oz. It follows that plausible values for the mean weight are between $(27.8 - 0.02)$ oz and $(27.8 + 0.02)$ oz. Therefore, the most plausible conclusion is that the mean weight of all handbags made by the company on that day is between 27.78 oz and 27.82 oz.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 9a144a01

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 9a144a01

Which of the following is true about the values of 2^x and

$2x + 2$ for $x > 0$?

- A. For all $x > 0$, it is true that $2^x < 2x + 2$.
- B. For all $x > 0$, it is true that $2^x > 2x + 2$.
- C. There is a constant c such that if $0 < x < c$, then $2^x < 2x + 2$, but if $x > c$, then $2^x > 2x + 2$.
- D. There is a constant c such that if $0 < x < c$, then $2^x > 2x + 2$, but if $x > c$, then $2^x < 2x + 2$.

ID: 9a144a01 Answer

Correct Answer:

C

Rationale

Choice C is correct. At $x = 0$, the value of 2^x is less than the value of $2x + 2$: $2^0 < 2(0) + 2$, which is equivalent to $1 < 2$. As the value of x increases, the value of 2^x remains less than the value of $2x + 2$ until $x = 3$, which is when the two values are equal: $2^3 = 2(3) + 2$, which is equivalent to $8 = 8$. Then, for $x > 3$, the value of 2^x is greater than the value of $2x + 2$. So there is a constant, 3, such that when $0 < x < 3$, then $2^x < 2x + 2$, but when $x > 3$, then $2^x > 2x + 2$.

Choice A is incorrect because $2^x > 2x + 2$ when $x > 3$. Choice B is incorrect because $2^x < 2x + 2$ when $0 < x < 3$. Choice D is incorrect because $2^x < 2x + 2$ when $0 < x < 3$ and $2^x > 2x + 2$ when $x > 3$.

Question Difficulty:

Medium

Question ID 022e9894

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 022e9894

An insurance company offers a series of three information sessions. **1,250** people attended the first information session. **72%** of the people who attended the first information session attended the second information session, and **36%** of the people who attended the first and second information sessions attended the third information session. How many people attended all three information sessions?

ID: 022e9894 Answer

Correct Answer:

324

Rationale

The correct answer is 324. It's given that 1,250 people attended the first information session, and that 72% of the people who attended the first information session attended the second information session. Therefore, the number of people who attended the first and second information sessions can be found by calculating 72% of 1,250, which is equal to $1,250 \frac{72}{100}$, or 900. It's also given that 36% of the people who attended the first and second information sessions attended the third information session. Since 900 people attended the first and second information sessions, the number of people who attended the first, second, and third information sessions can be found by calculating 36% of 900, which is equal to $900 \frac{36}{100}$, or 324. Therefore, 324 people attended all three information sessions.

Question Difficulty:

Medium

Question ID 457d2f2c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 457d2f2c

A data set of 27 different numbers has a mean of 33 and a median of 33. A new data set is created by adding 7 to each number in the original data set that is greater than the median and subtracting 7 from each number in the original data set that is less than the median. Which of the following measures does NOT have the same value in both the original and new data sets?

- A. Median
- B. Mean
- C. Sum of the numbers
- D. Standard deviation

ID: 457d2f2c Answer

Correct Answer:

D

Rationale

Choice D is correct. When a data set has an odd number of elements, the median can be found by ordering the values from least to greatest and determining the middle value. Out of the 27 different numbers in this data set, 13 numbers are below the median, one number is exactly 33, and 13 numbers are above the median. When 7 is subtracted from each number below the median and added to each number above the median, the data spread out from the median. Since the median of this data set, 33, is equivalent to the mean of the data set, the data also spread out from the mean. Since standard deviation is a measure of how spread out the data are from the mean, a greater spread from the mean indicates an increased standard deviation.

Choice A is incorrect. All the numbers less than the median decrease and all the numbers greater than the median increase, but the median itself doesn't change. Choices B and C are incorrect. The mean of a data set is found by dividing the sum of the values by the number of values. The net change from subtracting 7 from 13 numbers and adding 7 to 13 numbers is zero. Therefore, neither the mean nor the sum of the numbers changes.

Question Difficulty:

Hard

Question ID 6310adbc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6310adbc

The ratio of t to u is 1 to 2, and $t = 10$.

What is the value of u ?

- A. 2
- B. 5
- C. 10
- D. 20

ID: 6310adbc Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the ratio of t to u is 1 to 2. Since $t = 10$, it follows that the ratio of 10 to u is also 1 to 2. The relationship between these ratios can be represented by the proportion $\frac{10}{u} = \frac{1}{2}$. Multiplying both sides of this equation by 2 and then by u yields $20 = u$.

Choice A is incorrect. This is the value of u when $t = 1$. Choice B is incorrect. This would be the value of u if the ratio of t to u were 2 to 1. Choice C is incorrect. This is the value of t , not u .

Question Difficulty:

Easy

Question ID 63573fea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: 63573fea

During the first month of sales, a company sold 1,300,000 units of a certain type of smartphone. During the same month, 15% of the units sold were returned. If sales and the return rate remain the same for each of the next 5 months, about how many units of this smartphone will be returned to the company during this 6-month period?

- A. 195,000
- B. 975,000
- C. 1,170,000
- D. 6,630,000

ID: 63573fea Answer

Correct Answer:

C

Rationale

Choice C is correct. Of the 1,300,000 units sold during the first month, 15% were returned, so $(1,300,000)(0.15) = 195,000$ units were returned during the first month. If the units were sold and returned at the same rate for the next 5 months, then a total of $(195,000)(6) = 1,170,000$ smartphone units were returned during the 6-month period.

Choice A is incorrect. This is the number of units that were returned in 1 month. Choice B is incorrect. This is the number of units that were returned in 5 months. Choice D is incorrect. This is the number of units sold and not returned during the first 6 months.

Question Difficulty:

Medium

Question ID 191d167b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 191d167b

Last year, 200 students enrolled in an interior design program. This year, the number of students enrolled is 147% of last year's number. How many students are enrolled in the interior design program this year?

- A. 247
- B. 294
- C. 347
- D. 394

ID: 191d167b Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the number of students enrolled in an interior design program this year is 147% of last year's number, which is 200. 147% of 200 can be expressed as $\frac{147}{100} \times 200$, or 1.47200, which is equivalent to 294. Therefore, 294 students are enrolled in the interior design program this year.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

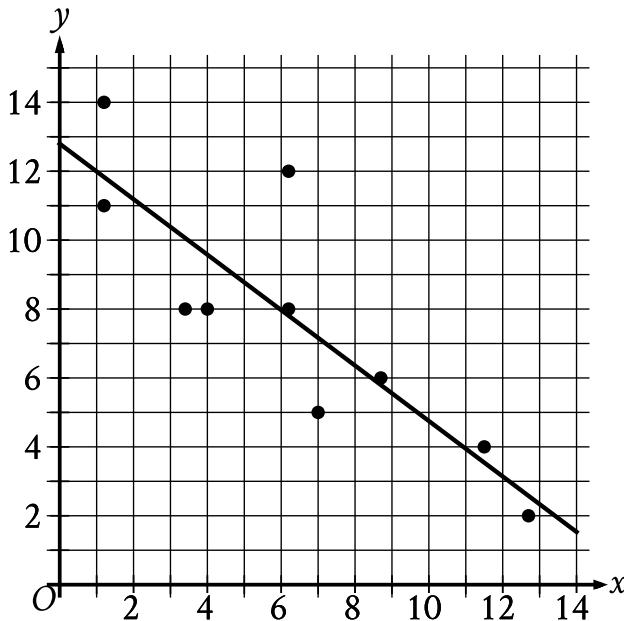
Easy

Question ID 03a16790

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 03a16790

The scatterplot shows the relationship between two variables, x and y . A line of best fit is also shown.



Which of the following is closest to the slope of the line of best fit shown?

- A. -2.4
- B. -0.8
- C. 0.8
- D. 2.4

ID: 03a16790 Answer

Correct Answer:

B

Rationale

Choice B is correct. A line of best fit is shown in the scatterplot such that as the value of x increases, the value of y decreases. Thus, the slope of the line of best fit shown is negative. The slope of a line passing through two points, x_1, y_1 and x_2, y_2 , can be calculated as $\frac{y_2 - y_1}{x_2 - x_1}$. The line of best fit shown passes approximately through the points 1, 12 and 11, 4. Substituting 1, 12 and 11, 4 for x_1, y_1 and x_2, y_2 , respectively, in $\frac{y_2 - y_1}{x_2 - x_1}$ gives $\frac{4 - 12}{11 - 1}$, which is equivalent to $-\frac{8}{10}$, or -0.8. Therefore, of the given choices, -0.8 is closest to the slope of the line of best fit shown.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. The line of best fit shown has a negative slope, not a positive slope.

Choice D is incorrect. The line of best fit shown has a negative slope, not a positive slope.

Question Difficulty:

Medium

Question ID 60caadfd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 60caadfd

Each rock in a collection of **70** rocks was classified as either igneous, metamorphic, or sedimentary, as shown in the frequency table.

Classification	Frequency
igneous	10
metamorphic	33
sedimentary	27

If one of these rocks is selected at random, what is the probability of selecting a rock that is igneous?

- A. $\frac{10}{27}$
- B. $\frac{10}{33}$
- C. $\frac{10}{60}$
- D. $\frac{10}{70}$

ID: 60caadfd Answer

Correct Answer:

D

Rationale

Choice D is correct. If one of the rocks in the collection is selected at random, the probability of selecting a rock that is igneous is equal to the number of igneous rocks in the collection divided by the total number of rocks in the collection. According to the table, there are 10 igneous rocks in the collection, and it's given that there's a total of 70 rocks in the collection. Therefore, if one of the rocks in the collection is selected at random, the probability of selecting a rock that is igneous is $\frac{10}{70}$.

Choice A is incorrect. This is the number of igneous rocks in the collection divided by the number of sedimentary rocks in the collection, not divided by the total number of rocks in the collection.

Choice B is incorrect. This is the number of igneous rocks in the collection divided by the number of metamorphic rocks in the collection, not divided by the total number of rocks in the collection.

Choice C is incorrect. This is the number of igneous rocks in the collection divided by the number of rocks in the collection that aren't igneous, not divided by the total number of rocks in the collection.

Question Difficulty:

Easy

Question ID b4f5a7ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4f5a7ca

A survey was conducted using a sample of history professors selected at random from the California State Universities. The professors surveyed were asked to name the publishers of their current texts. What is the largest population to which the results of the survey can be generalized?

- A. All professors in the United States
- B. All history professors in the United States
- C. All history professors at all California State Universities
- D. All professors at all California State Universities

ID: b4f5a7ca Answer

Correct Answer:

C

Rationale

Choice C is correct. Selecting a sample at random when conducting a survey allows the results to be generalized to the population from which the sample was selected, but not beyond this population. In this situation, the population that the sample was selected from is history professors from the California State Universities. Therefore, the largest population to which the results of the survey can be generalized is all history professors at all California State Universities.

Choices A, B, and D are incorrect. Since the sample was selected at random from history professors from the California State Universities, the results of the survey can't be generalized to all professors in the United States, all history professors in the United States, or all professors at all California State Universities. All three of these populations may use different texts and therefore may name different publishers.

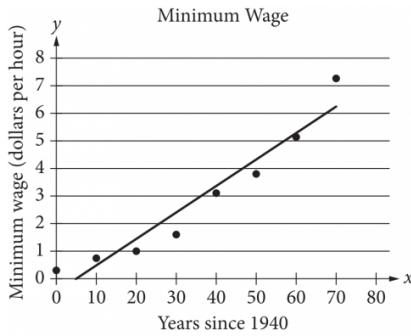
Question Difficulty:

Medium

Question ID d6af3572

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: d6af3572



The scatterplot above shows the federal-mandated minimum wage every 10 years between 1940 and 2010. A line of best fit is shown, and its equation is

$y = 0.096x - 0.488$. What does the line of best fit predict about the increase in the minimum wage over the 70-year period?

- A. Each year between 1940 and 2010, the average increase in minimum wage was 0.096 dollars.
- B. Each year between 1940 and 2010, the average increase in minimum wage was 0.49 dollars.
- C. Every 10 years between 1940 and 2010, the average increase in minimum wage was 0.096 dollars.
- D. Every 10 years between 1940 and 2010, the average increase in minimum wage was 0.488 dollars.

ID: d6af3572 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given equation is in slope-intercept form, or $y = mx + b$, where m is the value of the slope of the line of best fit. Therefore, the slope of the line of best fit is 0.096. From the definition of slope, it follows that an increase of 1 in the x -value corresponds to an increase of 0.096 in the y -value. Therefore, the line of best fit predicts that for each year between 1940 and 2010, the minimum wage will increase by 0.096 dollar per hour.

Choice B is incorrect and may result from using the y -coordinate of the y -intercept as the average increase, instead of the slope. Choice C is incorrect and may result from using the 10-year increments given on the x -axis to incorrectly interpret the slope of the line of best fit. Choice D is incorrect and may result from using the y -coordinate of the y -intercept as the average increase, instead of the slope, and from using the 10-year increments given on the x -axis to incorrectly interpret the slope of the line of best fit.

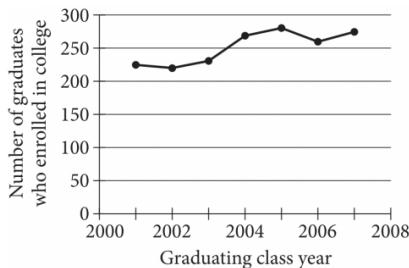
Question Difficulty:

Hard

Question ID 74dee52b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 74dee52b



The line graph shows the number of graduates from the classes of 2001 through 2007 at a certain school who enrolled in college within 24 months of graduation. Of the following, which class had the fewest graduates who enrolled in college within 24 months of graduation?

- A. 2002
- B. 2004
- C. 2005
- D. 2007

ID: 74dee52b Answer

Correct Answer:

A

Rationale

Choice A is correct. The year with the fewest graduates who enrolled in college within 24 months of graduation is the point with the lowest value on the vertical axis. This occurs at 2002.

Choice B, C, and D are incorrect. The years 2004, 2005, and 2007 each had a greater number of graduates who enrolled in college within 24 months of graduation than did the year 2002.

Question Difficulty:

Easy

Question ID fea831fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0070C0; height: 10px;"></div> <div style="width: 50%; background-color: #D9D9D9; height: 10px;"></div>

ID: fea831fc

On April 18, 1775, Paul Revere set off on his midnight ride from Charlestown to Lexington. If he had ridden straight to Lexington without stopping, he would have traveled 11 miles in 26 minutes. In such a ride, what would the average speed of his horse have been, to the nearest tenth of a mile per hour?

ID: fea831fc Answer

Rationale

The correct answer is 25.4. The average speed is the total distance divided by the total time. The total distance is 11 miles and the total time is 26 minutes. Thus, the average speed is $\frac{11}{26}$ miles per minute. The question asks for the average speed in miles per hour, and there are 60 minutes in an hour; converting miles per minute to miles per hour gives the following:

$$\text{Average speed} = \frac{11 \text{ miles}}{26 \text{ minutes}} \times \frac{60 \text{ minutes}}{1 \text{ hour}}$$

$$= \frac{660}{26} \text{ miles per hour}$$

$$\approx 25.38 \text{ miles per hour}$$

Therefore, to the nearest tenth of a mile per hour, the average speed of Paul Revere's ride would have been 25.4 miles per hour. Note that 25.4 and 127/5 are examples of ways to enter a correct answer.

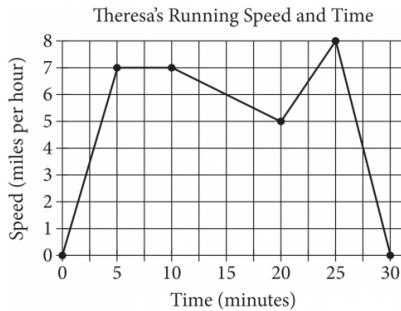
Question Difficulty:

Medium

Question ID 9d88a3e3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9d88a3e3



Theresa ran on a treadmill for thirty minutes, and her time and speed are shown on the graph above. According to the graph, which of the following statements is NOT true concerning Theresa's run?

- A. Theresa ran at a constant speed for five minutes.
- B. Theresa's speed was increasing for a longer period of time than it was decreasing.
- C. Theresa's speed decreased at a constant rate during the last five minutes.
- D. Theresa's speed reached its maximum during the last ten minutes.

ID: 9d88a3e3 Answer

Correct Answer:

B

Rationale

Choice B is correct. Theresa's speed was increasing from 0 to 5 minutes and from 20 to 25 minutes, which is a total of 10 minutes. Theresa's speed was decreasing from 10 minutes to 20 minutes and from 25 to 30 minutes, which is a total of 15 minutes. Therefore, Theresa's speed was NOT increasing for a longer period of time than it was decreasing.

Choice A is incorrect. Theresa ran at a constant speed for the 5-minute period from 5 to 10 minutes. Choice C is incorrect. Theresa's speed decreased at a constant rate during the last 5 minutes, which can be seen since the graph is linear during that time. Choice D is incorrect. Theresa's speed reached its maximum at 25 minutes, which is within the last 10 minutes.

Question Difficulty:

Easy

Question ID e03f3477

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #006699; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: e03f3477

A sample consisting of **720** adults who own televisions was selected at random for a study. Based on the sample, it is estimated that **32%** of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of **3.41%**. Which of the following is the most plausible conclusion about all adults who own televisions?

- A. More than **35.41%** of all adults who own televisions use their televisions to watch nature shows.
- B. Between **28.59%** and **35.41%** of all adults who own televisions use their televisions to watch nature shows.
- C. Since the sample included adults who own televisions and not just those who use their televisions to watch nature shows, no conclusion can be made.
- D. Since the sample did not include all the people who watch nature shows, no conclusion can be made.

ID: e03f3477 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that based on a sample selected at random, it's estimated that 32% of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of 3.41%. Subtracting the margin of error from the estimate and adding the margin of error to the estimate gives an interval of plausible values for the true percentage of adults who own televisions who use their televisions to watch nature shows. This means it's plausible that between $32\% - 3.41\%$, or 28.59%, and $32\% + 3.41\%$, or 35.41%, of all adults who own televisions use their televisions to watch nature shows. Therefore, of the given choices, the most plausible conclusion is that between 28.59% and 35.41% of all adults who own televisions use their televisions to watch nature shows.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect. To make a plausible conclusion about all adults who own televisions, the sample must be selected at random from all adults who own televisions, not just those who use their televisions to watch nature shows.

Choice D is incorrect. Since the sample was selected at random from all adults who own televisions, a plausible conclusion can be made about all adults who own televisions.

Question Difficulty:

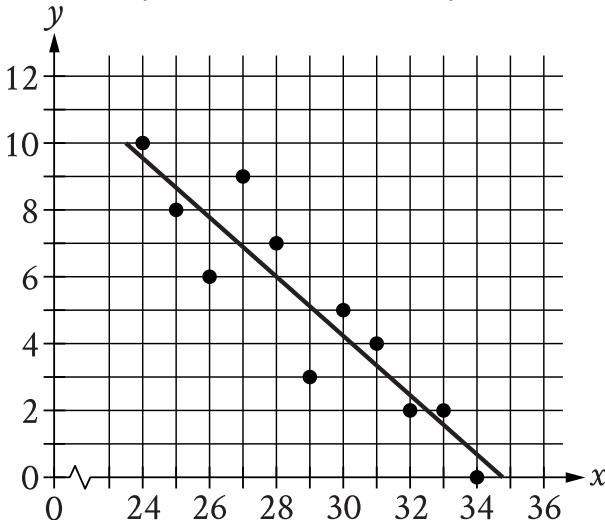
Medium

Question ID f46139df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f46139df

The scatterplot shows the relationship between two variables, x and y . A line of best fit for the data is also shown.



At $x = 25.5$, which of the following is closest to the y -value predicted by the line of best fit?

- A. 6.2
- B. 7.3
- C. 8.2
- D. 9.1

ID: f46139df Answer

Correct Answer:

C

Rationale

Choice C is correct. On the line of best fit, an x -value of 25.5 corresponds to a y -value between 8 and 8.5. Therefore, at $x = 25.5$, 8.2 is closest to the y -value predicted by the line of best fit.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 07f2829b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 07f2829b

International Tourist

Arrivals, in millions

Country	2012	2013
France	83.0	84.7
United States	66.7	69.8
Spain	57.5	60.7
China	57.7	55.7
Italy	46.4	47.7
Turkey	35.7	37.8
Germany	30.4	31.5
United Kingdom	26.3	32.2
Russia	24.7	28.4

The table above shows the number of international tourist arrivals, rounded to the nearest tenth of a million, to the top nine tourist destinations in both 2012 and 2013. Based on the information given in the table, how much greater, in millions, was the median number of international tourist arrivals to the top nine tourist destinations in 2013 than the median number in 2012, to the nearest tenth of a million?

ID: 07f2829b Answer

Rationale

The correct answer is 1.3. The median number of tourists is found by ordering the number of tourists from least to greatest and determining the middle value from this list. When the number of tourists in 2012 is ordered from least to greatest, the middle value, or the fifth number, is 46.4 million. When the number of tourists in 2013 is ordered from least to greatest, the middle value, or the fifth number, is 47.7 million. The difference between these two medians is $47.7 \text{ million} - 46.4 \text{ million} = 1.3 \text{ million}$. Note that 1.3 and 13/10 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID e5b5fbdd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: e5b5fbdd

Of the 8 planets in our solar system, 4 are considered rocky. If a student randomly selects 1 of those 8 planets as a topic for a report, what is the probability that the selected planet will be rocky?

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. 2

ID: e5b5fbdd Answer

Correct Answer:

C

Rationale

Choice C is correct. If one of these planets is selected at random, the probability that the selected planet will be rocky is calculated by dividing the number of planets that are considered rocky by the total number of planets. It's given that 4 of the 8 total planets

are considered rocky. Therefore, the probability that the selected planet will be rocky is $\frac{4}{8}$, which is equivalent to $\frac{1}{2}$.

Choices A and B are incorrect. These represent the probability if 1 of the 8 planets was considered rocky (choice A) and if 2 of the 8 planets were considered rocky (choice B). Choice D is incorrect and may result from dividing the total number of planets by the number of planets that are considered rocky.

Question Difficulty:

Easy

Question ID 7ac5d686

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 7ac5d686

An inspector begins a day of work with a large sample of shirts that need to be checked for defects. The inspector works at a constant rate throughout the morning. What type of model is best to model the number of shirts remaining to be checked for defects at any given time throughout the morning?

- A. A linear model with a positive slope
- B. A linear model with a negative slope
- C. An exponential growth model
- D. An exponential decay model

ID: 7ac5d686 Answer

Rationale

Choice B is correct. Since the work is done at a constant rate, a linear model best models the situation. The number of shirts remaining is dependent on the length of time the inspector has worked; therefore, if the relationship were graphed, time would be the variable of the horizontal axis and the number of remaining shirts would be the variable of the vertical axis. Since the number of shirts decreases as the time worked increases, it follows that the slope of this graph is negative.

Choice A is incorrect and may result from incorrectly reasoning about the slope. Choices C and D are incorrect and may result from not identifying the constant rate of work as a characteristic of a linear model.

Question Difficulty:

Medium

Question ID 181cc4d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 181cc4d6

Rectangle A has length 15 and width w . Rectangle B has length 20 and the same length-to-width ratio as rectangle A. What is the width of rectangle B in terms of w ?

A. $\frac{4}{3}w$

B. $w + 5$

C. $\frac{3}{4}w$

D. $w - 5$

ID: 181cc4d6 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that rectangle A has length 15 and width w . Therefore, the length-to-width ratio of rectangle A is 15 to w . It's also given that rectangle B has length 20 and the same length-to-width ratio as rectangle A. Let x represent the width of

rectangle B. The proportion $\frac{15}{w} = \frac{20}{x}$ can be used to solve for x in terms of w . Multiplying both sides of this equation by x yields

$\frac{15x}{w} = 20$, and then multiplying both sides of this equation by w yields $15x = 20w$. Dividing both sides of this equation by 15

yields $x = \frac{20w}{15}$. Simplifying this fraction yields $x = \frac{4}{3}w$.

Choices B and D are incorrect and may result from interpreting the difference in the lengths of rectangle A and rectangle B as equivalent to the difference in the widths of rectangle A and rectangle B. Choice C is incorrect and may result from using a length-to-width ratio of w to 15, instead of 15 to w .

Question Difficulty:

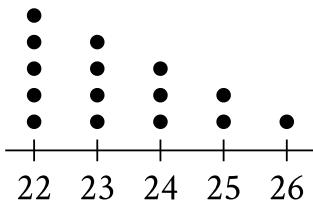
Medium

Question ID 578e26ae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 20%; background-color: #005a7a; height: 10px;"></div> <div style="width: 20%; background-color: #005a7a; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 578e26ae

Data Set A



Data set A has 15 values and is represented by the dot plot shown. Data set B is created by adding 46 to each of the values in data set A. Which of the following correctly compares the medians and the ranges of data sets A and B?

- A. The median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.
- B. The median of data set B is greater than the median of data set A, and the range of data set B is greater than the range of data set A.
- C. The median of data set B is equal to the median of data set A, and the range of data set B is greater than the range of data set A.
- D. The median of data set B is equal to the median of data set A, and the range of data set B is equal to the range of data set A.

ID: 578e26ae Answer

Correct Answer:

A

Rationale

Choice A is correct. The median is the middle value in a data set when the data are arranged in order from least to greatest. Since there are 15 values in data set A, the median is the 8th value. The 8th value is 23, so the median of data set A is 23. The range is found by subtracting the minimum value in a data set from the maximum value. The minimum value in data set A is 22 and the maximum value is 26. Therefore, the range of data set A is $26 - 22$, or 4. It's given that data set B is created by adding 46 to each of the values in data set A. Therefore, the 8th value in data set B is $23 + 46$, or 69, so the median of data set B is 69. The minimum value in data set B is $22 + 46$, or 68, and the maximum value is $26 + 46$, or 72. Therefore, the range of data set B is $72 - 68$, or 4. Since the median of data set A is 23, and the median of data set B is 69, the median of data set B is greater than the median of data set A. Since the ranges of data sets A and B are both 4, the range of data set B is equal to the range of data set A.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID e9841407

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e9841407

Shaquan has 7 red cards and 28 blue cards. What is the ratio of red cards to blue cards that Shaquan has?

- A. 1 to 4
- B. 4 to 1
- C. 1 to 7
- D. 7 to 1

ID: e9841407 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that Shaquan has 7 red cards and 28 blue cards. Therefore, the ratio of red cards to blue cards that Shaquan has is 7 to 28. This ratio can be reduced by dividing both parts of the ratio by 7, which yields the ratio 1 to 4.

Choice B is incorrect. This is the ratio of blue cards to red cards that Shaquan has. Choice C is incorrect and may result from a calculation error when reducing the ratio. Choice D is incorrect. This may result from finding the ratio of blue cards to red cards, or 28 to 7, and then making a calculation error when reducing the ratio.

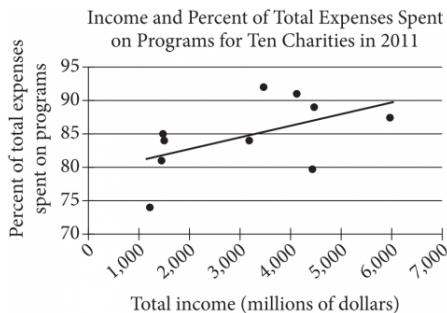
Question Difficulty:

Easy

Question ID 7fd284ac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7fd284ac



The scatterplot above shows data for ten charities along with the line of best fit. For the charity with the greatest percent of total expenses spent on programs, which of the following is closest to the difference of the actual percent and the percent predicted by the line of best fit?

- A. 10%
- B. 7%
- C. 4%
- D. 1%

ID: 7fd284ac Answer

Correct Answer:

B

Rationale

Choice B is correct. The charity with the greatest percent of total expenses spent on programs is represented by the highest point on the scatterplot; this is the point that has a vertical coordinate slightly less than halfway between 90 and 95 and a horizontal coordinate slightly less than halfway between 3,000 and 4,000. Thus, the charity represented by this point has a total income of about \$3,400 million and spends about 92% of its total expenses on programs. The percent predicted by the line of best fit is the vertical coordinate of the point on the line of best fit with horizontal coordinate \$3,400 million; this vertical coordinate is very slightly more than 85. Thus, the line of best fit predicts that the charity with the greatest percent of total expenses spent on programs will spend slightly more than 85% on programs. Therefore, the difference between the actual percent (92%) and the prediction (slightly more than 85%) is slightly less than 7%.

Choice A is incorrect. There is no charity represented in the scatterplot for which the difference between the actual percent of total expenses spent on programs and the percent predicted by the line of best fit is as much as 10%. Choices C and D are incorrect. These choices may result from misidentifying in the scatterplot the point that represents the charity with the greatest percent of total expenses spent on programs.

Question Difficulty:

Medium

Question ID e7d9649f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e7d9649f

A random sample of 50 people from a town with a population of 14,878 were asked to name their favorite flavor of ice cream. If 7 people in the sample named chocolate as their favorite ice-cream flavor, about how many people in the town would be expected to name chocolate?

- A. 350
- B. 2,100
- C. 7,500
- D. 10,500

ID: e7d9649f Answer

Correct Answer:

B

Rationale

Choice B is correct. Let x be the number of people in the entire town that would be expected to name chocolate. Since the sample of 50 people was selected at random, it is reasonable to expect that the proportion of people who named chocolate as their favorite ice-cream flavor would be the same for both the sample and the town population. Symbolically, this can be expressed as $\frac{7}{50} = \frac{x}{14,878}$. Using cross multiplication, $7 \times 14,878 = x \times 50$; solving for x yields 2,083. The choice closest to the value of 2,083 is choice B, 2,100.

Choices A, C, and D are incorrect and may be the result of errors when setting up the proportion, solving for the unknown, or incorrectly comparing the choices to the number of people expected to name chocolate, 2,083.

Question Difficulty:

Easy

Question ID 2df8f293

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 2df8f293

Each vertex of a **14**-sided polygon is labeled with one of the **14** letters **A** through **N**, with a different letter at each vertex. If one vertex is selected at random, what is the probability that the letter **D** will be at the selected vertex? (Express your answer as a decimal or fraction, not as a percent.)

ID: 2df8f293 Answer

Correct Answer:

.0714, 1/14

Rationale

The correct answer is $\frac{1}{14}$. If one vertex of the polygon is selected at random, the probability that the letter **D** will be at the selected vertex is equal to the number of vertices labeled with the letter **D** divided by the total number of vertices. It's given that each vertex is labeled with one of the 14 letters **A** through **N**, with a different letter at each vertex. It follows that there is 1 vertex labeled with the letter **D**. It's also given that the polygon is 14-sided. It follows that there are a total of 14 vertices. Thus, the probability that the letter **D** will be at the selected vertex is $\frac{1}{14}$. Note that 1/14, .0714, and 0.071 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID ec7b0eb8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: ec7b0eb8

Texting behavior	Talks on cell phone daily	Does not talk on cell phone daily	Total
Light	110	146	256
Medium	139	164	303
Heavy	166	74	240
Total	415	384	799

In a study of cell phone use, 799 randomly selected US teens were asked how often they talked on a cell phone and about their texting behavior. The data are summarized in the table above. If one of the 799 teens surveyed is selected at random, what is the probability that the teen talks on a cell phone daily?

- A. $\frac{1}{799}$
- B. $\frac{415}{799}$
- C. $\frac{384}{415}$
- D. $\frac{384}{799}$

ID: ec7b0eb8 Answer

Correct Answer:

B

Rationale

Choice B is correct. If one of the teens surveyed is selected at random, the probability that the teen talks on a cell phone daily is equal to the quotient of the total number of teens who reported that they talk on a cell phone daily, 415, and the total number of

teens surveyed, 799. Therefore, this probability is equal to $\frac{415}{799}$.

Choice A is incorrect. This fraction represents the probability of selecting at random any one of the 799 teens surveyed. Choice C is incorrect and may result from conceptual errors. Choice D is incorrect. This fraction represents the probability of selecting at random one of the 799 teens surveyed who doesn't talk on a cell phone daily.

Question Difficulty:
Easy

Question ID 3638f413

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 3638f413

Jeremy deposited x dollars in his investment account on January 1, 2001. The amount of money in the account doubled each year until Jeremy had 480 dollars in his investment account on January 1, 2005. What is the value of x ?

ID: 3638f413 Answer

Rationale

The correct answer is 30. The situation can be represented by the equation $x(2^4) = 480$, where the 2 represents the fact that the amount of money in the account doubled each year and the 4 represents the fact that there are 4 years between January 1, 2001, and January 1, 2005. Simplifying $x(2^4) = 480$ gives $16x = 480$. Therefore, $x = 30$.

Question Difficulty:

Hard

Question ID 1142af44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 1142af44

Value	Frequency
1	a
2	$2a$
3	$3a$
4	$2a$
5	a

The frequency distribution above summarizes a set of data, where a is a positive integer. How much greater is the mean of the set of data than the median?

- A. 0
- B. 1
- C. 2
- D. 3

ID: 1142af44 Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the frequencies of values less than the middle value, 3, are the same as the frequencies of the values greater than 3, the set of data has a symmetric distribution. When a set of data has a symmetric distribution, the mean and median values are equal. Therefore, the mean is 0 greater than the median.

Choices B, C, and D are incorrect and may result from misinterpreting the set of data.

Question Difficulty:

Hard

Question ID 445dd032

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 445dd032

Tanya earns \$13.50 per hour at her part-time job. When she works z hours, she earns $13.50z$ dollars. Which of the following expressions gives the amount, in dollars, Tanya will earn if she works $3z$ hours?

- A. $3(13.50z)$
- B. $3 + 13.50z$
- C. $3z + 13.50z$
- D. $13.50(z + 3)$

ID: 445dd032 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that when Tanya works z hours, she earns $13.50z$ dollars. Since her hourly rate is constant, if she works 3 times as many hours, or $3z$ hours, she will earn 3 times as many dollars, or $3(13.50z)$.

Choice B is incorrect. This expression represents adding 3 dollars to the $13.50z$ dollars Tanya will earn. Choice C is incorrect. This expression can be rewritten as $16.50z$, which implies that Tanya earns \$16.50 per hour, not \$13.50. Choice D is incorrect. This expression adds 3 to the number of hours Tanya works, rather than multiplying the hours she works by 3.

Question Difficulty:

Medium

Question ID 1e8ccffd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%;"><div style="width: 100px; height: 10px; background-color: #0056b3;"></div></div>

ID: 1e8ccffd

The mean score of 8 players in a basketball game was 14.5 points. If the highest individual score is removed, the mean score of the remaining 7 players becomes 12 points. What was the highest score?

- A. 20
- B. 24
- C. 32
- D. 36

ID: 1e8ccffd Answer

Correct Answer:

C

Rationale

Choice C is correct. If the mean score of 8 players is 14.5, then the total of all 8 scores is $14.5 \times 8 = 116$. If the mean of 7 scores is 12, then the total of all 7 scores is $12 \times 7 = 84$. Since the set of 7 scores was made by removing the highest score of the set of 8 scores, then the difference between the total of all 8 scores and the total of all 7 scores is equal to the removed score: $116 - 84 = 32$.

Choice A is incorrect because if 20 is removed from the group of 8 scores, then the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 20}{7}$

is approximately 13.71, not 12. Choice B is incorrect because if 24 is removed from the group of 8 scores, then

$$\frac{(14.5 \times 8) - 24}{7}$$

the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 24}{7}$ is approximately 13.14, not 12. Choice D is incorrect because if 36

$$\frac{(14.5 \times 8) - 36}{7}$$

is removed from the group of 8 scores, then the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 36}{7}$ or approximately 11.43, not 12.

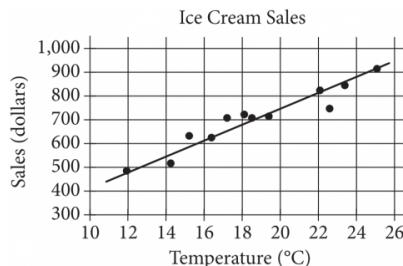
Question Difficulty:

Hard

Question ID 1e1027a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: 1e1027a7



The scatterplot above shows a company's ice cream sales d , in dollars, and the high temperature t , in degrees Celsius ($^{\circ}\text{C}$), on 12 different days. A line of best fit for the data is also shown. Which of the following could be an equation of the line of best fit?

- A. $d = 0.03t + 402$
- B. $d = 10t + 402$
- C. $d = 33t + 300$
- D. $d = 33t + 84$

ID: 1e1027a7 Answer

Correct Answer:

D

Rationale

Choice D is correct. On the line of best fit, d increases from approximately 480 to 880 between $t = 12$ and $t = 24$. The slope of the line of best fit is the difference in d -values divided by the difference in t -values, which gives $\frac{880 - 480}{24 - 12} = \frac{400}{12}$, or approximately 33. Writing the equation of the line of best fit in slope-intercept form gives $d = 33t + b$, where b is the y -coordinate of the y -intercept. This equation is satisfied by all points on the line, so $d = 480$ when $t = 12$. Thus, $480 = 33(12) + b$, which is equivalent to $480 = 396 + b$. Subtracting 396 from both sides of this equation gives $b = 84$. Therefore, an equation for the line of best fit could be $d = 33t + 84$.

Choice A is incorrect and may result from an error in calculating the slope and misidentifying the y -coordinate of the y -intercept of the graph as the value of d at $t = 10$ rather than the value of d at $t = 0$. Choice B is incorrect and may result from using the smallest value of t on the graph as the slope and misidentifying the y -coordinate of the y -intercept of the graph as the value of d at $t = 10$ rather than the value of d at $t = 0$. Choice C is incorrect and may result from misidentifying the y -coordinate of the y -intercept as the smallest value of d on the graph.

Question Difficulty:

Hard

Question ID ba62b0b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: ba62b0b0

A kangaroo has a mass of 28 kilograms. What is the kangaroo's mass, in grams? (1 kilogram = 1,000 grams)

- A. 28,000
- B. 1,028
- C. 972
- D. 784

ID: ba62b0b0 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a kangaroo has a mass of 28 kilograms and that 1 kilogram is equal to 1,000 grams. Therefore, the kangaroo's mass, in grams, is $28 \text{ kilograms} \times \frac{1,000 \text{ grams}}{1 \text{ kilogram}}$, which is equivalent to 28,000 grams.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

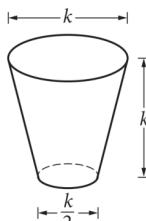
Question Difficulty:

Easy

Question ID 939c46d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 939c46d1



$$\text{Volume} = \frac{7\pi k^3}{48}$$

The glass pictured above can hold a maximum volume of 473 cubic centimeters, which is approximately 16 fluid ounces. Jenny has a pitcher that contains 1 gallon of water. How many times could Jenny completely fill the glass with 1 gallon of water?

(1 gallon = 128 fluid ounces)

- A. 16
- B. 8
- C. 4
- D. 3

ID: 939c46d1 Answer

Correct Answer:

B

Rationale

Choice A is correct. It is given that the volume of the glass is approximately 16 fluid ounces. If Jenny has 1 gallon of water, which is 128 fluid ounces, she could fill the glass $\frac{128}{16} = 8$ times.

Choice A is incorrect because Jenny would need 16×16 fluid ounces = 256 fluid ounces, or 2 gallons, of water to fill the glass 16 times. Choice C is incorrect because Jenny would need only 4×16 fluid ounces = 64 fluid ounces of water to fill the glass 4 times. Choice D is incorrect because Jenny would need only 3×16 fluid ounces = 48 fluid ounces to fill the glass 3 times.

Question Difficulty:

Medium

Question ID 29c177e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 29c177e6

What is 10% of 470?

- A. 37
- B. 47
- C. 423
- D. 460

ID: 29c177e6 Answer

Correct Answer:

B

Rationale

Choice B is correct. 10% of a quantity means $\frac{10}{100}$ times the quantity. Therefore, 10% of 470 can be represented as $\frac{10}{100} \cdot 470$, which is equivalent to 0.10 · 470, or 47. Therefore, 10% of 470 is 47.

Choice A is incorrect. This is 10% of 370, not 10% of 470.

Choice C is incorrect. This is 90% of 470, not 10% of 470.

Choice D is incorrect. This is 470 - 10, not 10% of 470.

Question Difficulty:

Easy

Question ID fc46af57

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #005599; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: fc46af57

A bag containing 10,000 beads of assorted colors is purchased from a craft store. To estimate the percent of red beads in the bag, a sample of beads is selected at random. The percent of red beads in the bag was estimated to be 15%, with an associated margin of error of 2%. If r is the actual number of red beads in the bag, which of the following is most plausible?

- A. $r > 1,700$
- B. $1,300 < r < 1,700$
- C. $200 < r < 1,500$
- D. $r < 1,300$

ID: fc46af57 Answer

Correct Answer:

B

Rationale

Choice B is correct. It was estimated that 15% of the beads in the bag are red. Since the bag contains 10,000 beads, it follows that there are an estimated $10,000 \times 0.15 = 1,500$ red beads. It's given that the margin of error is 2%, or $10,000 \times 0.02 = 200$ beads. If the estimate is too high, there could plausibly be $1,500 - 200 = 1,300$ red beads. If the estimate is too low, there could plausibly be $1,500 + 200 = 1,700$ red beads. Therefore, the most plausible statement of the actual number of red beads in the bag is $1,300 < r < 1,700$.

Choices A and D are incorrect and may result from misinterpreting the margin of error. It's unlikely that more than 1,700 beads or fewer than 1,300 beads in the bag are red. Choice C is incorrect because 200 is the margin of error for the number of red beads, not the lower bound of the range of red beads.

Question Difficulty:

Medium

Question ID 7b65bb28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7b65bb28

Station 1	Station 2	Station 3	Station 4	Station 5
\$3.699	\$3.609	\$3.729	\$3.679	\$3.729

In the table above, Melissa recorded the price of one gallon of regular gas from five different local gas stations on the same day. What is the median of the gas prices Melissa recorded?

- A. \$3.679
- B. \$3.689
- C. \$3.699
- D. \$3.729

ID: 7b65bb28 Answer

Correct Answer:

C

Rationale

Choice C is correct. The median of a data set is the middle value when the data is in ascending or descending order. In ascending order, the gas prices are \$3.609, \$3.679, \$3.699, \$3.729, and \$3.729. The middle number of this list is 3.699, so it follows that \$3.699 is the median gas price.

Choice A is incorrect. When the gas prices are listed in ascending order, this value isn't the middle number. Choice B is incorrect. This value represents the mean gas price. Choice D is incorrect. This value represents both the mode and the maximum gas price.

Question Difficulty:

Medium

Question ID 8a714fa1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 8a714fa1

Which of the following represents the result of increasing the quantity x by 9%, where $x > 0$?

- A. $1.09x$
- B. $0.09x$
- C. $x + 9$
- D. $x + 0.09$

ID: 8a714fa1 Answer

Correct Answer:

A

Rationale

Choice A is correct. Increasing the positive quantity x by 9% is the result of adding 9% of x to x . 9% of x can be represented algebraically as $\frac{9}{100}x$, or $0.09x$. Adding this expression to x yields $x + 0.09x$, or $1.09x$.

Choice B is incorrect. This represents 9% of x . Choice C is incorrect. This represents increasing x by 9, not by 9%. Choice D is incorrect. This represents increasing x by 0.09, not by 9%.

Question Difficulty:

Medium

Question ID 7cd1c6db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7cd1c6db

An object travels at a constant speed of **12** centimeters per second. At this speed, what is the time, in seconds, that it would take for the object to travel **108** centimeters?

- A. **9**
- B. **96**
- C. **120**
- D. **972**

ID: 7cd1c6db Answer

Correct Answer:

A

Rationale

Choice A is correct. If the object travels 108 centimeters at a speed of 12 centimeters per second, the time of travel can be determined by dividing the total distance by the speed. This results in $\frac{108 \text{ centimeters}}{12 \text{ centimeters / second}}$, which is 9 seconds.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 8637294f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8637294f

If $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$, what is the value of n ?

ID: 8637294f Answer

Correct Answer:

.0625, 1/16

Rationale

The correct answer is .0625. It's given that $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$. The equation $\frac{4a}{b} = 6.7$ can be rewritten as $\frac{a}{b} = 1.675$. Dividing both sides of this equation by 4 yields $\frac{a}{b} = 1.675$. The equation $\frac{a}{bn} = 26.8$ can be rewritten as $\frac{a}{bn} = 26.8$. Substituting 1.675 for $\frac{a}{b}$ in this equation yields $1.675 \cdot \frac{1}{n} = 26.8$, or $\frac{1.675}{n} = 26.8$. Multiplying both sides of this equation by n yields $1.675 = 26.8n$. Dividing both sides of this equation by 26.8 yields $n = 0.0625$. Therefore, the value of n is 0.0625. Note that .0625, 0.062, 0.063, and 1/16 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 8e2e424e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 8e2e424e

The number k is 36% greater than 50. If k is the product of 50 and r , what is the value of r ?

- A. 36
- B. 3.6
- C. 1.36
- D. 0.36

ID: 8e2e424e Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the number k is 36% greater than 50. Therefore, the value of k is the number 50 plus 36% of 50.

This can be rewritten as $k = 50 + \left(\frac{36}{100}\right)(50)$. Multiplying the terms $\left(\frac{36}{100}\right)(50)$ yields 18, so $k = 50 + 18$, or $k = 68$. It's also given that k is the product of 50 and r , which can be rewritten as $k = 50r$. Substituting 68 for k yields $68 = 50r$. Dividing both sides of this equation by 50 yields $r = 1.36$.

Choice A is incorrect. This is the percentage that k is greater than 50. Choice B is incorrect and may result from a calculation error. Choice D is incorrect. This would be the value of r if k were 36% of 50, instead of 36% greater than 50.

Question Difficulty:

Medium

Question ID 24ad9dcb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 24ad9dcb

The weight of an object on Venus is approximately $\frac{9}{10}$ of its weight on Earth. The weight of an object on Jupiter is approximately $\frac{23}{10}$ of its weight on Earth. If an object weighs 100 pounds on Earth, approximately how many more pounds does it weigh on Jupiter than it weighs on Venus?

- A. 90
- B. 111
- C. 140
- D. 230

ID: 24ad9dcb Answer

Correct Answer:

C

Rationale

Choice C is correct. The weight of an object on Venus is approximately $\frac{9}{10}$ of its weight on Earth. If an object weighs 100 pounds on Earth, then the object's weight on Venus is approximately $\frac{9}{10}(100) = 90$ pounds. The same object's weight on Jupiter is approximately $\frac{23}{10}$ of its weight on Earth; therefore, the object weighs approximately $\frac{23}{10}(100) = 230$ pounds on Jupiter. The difference between the object's weight on Jupiter and the object's weight on Venus is approximately $230 - 90 = 140$ pounds. Therefore, an object that weighs 100 pounds on Earth weighs 140 more pounds on Jupiter than it weighs on Venus.

Choice A is incorrect because it is the weight, in pounds, of the object on Venus. Choice B is incorrect because it is the weight, in pounds, of an object on Earth if it weighs 100 pounds on Venus. Choice D is incorrect because it is the weight, in pounds, of the object on Jupiter.

Question Difficulty:

Easy

Question ID be00d896

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: be00d896

For which of the following data sets is the mean greater than the median?

- A. 5, 5, 5, 5, 5, 5, 5, 5, 5
- B. 0, 10, 20, 30, 40, 50, 60, 70, 80
- C. 2, 4, 8, 16, 32, 64, 128, 256, 512
- D. 7, 107, 107, 207, 207, 207, 307, 307, 307

ID: be00d896 Answer

Correct Answer:

C

Rationale

Choice C is correct. If the values in a data set are ordered from least to greatest, the median of the data set will be the middle value. Since each data set in the choices is ordered and contains exactly 9 data values, the 5th value in each is the median. It follows that the median of the data set in choice C is 32. The sum of the positive differences between 32 and each of the values that are less than 32 is significantly smaller than the sum of the positive differences between 32 and each of the values that are greater than 32. If 32 were the mean, these sums would have been equal to each other. Therefore, the mean of this data set must be greater than 32. This can also be confirmed by calculating the mean as the sum of the values divided by the number of values

$$\frac{2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512}{9} = 113\frac{5}{9}$$

in the data set:

Choices A and B are incorrect. Each of the data sets in these choices is symmetric with respect to its median, so the mean and the median for each of these choices are equivalent. Choice D is incorrect. The median of this data set is 207. Since the sum of the positive differences between 207 and each of the values less than 207 is greater than the sum of the positive differences between 207 and each value greater than 207 in this data set, the mean must be less than the median.

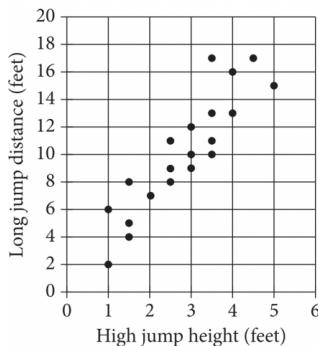
Question Difficulty:

Medium

Question ID 3d985614

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3d985614



Each dot in the scatterplot above represents the height x , in feet, in the high jump, and the distance y , in feet, in the long jump, made by each student in a group of twenty students. The graph of which of the following equations is a line that most closely fits the data?

- A. $y = 0.82x + 3.30$
- B. $y = 0.82x - 0.82$
- C. $y = 3.30x + 0.82$
- D. $y = 3.30x - 3.30$

ID: 3d985614 Answer

Correct Answer:

C

Rationale

Choice C is correct. A line that most closely fits the data is a line with an approximately balanced number of data points above and below the line. Fitting a line to the data shown results in a line with an approximate slope of 3 and a y-intercept near the point $(0, 1)$. An equation for the line can be written in slope-intercept form, $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept. The equation $y = 3.30x + 0.82$ in choice C fits the data most closely.

Choices A and B are incorrect because the slope of the lines of these equations is 0.82, which is a value that is too small to be the slope of the line that fits the data shown. Choice D is incorrect. The graph of this equation has a y-intercept at $(0, -3.30)$, not $(0, 0.82)$. This line would lie below all of the data points, and therefore would not closely fit the data.

Question Difficulty:

Medium

Question ID 308084c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 308084c5

Sample	Percent in favor	Margin of error
A	52%	4.2%
B	48%	1.6%

The results of two random samples of votes for a proposition are shown above. The samples were selected from the same population, and the margins of error were calculated using the same method. Which of the following is the most appropriate reason that the margin of error for sample A is greater than the margin of error for sample B?

- A. Sample A had a smaller number of votes that could not be recorded.
- B. Sample A had a higher percent of favorable responses.
- C. Sample A had a larger sample size.
- D. Sample A had a smaller sample size.

ID: 308084c5 Answer

Correct Answer:

D

Rationale

Choice D is correct. Sample size is an appropriate reason for the margin of error to change. In general, a smaller sample size increases the margin of error because the sample may be less representative of the whole population.

Choice A is incorrect. The margin of error will depend on the size of the sample of recorded votes, not the number of votes that could not be recorded. In any case, the smaller number of votes that could not be recorded for sample A would tend to decrease, not increase, the comparative size of the margin of error. Choice B is incorrect. Since the percent in favor for sample A is the same distance from 50% as the percent in favor for sample B, the percent of favorable responses doesn't affect the comparative size of the margin of error for the two samples. Choice C is incorrect. If sample A had a larger margin of error than sample B, then sample A would tend to be less representative of the population. Therefore, sample A is not likely to have a larger sample size.

Question Difficulty:

Hard

Question ID 7d721177

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 7d721177

The density of a certain type of wood is **353** kilograms per cubic meter. A sample of this type of wood is in the shape of a cube and has a mass of **345** kilograms. To the nearest hundredth of a meter, what is the length of one edge of this sample?

- A. **0.98**
- B. **0.99**
- C. **1.01**
- D. **1.02**

ID: 7d721177 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the density of a certain type of wood is 353 kilograms per cubic meter kg/m^3 , and a sample of this type of wood has a mass of 345 kg. Let x represent the volume, in m^3 , of the sample. It follows that the relationship between the density, mass, and volume of this sample can be written

as $\frac{353 \text{ kg}}{1 \text{ m}^3} = \frac{345 \text{ kg}}{x \text{ m}^3}$, or $353 = \frac{345}{x}$. Multiplying both sides of this equation by x yields $353x = 345$. Dividing both sides of this equation by 353 yields $x = \frac{345}{353}$. Therefore, the volume of this sample is $\frac{345}{353} \text{ m}^3$. Since it's given that the sample of this type of wood is a cube, it follows that the length of one edge of this sample can be found using the volume formula for a cube, $V = s^3$, where V represents the volume, in m^3 , and s represents the length, in m, of one edge of the cube. Substituting $\frac{345}{353}$ for V in this formula yields $\frac{345}{353} = s^3$. Taking the cube root of both sides of this equation yields $\sqrt[3]{\frac{345}{353}} = s$, or $s \approx 0.99$. Therefore, the length of one edge of this sample to the nearest hundredth of a meter is 0.99 .

Choices A, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 1d945139

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1d945139

The total mass, in kilograms, of r identical objects is t . Which expression represents the total mass, in kilograms, of $146r$ of these objects?

- A. $146 - t$
- B. $146 + t$
- C. $\frac{t}{146}$
- D. $146t$

ID: 1d945139 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the total mass, in kilograms, of r identical objects is t . To obtain the expression $146r$, r is multiplied by 146. Therefore, to find the total mass, in kilograms, of $146r$ of these objects, t must also be multiplied by 146. The result of multiplying t by 146 is the expression $146t$. Therefore, the total mass, in kilograms, of $146r$ of these objects, is $146t$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 4b09f783

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4b09f783

A list of 10 data values is shown.

6, 8, 16, 4, 17, 26, 8, 5, 5, 5

What is the mean of these data?

ID: 4b09f783 Answer

Correct Answer:

10

Rationale

The correct answer is 10. The mean of a data set is calculated by dividing the sum of the data values by the number of data values in the data set. For this data set, the mean can be calculated as $\frac{6 + 8 + 16 + 4 + 17 + 26 + 8 + 5 + 5 + 5}{10}$, which is equivalent to $\frac{100}{10}$, or 10.

Question Difficulty:

Easy

Question ID 67c0200a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 67c0200a

The number a is 70% less than the positive number b . The number c is 80% greater than a . The number c is how many times b ?

ID: 67c0200a Answer

Correct Answer:

.54, 27/50

Rationale

The correct answer is .54. It's given that the number a is 70% less than the positive number b . Therefore, $a = 1 - \frac{70}{100}b$, which is equivalent to $a = 1 - 0.70b$, or $a = 0.30b$. It's also given that the number c is 80% greater than a . Therefore, $c = 1 + \frac{80}{100}a$, which is equivalent to $c = 1 + 0.80a$, or $c = 1.80a$. Since $a = 0.30b$, substituting $0.30b$ for a in the equation $c = 1.80a$ yields $c = 1.80(0.30b)$, or $c = 0.54b$. Thus, c is 0.54 times b . Note that .54 and 27/50 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID f04d40b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f04d40b2

From a population of **50,000** people, **1,000** were chosen at random and surveyed about a proposed piece of legislation. Based on the survey, it is estimated that **35%** of people in the population support the legislation, with an associated margin of error of **3%**. Based on these results, which of the following is a plausible value for the total number of people in the population who support the proposed legislation?

- A. **350**
- B. **650**
- C. **16,750**
- D. **31,750**

ID: f04d40b2 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that an estimated 35% of people in the population support the legislation, with an associated margin of error of 3%. Subtracting and adding the margin of error from the estimate gives an interval of plausible values for the true percentage of people in the population who support the legislation. Therefore, it's plausible that between 32% and 38% of people in this population support the legislation. The corresponding numbers of people represented by these percentages in the population can be calculated by multiplying the total population, 50,000, by 0.32 and by 0.38, which gives $50,000 \cdot 0.32 = 16,000$ and $50,000 \cdot 0.38 = 19,000$, respectively. It follows that any value in the interval 16,000 to 19,000 is a plausible value for the total number of people in the population who support the proposed legislation. Of the choices given, only 16,750 is in this interval.

Choice A is incorrect. This is the number of people in the sample, rather than in the population, who support the legislation.

Choice B is incorrect. This is the number of people in the sample who do not support the legislation.

Choice D is incorrect. This is a plausible value for the total number of people in the population who do not support the proposed legislation.

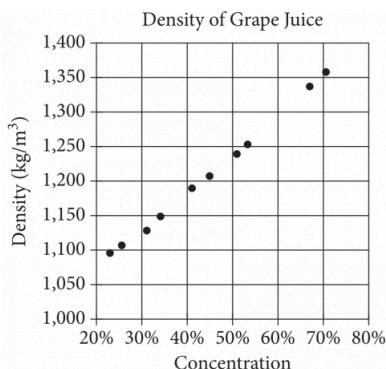
Question Difficulty:

Medium

Question ID c9dd92b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: c9dd92b1



The densities of different concentrations of grape juice are shown in the scatterplot above. According to the trend shown by the data, which of the following is closest to the predicted density, in kilograms per cubic meter (kg/m^3), for grape juice with a concentration of 60%?

- A. 1,200
- B. 1,250
- C. 1,300
- D. 1,350

ID: c9dd92b1 Answer

Correct Answer:

C

Rationale

Choice C is correct. The data in the scatterplot show an increasing linear trend. The density when the juice concentration is 60% will be between the densities shown at about 53% and 67% concentration, or between about 1,255 and 1,340 kg/m^3 . Of the choices given, only 1,300 falls within this range.

Choices A, B, and D are incorrect. These are the approximate densities of grape juice with a concentration of 45%, 55%, and 70%, respectively.

Question Difficulty:

Easy

Question ID 9bf4c545

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9bf4c545

The members of a city council wanted to assess the opinions of all city residents about converting an open field into a dog park. The council surveyed a sample of 500 city residents who own dogs. The survey showed that the majority of those sampled were in favor of the dog park. Which of the following is true about the city council's survey?

- A. It shows that the majority of city residents are in favor of the dog park.
- B. The survey sample should have included more residents who are dog owners.
- C. The survey sample should have consisted entirely of residents who do not own dogs.
- D. The survey sample is biased because it is not representative of all city residents.

ID: 9bf4c545 Answer

Correct Answer:

D

Rationale

Choice D is correct. The members of the city council wanted to assess opinions of all city residents. To gather an unbiased sample, the council should have used a random sampling design to select subjects from all city residents. The given survey introduced a sampling bias because the 500 city residents surveyed were all dog owners. This sample is not representative of all city residents because not all city residents are dog owners.

Choice A is incorrect because when the sampling method isn't random, there is no guarantee that the survey results will be reliable; hence, they cannot be generalized to the entire population. Choice B is incorrect because a larger sample of residents who are dog owners would not correct the sampling bias. Choice C is incorrect because a survey sample of entirely non-dog owners would likely have a biased opinion, just as a sample of dog owners would likely have a biased opinion.

Question Difficulty:

Easy

Question ID fa7a0164

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: fa7a0164

The table below shows the high and low temperatures in Houston, Texas, during a five-day period.

Temperatures in Houston, Texas
(degrees Fahrenheit)

	Monday	Tuesday	Wednesday	Thursday	Friday
High temperature	73	56	62	75	81
Low temperature	49	37	41	54	63

What was the mean low temperature, in degrees Fahrenheit, during the five-day period?

- A. 48.8
- B. 49
- C. 59
- D. 59.1

ID: fa7a0164 Answer

Correct Answer:

A

Rationale

Choice A is correct. The mean low temperature can be calculated by finding the sum of the low temperatures for all the days shown in the table, $49 + 37 + 41 + 54 + 63 = 244$, and then dividing the sum by the number of days the temperature was recorded, $244 \div 5 = 48.8$.

Choice B is incorrect. This may be the result of choosing the median rather than calculating the mean. Choices C and D are incorrect and may be the result of calculation errors.

Question Difficulty:

Easy

Question ID 708590d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 708590d7

Data set A: 1, 2, 3, 4, 5, 6, 7

Data set B: 1, 1, 2, 2, 3, 3, 4

Which of the following statements correctly compares the means of data set A and data set B?

- A. The mean of each data set is 2.
- B. The mean of each data set is 4.
- C. The mean of data set A is less than the mean of data set B.
- D. The mean of data set A is greater than the mean of data set B.

ID: 708590d7 Answer

Correct Answer:

D

Rationale

Choice D is correct. The mean of a data set is found by dividing the sum of the values in the data set by the number of values in

the data set. Therefore, the mean of data set A is $\frac{1+2+3+4+5+6+7}{7} = \frac{28}{7}$, or 4. The mean of data set B is

$\frac{1+1+2+2+3+3+4}{7} = \frac{16}{7}$, or approximately 2.2857. Therefore, the mean of data set A is greater than the mean of data set

B.

Alternate approach: Data set A and data set B are both ordered from least to greatest value. Besides the first value in each data set, which is 1, each value in ordered data set B is less than the respective value in ordered data set A. Therefore, conceptually, the mean of data set A must be greater than the mean of data set B.

Choices A, B, and C are incorrect and may result from various misconceptions or miscalculations.

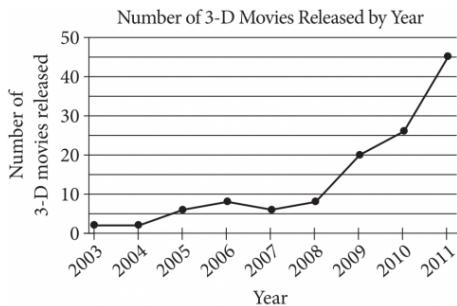
Question Difficulty:

Easy

Question ID a6b2fcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002060; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a6b2fcce



According to the line graph above, between which two consecutive years was there the greatest change in the number of 3-D movies released?

- A. 2003–2004
- B. 2008–2009
- C. 2009–2010
- D. 2010–2011

ID: a6b2fcce Answer

Correct Answer:

D

Rationale

Choice D is correct. The change in the number of 3-D movies released between any two consecutive years can be found by first estimating the number of 3-D movies released for each of the two years and then finding the positive difference between these two estimates. Between 2003 and 2004, this change is approximately $2 - 2 = 0$ movies; between 2008 and 2009, this change is approximately $20 - 8 = 12$ movies; between 2009 and 2010, this change is approximately $26 - 20 = 6$ movies; and between 2010 and 2011, this change is approximately $46 - 26 = 20$ movies. Therefore, of the pairs of consecutive years in the choices, the greatest increase in the number of 3-D movies released occurred during the time period between 2010 and 2011.

Choices A, B, and C are incorrect. Between 2010 and 2011, approximately 20 more 3-D movies were released. The change in the number of 3-D movies released between any of the other pairs of consecutive years is significantly smaller than 20.

Question Difficulty:

Easy

Question ID 06a152cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 06a152cd

To make a bakery's signature chocolate muffins, a baker needs 2.5 ounces of chocolate for each muffin. How many pounds of chocolate are needed to make 48 signature chocolate muffins? (1 pound = 16 ounces)

- A. 7.5
- B. 10
- C. 50.5
- D. 120

ID: 06a152cd Answer

Correct Answer:

A

Rationale

Choice A is correct. If 2.5 ounces of chocolate are needed for each muffin, then the number of ounces of chocolate needed to make 48 muffins is $48 \times 2.5 = 120$ ounces. Since 1 pound = 16 ounces, the number of pounds that is equivalent to 120 ounces is $\frac{120}{16} = 7.5$ pounds. Therefore, 7.5 pounds of chocolate are needed to make the 48 muffins.

Choice B is incorrect. If 10 pounds of chocolate were needed to make 48 muffins, then the total number of ounces of chocolate needed would be $10 \times 16 = 160$ ounces. The number of ounces of chocolate per muffin would then be $\frac{160}{48} = 3.33$ ounces per muffin, not 2.5 ounces per muffin. Choices C and D are also incorrect. Following the same procedures as used to test choice B gives 16.8 ounces per muffin for choice C and 40 ounces per muffin for choice D, not 2.5 ounces per muffin. Therefore, 50.5 and 120 pounds cannot be the number of pounds needed to make 48 signature chocolate muffins.

Question Difficulty:

Easy

Question ID 7d68096f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 7d68096f

A trivia tournament organizer wanted to study the relationship between the number of points a team scores in a trivia round and the number of hours that a team practices each week. For the study, the organizer selected **55** teams at random from all trivia teams in a certain tournament. The table displays the information for the **40** teams in the sample that practiced for at least **3** hours per week.

Hours practiced	Number of points per round		
	6 to 13 points	14 or more points	Total
3 to 5 hours	6	4	10
More than 5 hours	4	26	30
Total	10	30	40

Which of the following is the largest population to which the results of the study can be generalized?

- A. All trivia teams in the tournament that scored **14** or more points in the round
- B. The **55** trivia teams in the sample
- C. The **40** trivia teams in the sample that practiced for at least **3** hours per week
- D. All trivia teams in the tournament

ID: 7d68096f Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the organizer selected 55 teams at random from all trivia teams in the tournament. A table is also given displaying the information for the 40 teams in the sample that practiced for at least 3 hours per week. Selecting a sample of a reasonable size at random to use for a survey allows the results from that survey to be applied to the population from which the sample was selected, but not beyond this population. Thus, only the sampling method information is necessary to determine the largest population to which the results of the study can be generalized. Since the organizer selected the sample at random from all trivia teams in the tournament, the largest population to which the results of the study can be generalized is all trivia teams in the tournament.

Choice A is incorrect. The sample was selected at random from all trivia teams in the tournament, not just from the teams that scored an average of 14 or more points per round.

Choice B is incorrect. If a study uses a sample selected at random from a population, the results of the study can be generalized to the population, not just the sample.

Choice C is incorrect. If a study uses a sample selected at random from a population, the results of the study can be generalized to the population, not just a subset of the sample.

Question Difficulty:

Hard

Question ID 8917ce38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8917ce38

Which of the following speeds is equivalent to 90 kilometers per hour? (1 kilometer = 1,000 meters)

- A. 25 meters per second
- B. 32 meters per second
- C. 250 meters per second
- D. 324 meters per second

ID: 8917ce38 Answer

Correct Answer:

A

Rationale

Choice A is correct. Since 1 kilometer is equal to 1,000 meters, it follows that 90 kilometers is equal to $90(1,000) = 90,000$ meters. Since 1 hour is equal to 60 minutes and 1 minute is equal to 60 seconds, it follows that 1 hour is equal to $60(60) = 3,600$ seconds. Now $\frac{90 \text{ kilometers}}{1 \text{ hour}}$ is equal to $\frac{90,000 \text{ meters}}{3,600 \text{ seconds}}$, which reduces to $\frac{25 \text{ meters}}{1 \text{ second}}$ or 25 meters per second.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID f4b3672a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: f4b3672a

A certain forest is 253 acres. To estimate the number of trees in the forest, a ranger randomly selects 5 different 1-acre parcels in the forest and determines the number of trees in each parcel. The numbers of trees in the sample acres are 51, 59, 45, 52, and 73. Based on the mean of the sample, which of the following ranges contains the best estimate for the number of trees in the entire forest?

- A. 11,000 to 12,000
- B. 12,500 to 13,500
- C. 13,500 to 14,500
- D. 18,000 to 19,000

ID: f4b3672a Answer

Correct Answer:

C

Rationale

$$\frac{51 + 59 + 45 + 52 + 73}{5} = 56$$

Choice C is correct. The mean of the 5 samples is $\frac{51 + 59 + 45 + 52 + 73}{5} = 56$ trees per acre. The best estimate for the total number of trees in the forest is the product of the mean number of trees per acre in the sample and the total number of acres in the forest. This is $(56)(253) = 14,168$, which is between 13,500 and 14,500.

Choice A is incorrect and may result from multiplying the minimum number of trees per acre in the sample, 45, by the number of acres, 253. Choice B is incorrect and may result from multiplying the median number of trees per acre in the sample, 52, by the number of acres, 253. Choice D is incorrect and may result from multiplying the maximum number of trees per acre in the sample, 73, by the number of acres, 253.

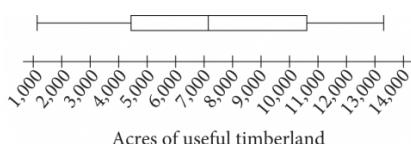
Question Difficulty:

Easy

Question ID 374b18f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 374b18f9



The number of acres of useful timberland in 13 counties in California is summarized in the box plot above. Which of the following is closest to the median number of acres?

- A. 4,399
- B. 7,067
- C. 8,831
- D. 10,595

ID: 374b18f9 Answer

Correct Answer:

B

Rationale

Choice B is correct. The median of the data summarized by a box plot is the value associated with the vertical line segment within the box. According to the box plot shown, this value is slightly greater than 7,000. Therefore, the closest value for the median number of acres is 7,067.

Choice A is incorrect. This is the value associated with the vertical line segment forming the left-hand side of the box. Choice C is incorrect. This value is greater than the value associated with the vertical line segment within the box. Choice D is incorrect. This is the value associated with the vertical line segment forming the right-hand side of the box.

Question Difficulty:

Easy

Question ID 585de39a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 585de39a

On May 10, 2015, there were 83 million Internet subscribers in Nigeria. The major Internet providers were MTN, Globacom, Airtel, Etisalat, and Visafone. By September 30, 2015, the number of Internet subscribers in Nigeria had increased to 97 million. If an Internet subscriber in Nigeria on September 30, 2015, is selected at random, the probability that the person selected was an MTN subscriber is 0.43. There were p million MTN subscribers in Nigeria on September 30, 2015. To the nearest integer, what is the value of p ?

ID: 585de39a Answer

Rationale

The correct answer is 42. It's given that in Nigeria on September 30, 2015, the probability of selecting an MTN subscriber from all Internet subscribers is 0.43, that there were p million, or $p(1,000,000)$, MTN subscribers, and that there were 97 million, or 97,000,000, Internet subscribers. The probability of selecting an MTN subscriber from all Internet subscribers can be found by dividing the number of MTN subscribers by the total number of Internet subscribers. Therefore, the equation

$$\frac{p(1,000,000)}{97,000,000} = 0.43$$

can be used to solve for p . Dividing 1,000,000 from the numerator and denominator of the expression on the left-hand side yields $\frac{p}{97} = 0.43$. Multiplying both sides of this equation by 97 yields $p = (0.43)(97) = 41.71$, which, to the nearest integer, is 42.

Question Difficulty:

Hard

Question ID 4ff597db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 60%; background-color: #005a9f; height: 10px;"></div>

ID: 4ff597db

The mean amount of time that the 20 employees of a construction company have worked for the company is 6.7 years. After one of the employees leaves the company, the mean amount of time that the remaining employees have worked for the company is reduced to 6.25 years. How many years did the employee who left the company work for the company?

- A. 0.45
- B. 2.30
- C. 9.00
- D. 15.25

ID: 4ff597db Answer

Correct Answer:

D

Rationale

Choice D is correct. The mean amount of time that the 20 employees worked for the company is 6.7 years. This means that the total number of years all 20 employees worked for the company is $(6.7)(20) = 134$ years. After the employee left, the mean amount of time that the remaining 19 employees worked for the company is 6.25 years. Therefore, the total number of years all 19 employees worked for the company is $(6.25)(19) = 118.75$ years. It follows that the number of years that the employee who left had worked for the company is $134 - 118.75 = 15.25$ years.

Choice A is incorrect; this is the change in the mean, which isn't the same as the amount of time worked by the employee who left. Choice B is incorrect and likely results from making the assumption that there were still 20 employees, rather than 19, at the company after the employee left and then subtracting the original mean of 6.7 from that result. Choice C is incorrect and likely results from making the assumption that there were still 20 employees, rather than 19, at the company after the employee left.

Question Difficulty:

Hard

Question ID ec787383

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ec787383

A distance of 61 furlongs is equivalent to how many feet? (1 furlong = 220 yards and 1 yard = 3 feet)

ID: ec787383 Answer

Correct Answer:

40260

Rationale

The correct answer is 40,260. It's given that 1 furlong = 220 yards and 1 yard = 3 feet. It follows that a distance of 61 furlongs is equivalent to $61 \frac{220 \text{ yards}}{1 \text{ furlong}} \frac{3 \text{ feet}}{1 \text{ yard}}$, or 40,260 feet.

Question Difficulty:

Medium

Question ID 7e6c745f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7e6c745f

Food	Protein	Cost
1 large egg	6 grams	\$0.36
1 cup of milk	8 grams	\$0.24

The table above shows the amount of protein in two foods and the cost of each food.

Based on the table, what is the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk?

- A. 1 : 2
- B. 2 : 3
- C. 3 : 4
- D. 2 : 1

ID: 7e6c745f Answer

Correct Answer:

D

Rationale

Choice D is correct. The cost per gram of protein in 1 large egg is $\$0.36 \div 6 = \0.06 . The cost per gram of protein in 1 cup of milk is $\$0.24 \div 8 = \0.03 . It follows that the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk is 0.06:0.03, which can be rewritten as 2:1.

Choice A is incorrect and may result from finding the ratio of the cost per gram of protein in a cup of milk to the cost per gram of protein in a large egg (the reciprocal of the ratio specified in the question). Choices B and C are incorrect and may result from incorrectly calculating the unit rates or from errors made when simplifying the ratio.

Question Difficulty:

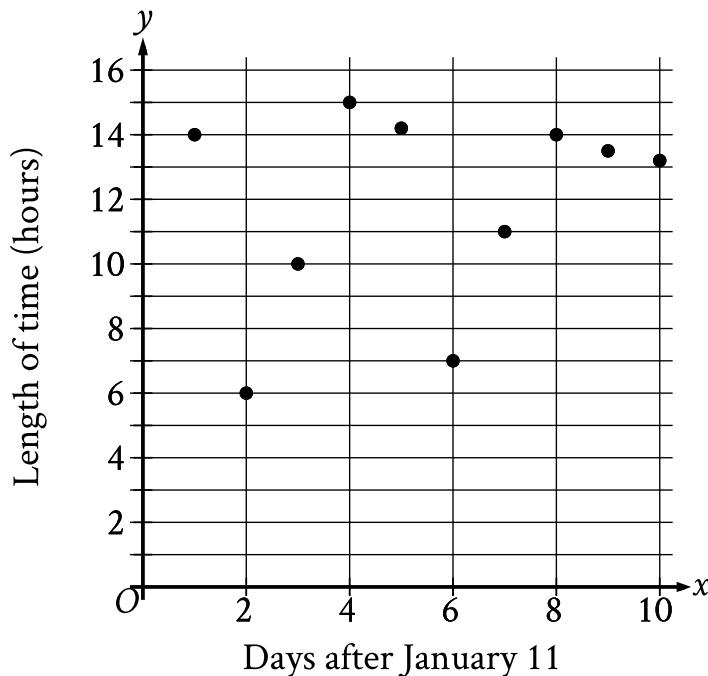
Medium

Question ID 7b52985c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #003366;"></div> <div style="width: 100px; height: 10px; background-color: #003366;"></div> <div style="width: 100px; height: 10px; background-color: #003366;"></div>

ID: 7b52985c

The scatterplot shows the relationship between the length of time y , in hours, a certain bird spent in flight and the number of days after January 11, x .



What is the average rate of change, in hours per day, of the length of time the bird spent in flight on January 13 to the length of time the bird spent in flight on January 15?

ID: 7b52985c Answer

Correct Answer:

4.5, 9/2

Rationale

The correct answer is $\frac{9}{2}$. It's given that the scatterplot shows the relationship between the length of time y , in hours, a certain bird spent in flight and the number of days after January 11, x . Since January 13 is 2 days after January 11, it follows that January 13 corresponds to an x -value of 2 in the scatterplot. In the scatterplot, when $x = 2$, the corresponding value of y is 6. In other words, on January 13, the bird spent 6 hours in flight. Since January 15 is 4 days after January 11, it follows that January 15 corresponds to an x -value of 4 in the scatterplot. In the scatterplot, when $x = 4$, the corresponding value of y is 15. In other words, on January 15, the bird spent 15 hours in flight. Therefore, the average rate of change, in hours per day, of the length of time the bird spent in flight on January 13 to the length of time the bird spent in flight on January 15 is the difference in the length of time, in hours, the bird spent in flight divided by the difference in the number of days after January 11, or $\frac{15 - 6}{4 - 2}$, which is equivalent to $\frac{9}{2}$. Note that $\frac{9}{2}$ and 4.5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 7ce2830a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 7ce2830a

A psychologist designed and conducted a study to determine whether playing a certain educational game increases middle school students' accuracy in adding fractions. For the study, the psychologist chose a random sample of 35 students from all of the students at one of the middle schools in a large city. The psychologist found that students who played the game showed significant improvement in accuracy when adding fractions. What is the largest group to which the results of the study can be generalized?

- A. The 35 students in the sample
- B. All students at the school
- C. All middle school students in the city
- D. All students in the city

ID: 7ce2830a Answer

Correct Answer:

B

Rationale

Choice B is correct. The largest group to which the results of a study can be generalized is the population from which the random sample was chosen. In this case, the psychologist chose a random sample from all students at one particular middle school. Therefore, the largest group to which the results can be generalized is all the students at the school.

Choice A is incorrect because this isn't the largest group the results can be generalized to. Choices C and D are incorrect because these groups are larger than the population from which the random sample was chosen. Therefore, the sample isn't representative of these groups.

Question Difficulty:

Hard

Question ID 12dbe3de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 12dbe3de

A store received a shipment of 1,000 MP3 players, 4 of which were defective. If an MP3 player is randomly selected from this shipment, what is the probability that it is defective?

- A. 0.004
- B. 0.04
- C. 0.4
- D. 4

ID: 12dbe3de Answer

Correct Answer:

A

Rationale

Choice A is correct. The probability of randomly selecting a defective MP3 player from the shipment is equal to the number of defective MP3 players divided by the total number of MP3 players in the shipment. Therefore, the probability is $\frac{4}{1,000}$, which is equivalent to 0.004.

Choice B is incorrect because 0.04 represents 4 defective MP3 players out of 100 rather than out of 1,000. Choice C is incorrect because 0.4 represents 4 defective MP3 players out of 10 rather than out of 1,000. Choice D is incorrect. This is the number of defective MP3 players in the shipment.

Question Difficulty:

Easy

Question ID 642519d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #0070c0; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 642519d7

A polling agency recently surveyed 1,000 adults who were selected at random from a large city and asked each of the adults, "Are you satisfied with the quality of air in the city?" Of those surveyed, 78 percent responded that they were satisfied with the quality of air in the city. Based on the results of the survey, which of the following statements must be true?

1. Of all adults in the city, 78 percent are satisfied with the quality of air in the city.
2. If another 1,000 adults selected at random from the city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.
3. If 1,000 adults selected at random from a different city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.

A. None

B. II only

C. I and II only

D. I and III only

ID: 642519d7 Answer

Correct Answer:

A

Rationale

Choice A is correct. Statement I need not be true. The fact that 78% of the 1,000 adults who were surveyed responded that they were satisfied with the air quality in the city does not mean that the exact same percentage of all adults in the city will be satisfied with the air quality in the city. Statement II need not be true because random samples, even when they are of the same size, are not necessarily identical with regard to percentages of people in them who have a certain opinion. Statement III need not be true for the same reason that statement II need not be true: results from different samples can vary. The variation may be even bigger for this sample since it would be selected from a different city. Therefore, none of the statements must be true.

Choices B, C, and D are incorrect because none of the statements must be true.

Question Difficulty:

Medium

Question ID 0108ac2d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 0108ac2d

At a large high school, 300 students were selected at random and were asked in a survey about a menu change in the school cafeteria. All 300 students completed the survey. It was estimated that 38% of the students were in support of a menu change, with a margin of error of 5.5%. Which of the following is the best interpretation of the survey results?

- A. The percent of the students at the school who support a menu change is 38%.
- B. The percent of the students at the school who support a menu change is greater than 38%.
- C. Plausible values of the percent of the students at the school who support a menu change are between 32.5% and 43.5%.
- D. Plausible values of the number of the students at the school who support a menu change are between 295 and 305.

ID: 0108ac2d Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that an estimated 38% of sampled students at the school were in support of a menu change, with a margin of error of 5.5%. It follows that the percent of the students at the school who support a menu change is 38% plus or minus 5.5%. The lower bound of this estimation is $38 - 5.5$, or 32.5%. The upper bound of this estimation is $38 + 5.5$, or 43.5%.

Therefore, plausible values of the percent of the students at the school who support a menu change are between 32.5% and 43.5%.

Choice A is incorrect. This is the percent of the sampled students at the school who support a menu change. Choices B and D are incorrect and may result from misinterpreting the margin of error.

Question Difficulty:

Easy

Question ID 28c6bd8c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 28c6bd8c

Where Do People Get Most of Their Medical Information?

Source	Percent of those surveyed
Doctor	63%
Internet	13%
Magazines/brochures	9%
Pharmacy	6%
Television	2%
Other/none of the above	7%

The table above shows a summary of 1,200 responses to a survey question. Based on the table, how many of those surveyed get most of their medical information from either a doctor or the Internet?

- A. 865
- B. 887
- C. 912
- D. 926

ID: 28c6bd8c Answer

Correct Answer:

C

Rationale

Choice C is correct. According to the table, 63% of survey respondents get most of their medical information from a doctor and 13% get most of their medical information from the Internet. Therefore, 76% of the 1,200 survey respondents get their information from either a doctor or the Internet, and 76% of 1,200 is 912.

Choices A, B, and D are incorrect. According to the table, 76% of survey respondents get their information from either a doctor or the Internet. Choice A is incorrect because 865 is about 72% (the percent of survey respondents who get most of their medical information from a doctor or from magazines/brochures), not 76%, of 1,200. Choice B is incorrect because 887 is about 74%, not 76%, of 1,200. Choice D is incorrect because 926 is about 77%, not 76%, of 1,200.

Question Difficulty:

Easy

Question ID 912cd125

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 912cd125

For a science project, Anka recorded whether it rained each weekday and weekend day for 12 weeks. Her results are summarized in the table below.

Weekday and Weekend Day Rain for 12 Weeks

	Rain	No rain	Total
Number of weekdays	12	48	60
Number of weekend days	8	16	24
Total	20	64	84

If one of the days on which there was no rain is selected at random, what is the probability the day was a weekend day?

A. $\frac{4}{21}$

B. $\frac{1}{4}$

C. $\frac{2}{3}$

D. $\frac{3}{4}$

ID: 912cd125 Answer

Correct Answer:

B

Rationale

Choice B is correct. There were 64 days with no rain. It was a weekend day for 16 of those 64 days. So 16 out of 64 of the days with no rain were weekend days. Because the day is selected at random, each day has an equal chance of being selected, so the

probability is $\frac{16}{64} = \frac{1}{4}$.

Choice A is incorrect. It is the probability that a day selected at random from any one of the days during the 12 weeks is a weekend day with no rain. Choice C is incorrect. It is the probability that a day selected at random from the weekend days has no rain.

Choice D is incorrect. It is the probability that a day selected at random from the days with no rain is a weekday.

Question Difficulty:

Medium

Question ID 3a6ed720

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3a6ed720

Of 900,000 beads, 828,000 are silver. What percentage of the beads are silver?

- A. 8%
- B. 36%
- C. 72%
- D. 92%

ID: 3a6ed720 Answer

Correct Answer:

D

Rationale

Choice D is correct. The proportion of the beads that are silver can be written as $\frac{828,000}{900,000}$, or 0.92. Therefore, the percentage of the beads that are silver is 0.92100, or 92%.

Choice A is incorrect. This is the percentage of the beads that are not silver.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 6a715bed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 6a715bed

The table summarizes the distribution of age and assigned group for 90 participants in a study.

	0–9 years	10–19 years	20+ years	Total
Group A	7	14	9	30
Group B	6	4	20	30
Group C	17	12	1	30
Total	30	30	30	90

One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least 10 years of age? (Express your answer as a decimal or fraction, not as a percent.)

ID: 6a715bed Answer

Correct Answer:

.3833, 23/60

Rationale

The correct answer is $\frac{23}{60}$. It's given that one of the participants will be selected at random. The probability of selecting a participant from group A given that the participant is at least 10 years of age is the number of participants in group A who are at least 10 years of age divided by the total number of participants who are at least 10 years of age. The table shows that in group A, there are 14 participants who are 10–19 years of age and 9 participants who are 20+ years of age. Therefore, there are $14 + 9$, or 23, participants in group A who are at least 10 years of age. The table also shows that there are a total of 30 participants who are 10–19 years of age and 30 participants who are 20+ years of age. Therefore, there are a total of $30 + 30$, or 60, participants who are at least 10 years of age. It follows that the probability of selecting a participant from group A given that the participant is at least 10 years of age is $\frac{23}{60}$. Note that 23/60, .3833, and 0.383 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 8cbf1415

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 8cbf1415

In a group, 40% of the items are red. Of all the red items in the group, 30% also have stripes. What percentage of the items in the group are red with stripes?

- A. 10%
- B. 12%
- C. 70%
- D. 75%

ID: 8cbf1415 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that in a group, 40% of the items are red. It follows that the number of red items in the group can be represented by $0.4x$, where x represents the total number of items in the group. It's also given that of all the red items in the group, 30% also have stripes. It follows that the number of items in the group that are red and have stripes can be represented by $0.30 \cdot 0.4x$, or $0.12x$. The expression $0.12x$ represents 12% of x . Since x represents the total number of items in the group, it follows that 12% of the items in the group are red and have stripes.

Choice A is incorrect and may result from subtracting 30% from 40% rather than calculating 30% of 40%.

Choice C is incorrect and may result from adding 30% and 40% rather than calculating 30% of 40%.

Choice D is incorrect and may result from calculating the percentage that 30% is of 40% rather than calculating 30% of 40%.

Question Difficulty:

Medium

Question ID c54b92a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: c54b92a2

A study was conducted on the production rates for a company that produces tractor wheels. The table below shows the number of wheels made during 11 consecutive one-hour production periods.

One-hour period	Number of wheels made
A	24
B	24
C	21
D	21
E	21
F	19
G	24
H	24
I	19
J	22
K	23

What is the range of the number of wheels made for the 11 one-hour periods?

- A. 5.5
- B. 5.0
- C. 4.5
- D. 4.0

ID: c54b92a2 Answer

Correct Answer:

B

Rationale

Choice B is correct. Range is defined as the difference between the greatest and least values from a set of data. The greatest number of wheels made during a one-hour period was 24 wheels. The least number of wheels was 19. Hence, the range is $24 - 19 = 5$, or 5.0.

Choices A, C, and D are incorrect and may be the result of arithmetic errors or incorrectly identifying the greatest or least number of wheels made during a one-hour period.

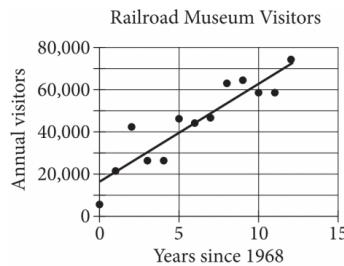
Question Difficulty:

Easy

Question ID 3c5b19ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3c5b19ef



The scatterplot above shows the number of visitors to a railroad museum in Pennsylvania each year from 1968 to 1980, where t is the number of years since 1968 and n is the number of visitors. A line of best fit is also shown. Which of the following could be an equation of the line of best fit shown?

- A. $n = 16,090 + 4,680t$
- B. $n = 4,690 + 16,090t$
- C. $n = 16,090 + 9,060t$
- D. $n = 9,060 + 16,090t$

ID: 3c5b19ef Answer

Correct Answer:

A

Rationale

Choice A is correct. An equation of a line of best fit can be written in the form $y = a + bx$, where a is the y -intercept of the line and b is the slope. In the scatterplot shown, the line of best fit intersects the y -axis just over halfway between 10,000 and 20,000, or approximately 16,000. The line of best fit also intersects the graph at $(5, 40,000)$. Using the slope formula $b = \frac{y_2 - y_1}{x_2 - x_1}$ and two points that lie on the graph such as $(5, 40,000)$ and $(0, 16,000)$, the slope can be approximated as $\frac{40,000 - 16,000}{5 - 0}$, or 4,800. Only choice A has a y -intercept near the estimate of 16,000 and a slope near the estimate of 4,800. Therefore, an equation of the line of best fit could be $n = 16,090 + 4,680t$.

Choice B is incorrect because the values for the slope and the y -coordinate of the y -intercept are switched. Choice C is incorrect because the value for the slope is approximately double the actual slope. Choice D is incorrect because the values for the slope and the y -intercept are switched and because the slope is approximately double the actual slope.

Question Difficulty:

Medium

Question ID 96a45430

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 96a45430

A number n is increased 6%. If the result is 318, what is the value of n ?

- A. 199
- B. 299
- C. 300
- D. 337

ID: 96a45430 Answer

Correct Answer:

C

Rationale

Choice C is correct. The decimal equivalent of 6% is 0.06. Since increasing the number n by 6% yields the number 318, this situation can be represented by the equation $n(1 + 0.06) = 318$, or $n(1.06) = 318$. Dividing both sides of this equation by 1.06 yields $n = 300$.

Choice A is incorrect. This is the result when n is increased by 60%, not by 6%. Choice B is incorrect. This is the approximate result of decreasing 318 by 6%. Choice D is incorrect. This is the approximate result of increasing 318 by 6%.

Question Difficulty:

Medium

Question ID 82dfb646

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 82dfb646

A market researcher selected 200 people at random from a group of people who indicated that they liked a certain book. The 200 people were shown a movie based on the book and then asked whether they liked or disliked the movie. Of those surveyed, 95% said they disliked the movie. Which of the following inferences can appropriately be drawn from this survey result?

- A. At least 95% of people who go see movies will dislike this movie.
- B. At least 95% of people who read books will dislike this movie.
- C. Most people who dislike this book will like this movie.
- D. Most people who like this book will dislike this movie.

ID: 82dfb646 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sample was selected from a group of people who indicated that they liked the book. It is inappropriate to generalize the result of the survey beyond the population from which the participants were selected. Choice D is the most appropriate inference from the survey results because it describes a conclusion about people who liked the book, and the results of the survey indicate that most people who like the book disliked the movie.

Choices A, B, and C are incorrect because none of these inferences can be drawn from the survey results. Choices A and B need not be true. The people surveyed all liked the book on which the movie was based, which is not necessarily true of all people who go see movies or all people who read books. Thus, the people surveyed are not representative of all people who go see movies or all people who read books. Therefore, the results of this survey cannot appropriately be extended to at least 95% of people who go see movies or to at least 95% of people who read books. Choice C need not be true because the sample includes only people who liked the book, and so the results do not extend to people who dislike the book.

Question Difficulty:

Easy

Question ID 5c3c2e3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 5c3c2e3c

The weights, in pounds, for 15 horses in a stable were reported, and the mean, median, range, and standard deviation for the data were found. The horse with the lowest reported weight was found to actually weigh 10 pounds less than its reported weight. What value remains unchanged if the four values are reported using the corrected weight?

- A. Mean
- B. Median
- C. Range
- D. Standard deviation

ID: 5c3c2e3c Answer

Correct Answer:

B

Rationale

Choice B is correct. The median weight is found by ordering the horses' weights from least to greatest and then determining the middle value from this list of weights. Decreasing the value for the horse with the lowest weight doesn't affect the median since it's still the lowest value.

Choice A is incorrect. The mean is calculated by finding the sum of all the weights of the horses and then dividing by the number of horses. Decreasing one of the weights would decrease the sum and therefore decrease the mean. Choice C is incorrect. Range is the difference between the highest and lowest weights, so decreasing the lowest weight would increase the range. Choice D is incorrect. Standard deviation is calculated based on the mean weight of the horses. Decreasing one of the weights decreases the mean and therefore would affect the standard deviation.

Question Difficulty:

Medium

Question ID 30db8f77

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 30db8f77

At a conference, there are a total of **275** attendees. Each attendee is assigned to either group A, group B, or group C. If one of these attendees is selected at random, the probability of selecting an attendee who is assigned to group A is **0.44** and the probability of selecting an attendee who is assigned to group B is **0.24**. How many attendees are assigned to group C?

ID: 30db8f77 Answer

Correct Answer:

88

Rationale

The correct answer is 88. It's given that there are a total of 275 attendees and each attendee is assigned to either group A, group B, or group C. It's also given that if one of these attendees is selected at random, the probability of selecting an attendee who is assigned to group A is 0.44 and the probability of selecting an attendee who is assigned to group B is 0.24. It follows that there are 0.44275, or 121, attendees who are assigned to group A and 0.24275, or 66, attendees who are assigned to group B. The number of attendees who are assigned to group C is the number of attendees who are not assigned to group A or group B. In other words, the number of attendees who are assigned to group C is the total number of attendees minus the number of attendees who are assigned to group A and group B. Therefore, the number of attendees who are assigned to group C is $275 - 121 - 66$, or 88.

Question Difficulty:

Medium

Question ID 3ac09984

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3ac09984

Marta has 7,500 pesos she will convert to US dollars using a currency exchange service. At this time, the currency exchange rate is 1 peso = 0.075 US dollars. The exchange service will charge Marta a 2% fee on the converted US dollar amount. How many US dollars will Marta receive from the currency exchange after the 2% fee is applied?

- A. \$551.25
- B. \$562.50
- C. \$5,625.00
- D. \$98,000.00

ID: 3ac09984 Answer

Correct Answer:

A

Rationale

Choice A is correct. At the exchange rate of 1 peso = 0.075 US dollars, 7,500 pesos would be converted to $7,500 \times 0.075 = \$562.50$. However, since Maria pays a 2% fee on the converted US dollar amount, she receives only $(100 - 2)\%$, or 98%, of the converted US dollars, and $562.50 \times 0.98 = \$551.25$.

Choice B is incorrect. This is the number of US dollars Maria would receive if the exchange service did not charge a 2% fee. Choice C is incorrect and may result from a decimal point error made when calculating the conversion to US dollars and from not assessing the 2% fee. Choice D is incorrect and may result from reversing the units of the exchange rate.

Question Difficulty:

Easy

Question ID 66f03086

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 66f03086

71, 72, 73, 76, 77, 79, 83, 87, 93

What is the median of the data shown?

- A. 71
- B. 77
- C. 78
- D. 79

ID: 66f03086 Answer

Correct Answer:

B

Rationale

Choice B is correct. The median of a data set with an odd number of data values is defined as the middle value of the ordered list of values. The data set shown has nine values, so the median is the fifth value in the ordered list, which is 77.

Choice A is incorrect. This is the minimum value of the data set, not the median.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the mean of the data set, not the median.

Question Difficulty:

Easy

Question ID 61f61789

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 61f61789

To study the moisture content in a group of trees, samples from the trunk of each tree were taken from **25** trees and cut in the shape of a cube. The length of the edge of one of these cubes is **2.00** centimeters. If this cube has a mass of **2.56** grams, what is the density of this cube, in grams per cubic centimeter?

ID: 61f61789 Answer

Correct Answer:

0.32, 8/25

Rationale

The correct answer is .32. The volume of a cube is given by the formula $V = s^3$, where s is the length of an edge of the cube. It's given that each edge of the cube has a length of 2.00 centimeters. Substituting 2.00 centimeters for s in the formula $V = s^3$ yields $V = (2.00 \text{ centimeters})^3$, or $V = 8.00$ cubic centimeters. It's given that the cube has a mass of 2.56 grams. Dividing the mass, in grams, of the cube by the volume, in cubic centimeters, of the cube gives its density, in grams per cubic centimeters. Therefore, the density of the cube is $\frac{2.56 \text{ grams}}{8.00 \text{ cubic centimeters}}$, or .32 grams per cubic centimeter. Note that .32 and 8/25 are examples of ways to enter a correct answer.

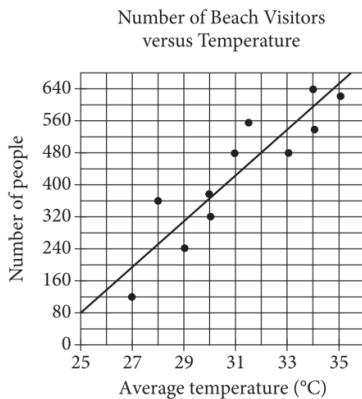
Question Difficulty:

Hard

Question ID d0430601

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: d0430601



Each dot in the scatterplot above represents the temperature and the number of people who visited a beach in Lagos, Nigeria, on one of eleven different days. The line of best fit for the data is also shown. The line of best fit for the data has a slope of approximately 57. According to this estimate, how many additional people per day are predicted to visit the beach for each 5°C increase in average temperature?

ID: d0430601 Answer

Rationale

The correct answer is 285. The number of people predicted to visit the beach each day is represented by the y-values of the line of best fit, and the average temperature, in degrees Celsius ($^{\circ}\text{C}$), is represented by the x-values. Since the slope of the line of best fit is approximately 57, the y-value, or the number of people predicted to visit the beach each day, increases by 57 for every x-value increase of 1, or every 1°C increase in average temperature. Therefore, an increase of 5°C in average temperature corresponds to a y-value increase of $57(5) = 285$ additional people per day predicted to visit the beach.

Question Difficulty:

Hard

Question ID 9110c120

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9110c120

Data set A: 5, 5, 5, 5, 5, 5, 5, 5, 5, 5

Data set B: 5, 5, 5, 5, 5, 5, 5, 5, 5, 100

Which of the following statements about the means and medians of data set A and data set B is true?

- A. Only the means are different.
- B. Only the medians are different.
- C. Both the means and the medians are different.
- D. Neither the means nor the medians are different.

ID: 9110c120 Answer

Correct Answer:

A

Rationale

Choice A is correct. The mean of a data set is the sum of the values divided by the number of values. The mean of data set A is $\frac{45}{9}$, or 5. The mean of data set B is $\frac{145}{10}$, or 14.5. Thus, the means are different. The median of a data set is the middle value when the values are ordered from least to greatest. The medians of data sets A and B are both 5. Therefore, the medians are the same, so only the means are different.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors.

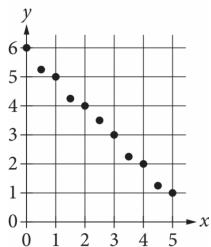
Question Difficulty:

Medium

Question ID 9296553d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 9296553d



Which of the following could be an equation for a line of best fit for the data in the scatterplot?

- A. $y = -x + 6$
- B. $y = -x - 6$
- C. $y = 6x + 1$
- D. $y = 6x - 1$

ID: 9296553d Answer

Correct Answer:

A

Rationale

Choice A is correct. A line of best fit for the data in a scatterplot is a line that follows the trend of the data with approximately half the data points above and half the data points below the line. Based on the given data, a line of best fit will have a positive y-intercept on or near the point $(0, 6)$ and a negative slope. All of the choices are in slope-intercept form $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept. Only choice A is an equation of a line with a positive y-intercept at $(0, 6)$ and a negative slope, -1 .

Choice B is incorrect. This equation is for a line that has a negative y-intercept, not a positive y-intercept. Choices C and D are incorrect and may result from one or more sign errors and from switching the values of the y-intercept and the slope in the equation.

Question Difficulty:

Easy

Question ID b2f6f17d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #006699; height: 10px;"></div> <div style="width: 60%; background-color: #CCCCCC; height: 10px;"></div>

ID: b2f6f17d

A customer's monthly water bill was \$75.74. Due to a rate increase, her monthly bill is now \$79.86. To the nearest tenth of a percent, by what percent did the amount of the customer's water bill increase?

- A. 4.1%
- B. 5.1%
- C. 5.2%
- D. 5.4%

ID: b2f6f17d Answer

Correct Answer:

D

Rationale

Choice D is correct. To find the percent increase of the customer's water bill, the absolute increase of the bill, in dollars, is divided by the original amount of the bill, and the result is multiplied by 100%, as follows: $\frac{79.86 - 75.74}{75.74} \approx 0.054$; $0.054 \times 100\% = 5.4\%$.

Choice A is incorrect. This choice is the difference $79.86 - 75.74$ rounded to the nearest tenth, which is the (absolute) increase of the bill's amount, not its percent increase. Choice B is incorrect and may be the result of some calculation errors. Choice C is incorrect and is the result of dividing the difference between the two bill amounts by the new bill amount instead of the original bill amount.

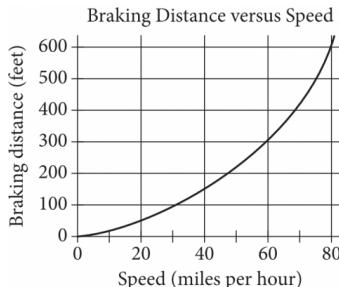
Question Difficulty:

Medium

Question ID d6121490

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d6121490



The graph above shows the relationship between the speed of a particular car, in miles per hour, and its corresponding braking distance, in feet. Approximately how many feet greater will the car's braking distance be when the car is traveling at 50 miles per hour than when the car is traveling at 30 miles per hour?

- A. 75
- B. 125
- C. 175
- D. 250

ID: d6121490 Answer

Correct Answer:

B

Rationale

Choice B is correct. According to the graph, when the car is traveling at 50 miles per hour, the braking distance is approximately 225 feet, and when the car is traveling at 30 miles per hour, the braking distance is approximately 100 feet. The difference between these braking distances is $225 - 100$, or 125 feet.

Choice A is incorrect and may result from finding the braking distance for 20 miles per hour, the difference between the given speeds. Choice C is incorrect and may result from subtracting the speed from the braking distance at 50 miles per hour. Choice D is incorrect and may result from finding the difference in the braking distances at 60 and 20 miles per hour.

Question Difficulty:

Easy

Question ID ab7740a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: ab7740a8

In which of the following tables is the relationship between the values of x and their corresponding y -values nonlinear?

A.

x	1	2	3	4
y	8	11	14	17

B.

x	1	2	3	4
y	4	8	12	16

C.

x	1	2	3	4
y	8	13	18	23

D.

x	1	2	3	4
y	6	12	24	48

ID: ab7740a8 Answer

Correct Answer:

D

Rationale

Choice D is correct. The relationship between the values of x and their corresponding y -values is nonlinear if the rate of change between these pairs of values isn't constant. The table for choice D gives four pairs of values: $(1,6)$, $(2,12)$, $(3,24)$, and $(4,48)$.

Finding the rate of change, or slope, between $(1,6)$ and $(2,12)$ by using the slope formula, $\frac{y_2 - y_1}{x_2 - x_1}$, yields $\frac{12 - 6}{2 - 1}$, or 6. Finding

the rate of change between $(2,12)$ and $(3,24)$ yields $\frac{24 - 12}{3 - 2}$, or 12. Finding the rate of change between $(3,24)$ and $(4,48)$ yields $\frac{48 - 24}{4 - 3}$

, or 24. Since the rate of change isn't constant for these pairs of values, this table shows a nonlinear relationship.

Choices A, B, and C are incorrect. The rate of change between the values of x and their corresponding y -values in each of these tables is constant, being 3, 4, and 5, respectively. Therefore, each of these tables shows a linear relationship.

Question Difficulty:

Medium

Question ID 2a08d878

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 2a08d878

There are n nonfiction books and 12 fiction books on a bookshelf. If one of these books is selected at random, what is the probability of selecting a nonfiction book, in terms of n ?

- A. $\frac{n}{12}$
- B. $\frac{n}{n+12}$
- C. $\frac{12}{n}$
- D. $\frac{12}{n+12}$

ID: 2a08d878 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since there are n nonfiction and 12 fiction books on the bookshelf, $n + 12$ represents the total number of books. If one of these books is selected at random, the probability of selecting a nonfiction book is equivalent to the number of nonfiction books divided by the total number of books. Therefore, the probability of selecting a nonfiction book, in terms of n , is $\frac{n}{n+12}$.

Choice A is incorrect. This expression represents the number of nonfiction books divided by the number of fiction books. Choice C is incorrect. This expression represents the number of fiction books divided by the number of nonfiction books. Choice D is incorrect. This expression represents the probability of selecting a fiction book.

Question Difficulty:

Easy

Question ID 38a9ac45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 38a9ac45

If 1,200 customers register for new accounts at a social media website every day, what fraction of the first 60,000 new accounts are registered in the first 5 days?

A. $\frac{1}{5}$

B. $\frac{1}{10}$

C. $\frac{1}{12}$

D. $\frac{1}{50}$

ID: 38a9ac45 Answer

Correct Answer:

B

Rationale

Choice B is correct. If 1,200 customers register for new accounts every day, then $(1,200)(5) = 6,000$ customers registered for new accounts in the first 5 days. Therefore, of the first 60,000 new accounts that were registered, $\frac{6,000}{60,000}$, or $\frac{1}{10}$, were registered in the first 5 days.

Choice A is incorrect. The fraction $\frac{1}{5}$ represents the fraction of accounts registered in 1 of the first 5 days. Choice C is incorrect

and may result from conceptual or computation errors. Choice D is incorrect. The fraction $\frac{1}{50}$ represents the fraction of the first 60,000 accounts that were registered in 1 day.

Question Difficulty:

Medium

Question ID eb672707

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: eb672707

How many tablespoons are equivalent to 14 teaspoons? (**3 teaspoons = 1 tablespoon**)

ID: eb672707 Answer

Correct Answer:

14/3, 4.666, 4.667

Rationale

The correct answer is $\frac{14}{3}$. It's given that 3 teaspoons is equivalent to 1 tablespoon. Therefore, 14 teaspoons is equivalent to 14 $\frac{1}{3}$ tablespoons, or $\frac{14}{3}$ tablespoons. Note that 14/3, 4.666, and 4.667 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 881ef5f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 881ef5f5

If a is the mean and b is the median of nine consecutive integers, what is the value of $|a - b|$?

ID: 881ef5f5 Answer

Rationale

The correct answer is 0. Any nine consecutive integers can be written as $k, k+1, k+2, k+3, k+4, k+5, k+6, k+7, k+8$. The

$$\frac{(k+k+1+k+2+\dots+k+8)}{9} = \frac{(9k+36)}{9}$$

mean of the integers is their sum divided by 9: $\frac{(9k+36)}{9}$, which simplifies to $k+4$. So $a = k+4$. Since there is an odd number of integers (nine), the median is the integer in the middle when all the integers are ordered from least to greatest: $k+4$. So $b = k+4$. Therefore, $|a - b| = |(k+4) - (k+4)|$, which is 0.

Question Difficulty:

Medium

Question ID 7ed0d098

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7ed0d098

Lani spent 15% of her 8-hour workday in meetings. How many minutes of her workday did she spend in meetings?

- A. 1.2
- B. 15
- C. 48
- D. 72

ID: 7ed0d098 Answer

Correct Answer:

D

Rationale

Choice D is correct. There are 60 minutes in one hour, so an 8-hour workday has $(60)(8) = 480$ minutes. To calculate 15% of 480, multiply 0.15 by 480: $(0.15)(480) = 72$. Therefore, Lani spent 72 minutes of her workday in meetings.

Choice A is incorrect because 1.2 is 15% of 8, which gives the time Lani spent of her workday in meetings in hours, not minutes. Choices B and C are incorrect and may be the result of computation errors.

Question Difficulty:

Easy

Question ID dae79de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dae79de4

	1 visit	2 or more visits	Total
Less than 40 years old	15	15	30
At least 40 years old	20	85	105
Total	35	100	135

The table summarizes customers who visited a car dealership in the last month by age and number of visits they made to the dealership. If a customer from the last month is selected at random, what is the probability that the selected customer is at least 40 years old?

- A. $\frac{30}{135}$
- B. $\frac{35}{135}$
- C. $\frac{100}{135}$
- D. $\frac{105}{135}$

ID: dae79de4 Answer

Correct Answer:

D

Rationale

Choice D is correct. Based on the table, there are a total of 135 customers who visited the car dealership in the last month, and 105 of these customers are at least 40 years old. If a customer from the last month is selected at random, the probability that the selected customer is at least 40 years old is equal to the number of customers who are at least 40 years old divided by the total number of customers. Therefore, the probability that the selected customer is at least 40 years old is $\frac{105}{135}$.

Choice A is incorrect. This is the probability that the selected customer is less than 40 years old.

Choice B is incorrect. This is the probability that the selected customer visited the dealership 1 time in the last month.

Choice C is incorrect. This is the probability that the selected customer visited the dealership 2 or more times in the last month.

Question Difficulty:

Easy

Question ID 4bb25495

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 4bb25495

Five Smallest Countries in 2016

Country	Land area (square kilometers)
Monaco	2.0
Nauru	21
San Marino	61
Tuvalu	26
Vatican City	0.44

The table above shows the land area, in square kilometers, of the five smallest countries of the world in 2016. Based on the table, what is the mean land area of the 5 smallest countries in 2016, to the nearest square kilometer?

- A. 20
- B. 22
- C. 61
- D. 110

ID: 4bb25495 Answer

Correct Answer:

B

Rationale

Choice B is correct. The mean land area of these 5 countries is equal to the sum of the land areas of these countries, or

$$\frac{2.0 + 21 + 61 + 26 + 0.44}{5} \text{. Combining like terms in the numerator yields } \frac{110.44}{5}$$

terms in the numerator yields $\frac{110.44}{5}$, which simplifies to 22.088 square kilometers. This value, when rounded to the nearest square kilometer, is 22.

Choice A is incorrect and may result from a calculation error. Choice C is incorrect. This is the greatest land area of the 5 countries in the table. Choice D is incorrect. This is the sum of the land areas of the 5 countries in the table, rounded to the nearest square kilometer.

Question Difficulty:

Easy

Question ID aa43b41f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: aa43b41f

Near the end of a US cable news show, the host invited viewers to respond to a poll on the show's website that asked, "Do you support the new federal policy discussed during the show?" At the end of the show, the host reported that 28% responded "Yes," and 70% responded "No." Which of the following best explains why the results are unlikely to represent the sentiments of the population of the United States?

- A. The percentages do not add up to 100%, so any possible conclusions from the poll are invalid.
- B. Those who responded to the poll were not a random sample of the population of the United States.
- C. There were not 50% "Yes" responses and 50% "No" responses.
- D. The show did not allow viewers enough time to respond to the poll.

ID: aa43b41f Answer

Correct Answer:

B

Rationale

Choice B is correct. In order for the poll results from a sample of a population to represent the entire population, the sample must be representative of the population. A sample that is randomly selected from a population is more likely than a sample of the type described to represent the population. In this case, the people who responded were people with access to cable television and websites, which aren't accessible to the entire population. Moreover, the people who responded also chose to watch the show and respond to the poll. The people who made these choices aren't representative of the entire population of the United States because they were not a random sample of the population of the United States.

Choices A, C, and D are incorrect because they present reasons unrelated to whether the sample is representative of the population of the United States.

Question Difficulty:

Hard

Question ID b6569d0e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b6569d0e

United States
Presidents
from 1789 to
2015

Ages	Number
40–44	2
45–49	7
50–54	13
55–59	11
60–64	7
65–69	3

The table above gives the number of United States presidents from 1789 to 2015 whose age at the time they first took office is within the interval listed. Of those presidents who were at least 50 years old when they first took office, what fraction were at least 60 years old?

A. $\frac{10}{43}$

B. $\frac{10}{34}$

C. $\frac{10}{24}$

D. $\frac{25}{34}$

ID: b6569d0e Answer

Correct Answer:

B

Rationale

Choice B is correct. The sample space is restricted to the presidents who were at least 50 years old when they first took office. Therefore, the sum of the values in the final four rows of the table, $13 + 11 + 7 + 3 = 34$, is the total number of presidents in the

sample space. The number of presidents who were at least 60 years old is the sum of the values in the final two rows of the table: $7 + 3 = 10$. Thus, the fraction of the 34 presidents who were at least 50 years old when they first took office who were at least 60 years old is $\frac{10}{34}$.

Choice A is incorrect. This is the fraction of all presidents in the table who were at least 60 years old when they first took office. Choice C is incorrect and may result from treating the number of presidents who were between 50 and 59 years old when they first took office, instead of the number of presidents who were at least 50 years old, as the sample space. Choice D is incorrect and may result from a calculation error.

Question Difficulty:

Medium

Question ID 5dc386fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5dc386fb

The table below shows the distribution of US states according to whether they have a state-level sales tax and a state-level income tax.

2013 State-Level Taxes

	State sales tax	No state sales tax
State income tax	39	4
No state income tax	6	1

To the nearest tenth of a percent, what percent of states with a state-level sales tax do not have a state-level income tax?

- A. 6.0%
- B. 12.0%
- C. 13.3%
- D. 14.0%

ID: 5dc386fb Answer

Correct Answer:

C

Rationale

Choice C is correct. The sum of the number of states with a state-level sales tax is $39 + 6 = 45$. Of these states, 6 don't have a state-level income tax. Therefore, $\frac{6}{45} = 0.1333\dots$, or about 13.3%, of states with a state-level sales tax don't have a state-level income tax.

Choice A is incorrect. This is the number of states that have a state-level sales tax and no state-level income tax. Choice B is incorrect. This is the percent of states that have a state-level sales tax and no state-level income tax. Choice D is incorrect. This is the percent of states that have no state-level income tax.

Question Difficulty:

Hard

Question ID 551c52b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 551c52b9

Tilly earns p dollars for every w hours of work. Which expression represents the amount of money, in dollars, Tilly earns for $39w$ hours of work?

- A. $39p$
- B. $\frac{p}{39}$
- C. $p + 39$
- D. $p - 39$

ID: 551c52b9 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that Tilly earns p dollars for every w hours of work. This can be represented by the proportion $\frac{p}{w}$. The amount of money, x , Tilly earns for $39w$ hours of work can be found by setting up the proportion $\frac{p}{w} = \frac{x}{39w}$. This can be rewritten as $39pw = xw$. Dividing both sides by w results in $x = 39p$.

Choice B is incorrect. This is the amount of money Tilly earns in dollars per hour, not the amount of money Tilly earns for $39w$ hours of work.

Choice C is incorrect. This is the amount of money Tilly earns for w hours of work plus 39, not the amount of money Tilly earns for $39w$ hours of work.

Choice D is incorrect. This is the amount of money Tilly earns for w hours of work minus 39, not the amount of money Tilly earns for $39w$ hours of work.

Question Difficulty:

Easy

Question ID 014c47ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 014c47ab

	Site A	Site B	Total
Tulip	35	15	50
Daffodil	31	21	52
Total	66	36	102

The table shows the distribution of two types of flowers at two different sites. If a flower represented in the table is selected at random, what is the probability of selecting a flower from site A, given that the flower is a tulip? (Express your answer as a decimal or fraction, not as a percent.)

ID: 014c47ab Answer

Correct Answer:

0.7, 7/10

Rationale

The correct answer is $\frac{35}{50}$. Based on the table, there are a total of 50 tulips, and 35 of these tulips are from site A. The probability of selecting at random a flower from site A, given that the flower is a tulip, is equal to the number of tulips from site A divided by the total number of tulips, which can be written as $\frac{35}{50}$, or $\frac{7}{10}$. Note that 35/50, 7/10, and .7 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 1180401d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1180401d

The total area of a coastal city is 92.1 square miles, of which 11.3 square miles is water. If the city had a population of 621,000 people in the year 2010, which of the following is closest to the population density, in people per square mile of land area, of the city at that time?

- A. 6,740
- B. 7,690
- C. 55,000
- D. 76,000

ID: 1180401d Answer

Correct Answer:

B

Rationale

Choice B is correct. The land area of the coastal city can be found by subtracting the area of the water from the total area of the coastal city; that is, $92.1 - 11.3 = 80.8$ square miles. The population density is the population divided by the land area, or $\frac{621,000}{80.8} = 7,686$, which is closest to 7,690 people per square mile.

Choice A is incorrect and may be the result of dividing the population by the total area, instead of the land area. Choice C is incorrect and may be the result of dividing the population by the area of water. Choice D is incorrect and may be the result of making a computational error with the decimal place.

Question Difficulty:

Medium

Question ID f6cbb04a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f6cbb04a

$$d = 55t$$

The equation above can be used to calculate the distance d , in miles, traveled by a car moving at a speed of 55 miles per hour over a period of t hours. For any positive constant k , the distance the car would have traveled after $9k$ hours is how many times the distance the car would have traveled after $3k$ hours?

- A. 3
- B. 6
- C. $3k$
- D. $6k$

ID: f6cbb04a Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the distance is equal to the amount of time multiplied by a constant, the given equation $d = 55t$ represents a proportional relationship between distance and time in this situation. Since $9k = 3 \cdot 3k$, the time when $t = 9k$ hours is 3 times the time when $t = 3k$ hours. Therefore, the distance traveled after $9k$ hours is 3 times the distance after $3k$ hours.

Choices B and D are incorrect and may result from interpreting the proportional relationship between time and distance as additive rather than multiplicative. Choice C is incorrect and may result from an arithmetic error.

Question Difficulty:

Medium

Question ID 98958ae8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 98958ae8

Data set A consists of the heights of **75** objects and has a mean of **25** meters. Data set B consists of the heights of **50** objects and has a mean of **65** meters. Data set C consists of the heights of the **125** objects from data sets A and B. What is the mean, in meters, of data set C?

ID: 98958ae8 Answer

Correct Answer:

41

Rationale

The correct answer is 41. The mean of a data set is computed by dividing the sum of the values in the data set by the number of values in the data set. It's given that data set A consists of the heights of 75 objects and has a mean of 25 meters. This can be represented by the equation $\frac{x}{75} = 25$, where x represents the sum of the heights of the objects, in meters, in data set A. Multiplying both sides of this equation by 75 yields $x = 75 \times 25$, or $x = 1,875$ meters. Therefore, the sum of the heights of the objects in data set A is 1,875 meters. It's also given that data set B consists of the heights of 50 objects and has a mean of 65 meters. This can be represented by the equation $\frac{y}{50} = 65$, where y represents the sum of the heights of the objects, in meters, in data set B. Multiplying both sides of this equation by 50 yields $y = 50 \times 65$, or $y = 3,250$ meters. Therefore, the sum of the heights of the objects in data set B is 3,250 meters. Since it's given that data set C consists of the heights of the 125 objects from data sets A and B, it follows that the mean of data set C is the sum of the heights of the objects, in meters, in data sets A and B divided by the number of objects represented in data sets A and B, or $\frac{1,875 + 3,250}{125}$, which is equivalent to 41 meters. Therefore, the mean, in meters, of data set C is 41.

Question Difficulty:

Hard

Question ID 623dbebb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 623dbebb

A reseller buys certain books for a purchase price of **5.00** dollars each and then marks them each for sale at a consumer price that is **270%** of the purchase price. After **4** months, any remaining books not yet sold are marked at a discounted price that is **70%** off the consumer price. What is the discounted price of each of the remaining books, in dollars?

ID: 623dbebb Answer

Correct Answer:

4.05, 81/20

Rationale

The correct answer is 4.05. It's given that the purchase price for certain books is 5.00 dollars each. It's also given that each book is marked for sale at a consumer price that is 270% of the purchase price. Since the consumer price is 270% of the purchase price of 5.00 dollars, it follows that the consumer price is $(2.7)(5.00)$, or 13.50, dollars. It's given that after 4 months, any remaining books are discounted at 70% off the consumer price. Thus, the discount amount is $(0.7)(13.50)$, or 9.45, dollars. Subtracting the discount amount from the consumer price gives the discounted price of each of the remaining books: $13.50 - 9.45 = 4.05$. Note that 4.05 and 81/20 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 2e92cc21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2e92cc21

The number a is 110% greater than the number b . The number b is 90% less than 47. What is the value of a ?

ID: 2e92cc21 Answer

Correct Answer:

9.87, 987/100

Rationale

The correct answer is 9.87. It's given that the number a is 110% greater than the number b . It follows that $a = 1 + \frac{110}{100}b$, or $a = 2.1b$. It's also given that the number b is 90% less than 47. It follows that $b = 1 - \frac{90}{100}47$, or $b = 0.147$, which yields $b = 4.7$. Substituting 4.7 for b in the equation $a = 2.1b$ yields $a = 2.147$, which is equivalent to $a = 9.87$. Therefore, the value of a is 9.87.

Question Difficulty:

Hard

Question ID 7f84b136

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7f84b136

The table summarizes the number of objects in each group.

Group	Number of objects
A	375
B	54
C	690
D	81
Total	1,200

The number of objects in group C is $p\%$ of the number of objects in group A. What is the value of p ?

ID: 7f84b136 Answer

Correct Answer:

184

Rationale

The correct answer is 184. It's given in the table that there are 375 objects in group A and 690 objects in group C. It's also given that the number of objects in group C is $p\%$ of the number of objects in group A. Therefore, 690 is $p\%$ of 375, which can be represented by $690 = \frac{p}{100}375$, or $690 = 3.75p$. Dividing both sides of this equation by 3.75 yields $184 = p$. Therefore, the value of p is 184.

Question Difficulty:

Medium

Question ID 2d31caae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 30%; background-color: #e0e0e0;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 2d31caae

Call Ratings

	1 Star	2 Stars	3 Stars	4 Stars	Total
Employee A	16	49	72	8	145
Employee B	4	10	22	34	70
Employee C	8	56	45	16	125
Employee D	22	42	84	12	160
Total	50	157	223	70	500

A supervisor at a call center reviewed 500 calls taken by four employees and rated the employees' performance on each call on a scale from 1 star to 4 stars. The ratings for each employee are shown in the table above. According to the table, to the nearest whole percent, what percent of Employee A's calls received a rating of 1 star?

- A. 3%
- B. 11%
- C. 16%
- D. 32%

ID: 2d31caae Answer

Correct Answer:

B

Rationale

Choice B is correct. The percent of Employee A's calls that received a rating of 1 star is the number of Employee A's 1-star calls divided by the total number of Employee A's calls. This quotient, $\frac{16}{145}$, is approximately equal to 0.1103, or 11.03%. To the nearest whole percent, this is 11%.

Choice A is incorrect. This is the percent of all calls taken by Employee A that received a rating of 1 star. Choice C is incorrect and may result from a conceptual error. For example, 16 is the number, not the percent, of calls taken by Employee A that received a rating of 1 star. Choice D is incorrect. This is the percent of all calls that received a rating of 1 star that were taken by Employee A.

Question Difficulty:

Easy

Question ID 4a422e3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 4a422e3e

To determine the mean number of children per household in a community, Tabitha surveyed 20 families at a playground. For the 20 families surveyed, the mean number of children per household was 2.4. Which of the following statements must be true?

- A. The mean number of children per household in the community is 2.4.
- B. A determination about the mean number of children per household in the community should not be made because the sample size is too small.
- C. The sampling method is flawed and may produce a biased estimate of the mean number of children per household in the community.
- D. The sampling method is not flawed and is likely to produce an unbiased estimate of the mean number of children per household in the community.

ID: 4a422e3e Answer

Correct Answer:

C

Rationale

Choice C is correct. In order to use a sample mean to estimate the mean for a population, the sample must be representative of the population (for example, a simple random sample). In this case, Tabitha surveyed 20 families in a playground. Families in the playground are more likely to have children than other households in the community. Therefore, the sample isn't representative of the population. Hence, the sampling method is flawed and may produce a biased estimate.

Choices A and D are incorrect because they incorrectly assume the sampling method is unbiased. Choice B is incorrect because a sample of size 20 could be large enough to make an estimate if the sample had been representative of all the families in the community.

Question Difficulty:

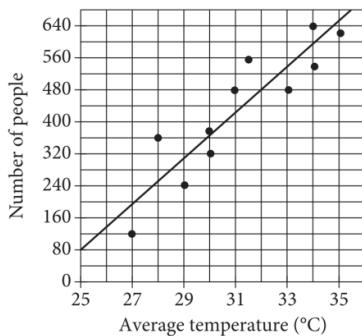
Hard

Question ID 8156d446

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002060; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8156d446

Number of Beach Visitors versus Temperature



Each dot in the scatterplot above represents the temperature and the number of people who visited a beach in Lagos, Nigeria, on one of eleven different days. The line of best fit for the data is also shown. According to the line of best fit, what is the number of people, rounded to the nearest 10, predicted to visit this beach on a day with an average temperature of 32°C?

ID: 8156d446 Answer

Rationale

The correct answer is 480. An average temperature of 32°C corresponds to the value 32 on the x-axis. On the line of best fit, an x-value of 32 corresponds to a y-value of 480. The values on the y-axis correspond to the number of people predicted to visit this beach. Therefore, 480 people are predicted to visit this beach on a day with an average temperature of 32°C .

Question Difficulty:

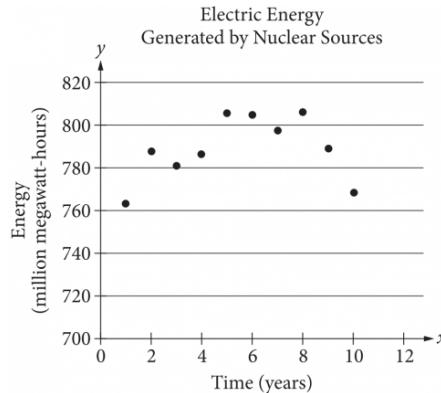
Easy

Question ID e821a26d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div>

ID: e821a26d

The scatterplot below shows the amount of electric energy generated, in millions of megawatt-hours, by nuclear sources over a 10-year period.



Of the following equations, which best models the data in the scatterplot?

- A. $y = 1.674x^2 + 19.76x - 745.73$
- B. $y = -1.674x^2 - 19.76x - 745.73$
- C. $y = 1.674x^2 + 19.76x + 745.73$
- D. $y = -1.674x^2 + 19.76x + 745.73$

ID: e821a26d Answer

Correct Answer:

D

Rationale

Choice D is correct. The data in the scatterplot roughly fall in the shape of a downward-opening parabola; therefore, the coefficient for the x^2 term must be negative. Based on the location of the data points, the y-intercept of the parabola should be somewhere between 740 and 760. Therefore, of the equations given, the best model is $y = -1.674x^2 + 19.76x + 745.73$.

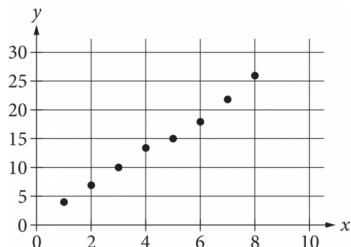
Choices A and C are incorrect. The positive coefficient of the x^2 term means that these equations each define upward-opening parabolas, whereas a parabola that fits the data in the scatterplot must open downward. Choice B is incorrect because it defines a parabola with a y-intercept that has a negative y-coordinate, whereas a parabola that fits the data in the scatterplot must have a y-intercept with a positive y-coordinate.

Question Difficulty:
Hard

Question ID 9eb896c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9eb896c5



Which of the following could be the equation for a line of best fit for the data shown in the scatterplot above?

- A. $y = 3x + 0.8$
- B. $y = 0.8x + 3$
- C. $y = -0.8x + 3$
- D. $y = -3x + 0.8$

ID: 9eb896c5 Answer

Correct Answer:

A

Rationale

Choice A is correct. The data show a strong linear relationship between x and y . The line of best fit for a set of data is a linear equation that minimizes the distances from the data points to the line. An equation for the line of best fit can be written in slope-intercept form, $y = mx + b$, where m is the slope of the graph of the line and b is the y -coordinate of the y -intercept of the graph.

Since, for the data shown, the y -values increase as the x -values increase, the slope of a line of best fit must be positive. The data

shown lie almost in a line, so the slope can be roughly estimated using the formula for slope, $m = \frac{y_2 - y_1}{x_2 - x_1}$. The leftmost and

rightmost data points have coordinates of about $(1, 4)$ and $(8, 26)$, so the slope is approximately $\frac{26 - 4}{8 - 1} = \frac{22}{7}$, which is a little greater than 3. Extension of the line to the left would intersect the y -axis at about $(0, 1)$. Only choice A represents a line with a slope close to 3 and a y -intercept close to $(0, 1)$.

Choice B is incorrect and may result from switching the slope and y -intercept. The line with a y -intercept of $(0, 3)$ and a slope of 0.8 is farther from the data points than the line with a slope of 3 and a y -intercept of $(0, 0.8)$. Choices C and D are incorrect. They represent lines with negative slopes, not positive slopes.

Question Difficulty:

Medium

Question ID 194ae3b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 194ae3b1

There were approximately 113,000 occupational therapy jobs in the United States in 2012. The Bureau of Labor Statistics has projected that this number will increase by 29% from 2012 to 2022. Of the following, which is closest to the number of occupational therapy jobs the bureau has projected for the United States in 2022?

- A. 115,900
- B. 116,300
- C. 142,000
- D. 145,800

ID: 194ae3b1 Answer

Correct Answer:

D

Rationale

Choice D is correct. The decimal equivalent of 29% is 0.29. It's given that the 113,000 occupational therapy jobs in the United States in 2012 are projected to increase by 29% by 2022. Increasing 113,000 by 29% can be expressed as $(113,000)(1 + 0.29)$, or $(113,000)(1.29)$. Evaluating this expression yields 145,770. The closest number is 145,800 in choice D.

Choice A is incorrect and may result from increasing 113,000 by 2,900 instead of by 29%. Choice B is incorrect and may result from increasing 113,000 by 2.9% instead of by 29%. Choice C is incorrect and may result from increasing 113,000 by 29,000 instead of by 29%.

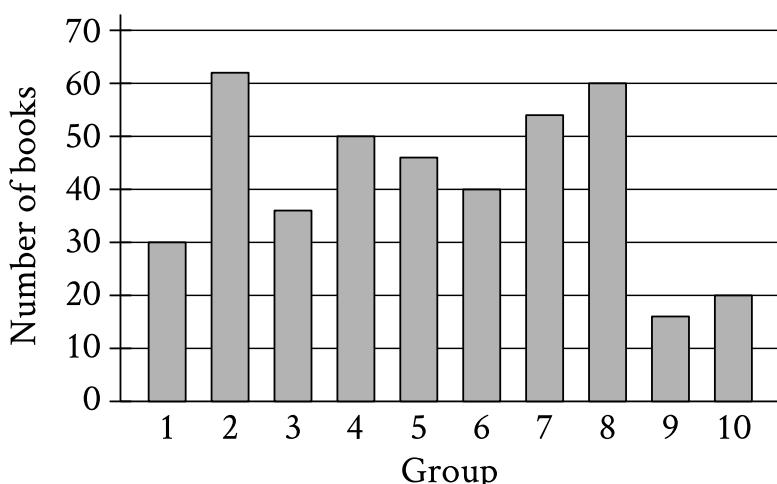
Question Difficulty:

Easy

Question ID 79340403

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #CCCCCC; height: 10px;"></div> <div style="width: 25%; background-color: #CCCCCC; height: 10px;"></div>

ID: 79340403



The bar graph shows the distribution of 414 books collected by 10 different groups for a book drive. How many books were collected by group 1?

ID: 79340403 Answer

Correct Answer:

30

Rationale

The correct answer is 30. The height of each bar in the bar graph shown represents the number of books collected by the group specified at the bottom of the bar. The bar for group 1 reaches a height of 30. Therefore, group 1 collected 30 books.

Question Difficulty:

Easy

Question ID a8fabad0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a8fabad0

A waiter receives tips from each customer. On average, the tip is 15% of the customer's bill. At this rate, which of the following is closest to the tip the waiter can expect when a customer has a bill that is \$78.20?

- A. \$8.00
- B. \$10.00
- C. \$12.00
- D. \$14.00

ID: a8fabad0 Answer

Correct Answer:

C

Rationale

Choice C is correct. If the bill is \$78.20, 15% of the bill can be found by multiplying 78.20 by the decimal conversion of 15%, $78.20 \times 0.15 = \$11.73$. The exact amount \$11.73 is closest in value to \$12.00.

Choices A, B, and D are incorrect and may be the result of errors when calculating 15% of the total \$78.20.

Question Difficulty:

Easy

Question ID 99550621

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 99550621

Makayla is planning an event in a 5,400-square-foot room. If there should be at least 8 square feet per person, what is the maximum number of people that could attend this event?

- A. 588
- B. 675
- C. 15,274
- D. 43,200

ID: 99550621 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the event will be in a 5,400-square-foot room and that there should be at least 8 square feet per person. The maximum number of people that could attend the event can be found by dividing the total square feet in the room by

$$\frac{5,400}{8} = 675$$

the minimum number of square feet needed per person, which gives $\frac{5,400}{8} = 675$.

Choices A and C are incorrect and may result from conceptual or computational errors. Choice D is incorrect and may result from multiplying, rather than dividing, 5,400 by 8.

Question Difficulty:

Easy

Question ID 9d935bd8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 9d935bd8

Percent of Residents Who Earned a Bachelor's Degree or Higher

State	Percent of residents
State A	21.9%
State B	27.9%
State C	25.9%
State D	19.5%
State E	30.1%
State F	36.4%
State G	35.5%

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

- A. 0.05%
- B. 0.95%
- C. 1.22%
- D. 7.45%

ID: 9d935bd8 Answer

Correct Answer:

B

Rationale

Choice A is correct. The median of a set of numbers is the middle value of the set values when ordered from least to greatest. If the percents in the table are ordered from least to greatest, the middle value is 27.9%. The difference between 27.9% and 26.95% is 0.95%.

Choice C is incorrect and may be the result of calculation errors or not finding the median of the data in the table correctly. Choice D is incorrect and may be the result of finding the mean instead of the median. Choice B is incorrect and may be the result of using the middle value of the unordered list.

Question Difficulty:

Hard

Question ID 8c5dbd3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8c5dbd3e

The number w is 110% greater than the number z . The number z is 55% less than 50. What is the value of w ?

ID: 8c5dbd3e Answer

Correct Answer:

189/4, 47.25

Rationale

The correct answer is 47.25. It's given that the number w is 110% greater than the number z . It follows that $w = 1 + \frac{110}{100}z$, or $w = 2.1z$. It's also given that the number z is 55% less than 50. It follows that $z = 1 - \frac{55}{100}50$, or $z = 0.4550$, which yields $z = 22.5$. Substituting 22.5 for z in the equation $w = 2.1z$ yields $w = 2.122.5$, which is equivalent to $w = 47.25$. Therefore, the value of w is 47.25. Note that 47.25 and 189/4 are examples of ways to enter a correct answer.

Question Difficulty:

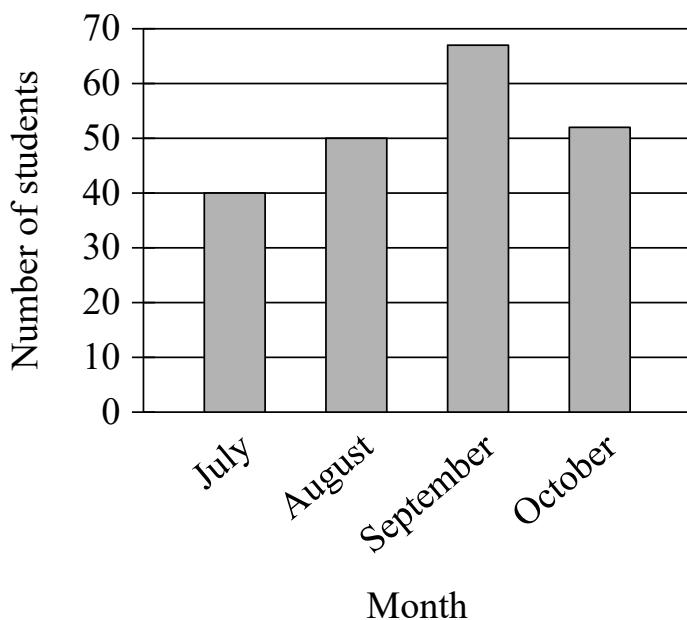
Hard

Question ID a067c926

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: a067c926

The bar graph shows the distribution of the number of students from one school who were born in one of four months.



How many more students were born in August than were born in July?

- A. 90
- B. 50
- C. 40
- D. 10

ID: a067c926 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the bar graph shows the number of students from one school who were born in either July, August, September, or October. The bar representing the number of students born in August has a height of 50; therefore, 50 students were born in August. The bar representing the number of students born in July has a height of 40; therefore, 40 students were born in July. Thus, there were $50 - 40$, or 10 more students born in August than in July.

Choice A is incorrect. This is the total number of students born in July and August.

Choice B is incorrect. This is the number of students born in August.

Choice C is incorrect. This is the number of students born in July.

Question Difficulty:

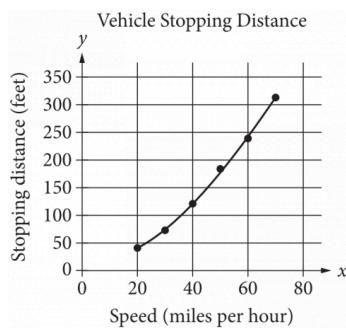
Easy

Question ID 5c24c861

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 5c24c861

A study was done to determine a new car's stopping distance when it was traveling at different speeds. The study was done on a dry road with good surface conditions. The results are shown below, along with the graph of a quadratic function that models the data.



According to the model, which of the following is the best estimate for the stopping distance, in feet, if the vehicle was traveling 55 miles per hour?

- A. 25
- B. 30
- C. 210
- D. 250

ID: 5c24c861 Answer

Correct Answer:

C

Rationale

Correct Answer Rationale

Choice C is correct. According to the model, the stopping distance, in feet, of a vehicle traveling 55 miles per hour is about 200 feet. Of the choices given, the best estimate of the stopping distance for a car traveling 55 miles per hour is 210 feet.

Incorrect Answer Rationale

Choices A, B, and D are incorrect and may be the result of incorrectly reading the given quadratic model. The corresponding x-values to the y-values of 25 and 30 are not part of the model. The corresponding x-value to a y-value of 250 is approximately 60 mph, not 55 mph.

Question Difficulty:

Easy

Question ID 9e2bf782

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9e2bf782

A fish hatchery has three tanks for holding fish before they are introduced into the wild. Ten fish weighing less than 5 ounces are placed in tank A. Eleven fish weighing at least 5 ounces but no more than 13 ounces are placed in tank B. Twelve fish weighing more than 13 ounces are placed in tank C. Which of the following could be the median of the weights, in ounces, of these 33 fish?

- A. 4.5
- B. 8
- C. 13.5
- D. 15

ID: 9e2bf782 Answer

Correct Answer:

B

Rationale

Choice B is correct. The median of a set of numbers is the middle number when the values in the set are ordered from least to greatest. There are 33 fish, so in an ordered list of the weights, the 17th value would be the median weight. The 10 fish in tank A weigh the least, and these 10 weights would be the first 10 values on the ordered list. The 11 fish in tank B have the next set of higher weights, and so would be the 11th through 21st weights in the ordered list, which includes the median weight as the 17th value. The fish in tank B weigh at least 5 ounces but no more than 13 ounces; of the given choices, only 8 ounces falls within this range of values.

Choice A is incorrect. It's given that tank A has ten fish weighing less than 5 ounces. Since there are more than ten fish in tanks B and C combined, the median weight cannot be less than 5 ounces. Choice C and D are incorrect. It's given that tank C has twelve fish weighing more than 13 ounces. There are more than twelve fish in tanks A and B combined, so the median weight can't be more than 13 ounces.

Question Difficulty:

Medium

Question ID 9ba3e283

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 75%; background-color: #003366; height: 10px;"></div>

ID: 9ba3e283

In State X, Mr. Camp's eighth-grade class consisting of 26 students was surveyed and 34.6 percent of the students reported that they had at least two siblings. The average eighth-grade class size in the state is 26. If the students in Mr. Camp's class are representative of students in the state's eighth-grade classes and there are 1,800 eighth-grade classes in the state, which of the following best estimates the number of eighth-grade students in the state who have fewer than two siblings?

- A. 16,200
- B. 23,400
- C. 30,600
- D. 46,800

ID: 9ba3e283 Answer

Correct Answer:

C

Rationale

Choice C is correct. It is given that 34.6% of 26 students in Mr. Camp's class reported that they had at least two siblings. Since 34.6% of 26 is 8.996, there must have been 9 students in the class who reported having at least two siblings and 17 students who reported that they had fewer than two siblings. It is also given that the average eighth-grade class size in the state is 26 and that Mr. Camp's class is representative of all eighth-grade classes in the state. This means that in each eighth-grade class in the state there are about 17 students who have fewer than two siblings. Therefore, the best estimate of the number of eighth-grade students in the state who have fewer than two siblings is $17 \times (\text{number of eighth-grade classes in the state})$, or $17 \times 1,800 = 30,600$.

Choice A is incorrect because 16,200 is the best estimate for the number of eighth-grade students in the state who have at least, not fewer than, two siblings. Choice B is incorrect because 23,400 is half of the estimated total number of eighth-grade students in the state; however, since the students in Mr. Camp's class are representative of students in the eighth-grade classes in the state and more than half of the students in Mr. Camp's class have fewer than two siblings, more than half of the students in each eighth-grade class in the state have fewer than two siblings, too. Choice D is incorrect because 46,800 is the estimated total number of eighth-grade students in the state.

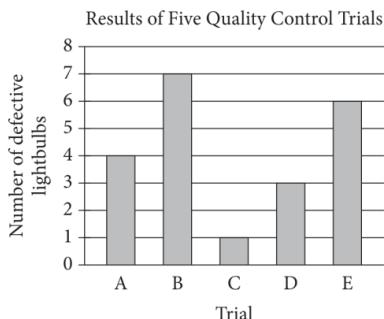
Question Difficulty:

Hard

Question ID a9647302

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a9647302



For quality control, a company that manufactures lightbulbs conducted five different trials. In each trial, 500 different lightbulbs were tested. The bar graph above shows the number of defective lightbulbs found in each trial. What is the mean number of defective lightbulbs for the five trials?

- A. 4.0
- B. 4.2
- C. 4.6
- D. 5.0

ID: a9647302 Answer

Correct Answer:

B

Rationale

Choice B is correct. The numbers of defective lightbulbs found for the five trials are 4, 7, 1, 3, and 6, respectively. The mean is

$$\text{therefore } \frac{4+7+1+3+6}{5} = 4.2.$$

Choice A is incorrect. This is the median number of defective lightbulbs for the five trials. Choice C is incorrect and may result from an arithmetic error. Choice D is incorrect and may result from mistaking the number of trials for the number of defective lightbulbs.

Question Difficulty:

Easy

Question ID 1c2f50a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1c2f50a6

During a sale, the original prices of all the items in a clothing store have been reduced by 20%. What is the sale price of a jacket with an original price of \$50 ?

- A. \$12
- B. \$30
- C. \$36
- D. \$40

ID: 1c2f50a6 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the original price of the jacket has been reduced by 20%. Multiplying the original price, \$50, by 20% gives the amount, in dollars, that the price of the jacket is reduced by: $50 \times .20 = 10$. Subtracting this value from the original price results in the sale price of the jacket: $\$50 - \10 , or \$40.

Choices A, B, and C are incorrect and may result from a conceptual or calculation error.

Question Difficulty:

Easy

Question ID 89c39d77

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 89c39d77

A competition consisted of four different events. One participant completed the first event with an average speed of **20.300** miles per hour. What was this average speed, in yards per hour? (**1 mile = 1,760 yards**)

ID: 89c39d77 Answer

Correct Answer:

35728

Rationale

The correct answer is 35,728. It's given that 1 mile = 1,760 yards. It follows that an average speed of 20.300 miles per hour is equivalent to $\frac{20.300 \text{ miles}}{1 \text{ hour}} \cdot \frac{1,760 \text{ yards}}{1 \text{ mile}}$, or 35,728 yards per hour.

Question Difficulty:

Medium

Question ID 8193e8cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 8193e8cd

2, 10, 3, 7, 6

The mean of the list of numbers above is what fraction of the sum of the five numbers?

ID: 8193e8cd Answer

Rationale

The correct answer is $\frac{1}{5}$. The mean of the list of numbers is found by dividing the sum of the numbers by the number of values in the list. Since there are 5 numbers in the list, the mean is $\frac{1}{5}$ of the sum of the numbers. Note that $1/5$ and $.2$ are examples of ways to enter a correct answer.

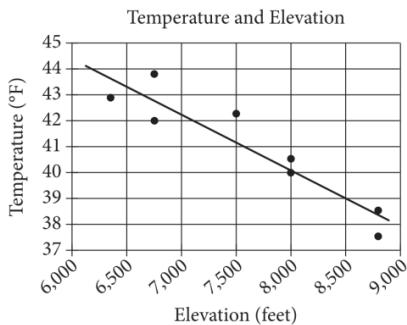
Question Difficulty:

Medium

Question ID 661dfddd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 661dfddd



The scatterplot above shows the high temperature on a certain day and the elevation of 8 different locations in the Lake Tahoe Basin. A line of best fit for the data is also shown. Which of the following statements best describes the association between the elevation and the temperature of locations in the Lake Tahoe Basin?

- A. As the elevation increases, the temperature tends to increase.
- B. As the elevation increases, the temperature tends to decrease.
- C. As the elevation decreases, the temperature tends to decrease.
- D. There is no association between the elevation and the temperature.

ID: 661dfddd Answer

Correct Answer:

B

Rationale

Choice B is correct. The association between the elevation and the temperature of locations in the Lake Tahoe Basin can be described by looking at the direction of the line of best fit. The line of best fit slopes downward, which corresponds to the temperature decreasing as the elevation increases.

Choices A and C are incorrect. Both of these choices would be represented by a line of best fit that slopes from the lower left to the upper right of the graph, which isn't what's shown on the graph. Choice D is incorrect. This choice would be represented by a line of best fit that is horizontal or has a slope very close to 0. This is not what's shown on the graph.

Question Difficulty:

Easy

Question ID 89f20d9e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 89f20d9e

The table summarizes the distribution of age and assigned group for 90 participants in a study.

	0–9 years	10–19 years	20+ years	Total
Group A	5	17	8	30
Group B	6	8	16	30
Group C	19	5	6	30
Total	30	30	30	90

One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least 10 years of age?

- A. $\frac{5}{18}$
- B. $\frac{5}{12}$
- C. $\frac{17}{30}$
- D. $\frac{5}{6}$

ID: 89f20d9e Answer

Correct Answer:

B

Rationale

Choice B is correct. Since the participant will be selected at random, the probability of selecting a participant from group A, given that the participant is at least 10 years of age, is equal to the number of participants from group A who are at least 10 years of age divided by the total number of participants who are at least 10 years of age. Based on the table, in group A, there are 17 participants who are 10–19 years of age and 8 participants who are 20+ years of age. Therefore, there are a total of 17 + 8, or 25, participants in group A who are at least 10 years of age. Based on the table, of the total number of participants, there are 30 participants who are 10–19 years of age and 30 participants who are 20+ years of age. Therefore, a total of 30 + 30, or 60, of the participants are at least 10 years of age. Thus, the probability of selecting a participant from group A, given that the participant is at least 10 years of age, is $\frac{25}{60}$, or $\frac{5}{12}$.

Choice A is incorrect. This is the number of participants from group A who are at least 10 years of age divided by the total number of participants, rather than divided by the number of participants who are at least 10 years of age.

Choice C is incorrect. This is the probability of randomly selecting a participant from group A, given that the participant is 10–19 years of age, rather than given that the participant is at least 10 years of age.

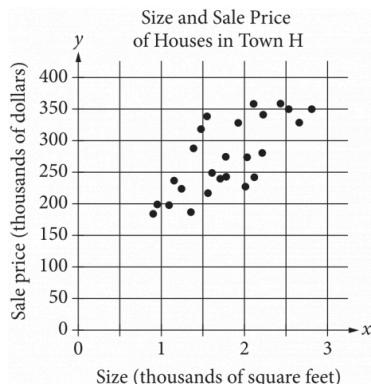
Choice D is incorrect. This is the probability of randomly selecting a participant who is at least 10 years of age, given that the participant is in group A.

Question Difficulty:
Hard

Question ID 79137c1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 79137c1b



The scatterplot above shows the size x and the sale price y of 25 houses for sale in Town H. Which of the following could be an equation for a line of best fit for the data?

- A. $y = 200x + 100$
- B. $y = 100x + 100$
- C. $y = 50x + 100$
- D. $y = 100x$

ID: 79137c1b Answer

Correct Answer:

B

Rationale

Choice B is correct. From the shape of the cluster of points, the line of best fit should pass roughly through the points $(1, 200)$ and $(2.5, 350)$. Therefore, these two points can be used to find an approximate equation for the line of best fit. The slope of this line of

best fit is therefore $\frac{y_2 - y_1}{x_2 - x_1} = \frac{350 - 200}{2.5 - 1}$, or 100. The equation for the line of best fit, in slope-intercept form, is $y = 100x + b$ for some value of b . Using the point $(1, 200)$, 1 can be substituted for x and 200 can be substituted for y : $200 = 100(1) + b$, or $b = 100$. Substituting this value into the slope-intercept form of the equation gives $y = 100x + 100$.

Choice A is incorrect. The line defined by $y = 200x + 100$ passes through the points $(1, 300)$ and $(2, 500)$, both of which are well above the cluster of points, so it cannot be a line of best fit. Choice C is incorrect. The line defined by $y = 50x + 100$ passes through the points $(1, 150)$ and $(2, 200)$, both of which lie at the bottom of the cluster of points, so it cannot be a line of best fit.

Choice D is incorrect and may result from correctly calculating the slope of a line of best fit but incorrectly assuming the y -intercept is at $(0, 0)$.

Question Difficulty:

Hard

Question ID 1dcea480

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 1dcea480

A bag contains a total of 60 marbles. A marble is to be chosen at random from the bag. If the probability that a blue marble will be chosen is 0.35, how many marbles in the bag are blue?

- A. 21
- B. 25
- C. 35
- D. 39

ID: 1dcea480 Answer

Rationale

Choice A is correct. Multiplying the number of marbles in the bag by the probability of selecting a blue marble gives the number of blue marbles in the bag. Since the bag contains a total of 60 marbles and the probability that a blue marble will be selected from the bag is 0.35, there are a total of $(0.35)(60) = 21$ blue marbles in the bag.

Choice B is incorrect and may result from subtracting 35 from 60. Choice C is incorrect. This would be the number of blue marbles in the bag if there were a total of 100 marbles, not 60 marbles. Choice D is incorrect. This is the number of marbles in the bag that aren't blue.

Question Difficulty:

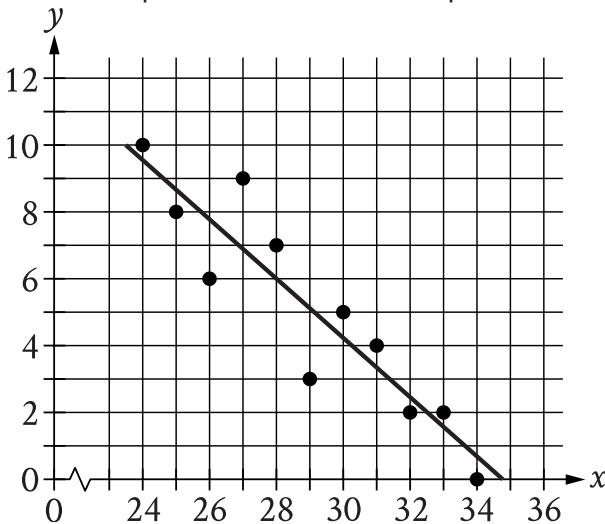
Easy

Question ID fdfc90e4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: fdfc90e4

The scatterplot shows the relationship between two variables, x and y . A line of best fit for the data is also shown.



At $x = 32$, which of the following is closest to the y -value predicted by the line of best fit?

- A. 0.4
- B. 1.5
- C. 2.4
- D. 3.3

ID: fdfc90e4 Answer

Correct Answer:

C

Rationale

Choice C is correct. At $x = 32$, the line of best fit has a y -value between 2 and 3. The only choice with a value between 2 and 3 is choice C.

Choice A is incorrect. This is the difference between the y -value predicted by the line of best fit and the actual y -value at $x = 32$ rather than the y -value predicted by the line of best fit at $x = 32$.

Choice B is incorrect. This is the y -value predicted by the line of best fit at $x = 31$ rather than at $x = 32$.

Choice D is incorrect. This is the y -value predicted by the line of best fit at $x = 33$ rather than at $x = 32$.

Question Difficulty:

Medium

Question ID 34e18ce4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 34e18ce4

There are **350** objects in a box. Of these objects, **4%** are balls. How many balls are in the box?

- A. **4**
- B. **14**
- C. **70**
- D. **346**

ID: 34e18ce4 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that 4% of the 350 objects in the box are balls. Therefore, the number of balls in the box can be found by calculating 4% of 350, which is equal to $350 \frac{4}{100}$, or 14.

Choice A is incorrect. This is the percentage of objects in the box that are balls, not the number of balls in the box.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 89f8d08a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 89f8d08a

A store manager reviewed the receipts from 80 customers who were selected at random from all the customers who made purchases last Thursday. Of those selected, 20 receipts showed that the customer had purchased fruit. If 1,500 customers made purchases last Thursday, which of the following is the most appropriate conclusion?

- A. Exactly 75 customers must have purchased fruit last Thursday.
- B. Exactly 375 customers must have purchased fruit last Thursday.
- C. The best estimate for the number of customers who purchased fruit last Thursday is 75.
- D. The best estimate for the number of customers who purchased fruit last Thursday is 375.

ID: 89f8d08a Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the manager took a random selection of the receipts of 80 customers from a total of 1,500. It's also given that of those 80 receipts, 20 showed that the customer had purchased fruit. This means that an appropriate estimate of

the fraction of customers who purchased fruit is $\frac{20}{80}$, or $\frac{1}{4}$. Multiplying this fraction by the total number of customers yields $\left(\frac{1}{4}\right)(1,500) = 375$. Therefore, the best estimate for the number of customers who purchased fruit is 375.

Choices A and B are incorrect because an exact number of customers can't be known from taking a random selection. Additionally, choice A may also be the result of a calculation error. Choice C is incorrect and may result from a calculation error.

Question Difficulty:

Medium

Question ID 54d93874

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 54d93874

	Masses (kilograms)					
Andrew	2.4	2.5	3.6	3.1	2.5	2.7
Maria	x	3.1	2.7	2.9	3.3	2.8

Andrew and Maria each collected six rocks, and the masses of the rocks are shown in the table above. The mean of the masses of the rocks Maria collected is 0.1 kilogram greater than the mean of the masses of the rocks Andrew collected. What is the value of x ?

ID: 54d93874 Answer

Rationale

The correct answer is 2.6. Since the mean of a set of numbers can be found by adding the numbers together and dividing by how many numbers there are in the set, the mean mass, in kilograms, of the rocks Andrew collected is

$$\frac{2.4 + 2.5 + 3.6 + 3.1 + 2.5 + 2.7}{6} = \frac{16.8}{6}$$

, or 2.8. Since the mean mass of the rocks Maria collected is 0.1 kilogram greater than the mean mass of rocks Andrew collected, the mean mass of the rocks Maria collected is $2.8 + 0.1 = 2.9$ kilograms. The

value of x can be found by writing an equation for finding the mean:

$$\frac{x + 3.1 + 2.7 + 2.9 + 3.3 + 2.8}{6} = 2.9$$

. Solving this equation gives $x = 2.6$. Note that 2.6 and 13/5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 6a305cd0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 6a305cd0

In a study, the data from a random sample of a population had a mean of 37, with an associated margin of error of 3. Which of the following is the most appropriate conclusion that can be made about the population mean?

- A. It is less than 37.
- B. It is greater than 37.
- C. It is between 34 and 40.
- D. It is less than 34 or greater than 40.

ID: 6a305cd0 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the mean of the data from a random sample of a population is 37, with an associated margin of error of 3. The most appropriate conclusion that can be made is that the mean of the entire population will fall between 37, plus or minus 3. Therefore, the population mean is between $37 - 3 = 34$ and $37 + 3 = 40$.

Choice A is incorrect. While it's an appropriate conclusion that the population mean is as low as $37 - 3$, or 34, it isn't appropriate to conclude that the population mean is less than 34. Choice B is incorrect. While it's an appropriate conclusion that the population mean is as high as $37 + 3$, or 40, it isn't appropriate to conclude that the population mean is greater than 40. Choice D is incorrect. It isn't an appropriate conclusion that the population mean is less than 34 or greater than 40.

Question Difficulty:

Easy

Question ID 048811bd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 048811bd

What is 10% of 370?

- A. 27
- B. 37
- C. 333
- D. 360

ID: 048811bd Answer

Correct Answer:

B

Rationale

Choice B is correct. 10% of a quantity means $\frac{10}{100}$ times the quantity. Therefore, 10% of 370 can be represented as $\frac{10}{100} \cdot 370$, which is equivalent to 0.10370, or 37. Therefore, 10% of 370 is 37.

Choice A is incorrect. This is 10% of 270, not 10% of 370.

Choice C is incorrect. This is 90% of 370, not 10% of 370.

Choice D is incorrect. This is 370 - 10, not 10% of 370.

Question Difficulty:

Easy

Question ID 869a32f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 869a32f1

The high temperature, in degrees Fahrenheit ($^{\circ}\text{F}$), in a certain city was recorded for each of 5 days. The data are shown below.

Day	1	2	3	4	5
High temperature ($^{\circ}\text{F}$)	81	80	81	81	82

Over this 5-day period, which of the following is NOT equal to 81°F ?

- A. Median of the high temperatures
- B. Mean of the high temperatures
- C. Mode of the high temperatures
- D. Range of the high temperatures

ID: 869a32f1 Answer

Correct Answer:

D

Rationale

Choice D is correct. The range of a data set is the difference between the maximum and the minimum values in the set. The maximum value among the high temperatures in the table is 82°F and the minimum value is 80°F . Therefore, the range is $82^{\circ}\text{F} - 80^{\circ}\text{F} = 2^{\circ}\text{F}$.

Choice A is incorrect. The median of a data set is the middle value when the values in the set are ordered from least to greatest. Ordering the high temperatures this way gives the list $80, 81, 81, 81, 82$. Therefore, the median high temperature is 81°F . Choice B

$$\frac{81+80+81+81+82}{5} = \frac{405}{5} = 81$$

is incorrect. The mean high temperature is $\frac{81+80+81+81+82}{5} = \frac{405}{5} = 81$. Choice C is incorrect. The mode is the value that occurs the greatest number of times. For the set of high temperatures shown, 81 is the value that occurs 3 times, and therefore, 81°F is the mode of the high temperatures.

Question Difficulty:

Easy

Question ID a3384df0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #005599; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: a3384df0

Penguin Exhibit			
Type of penguin	Male	Female	Total
Chinstrap	41	59	100
Emperor	8	27	35
Gentoo	49	54	103
Macaroni	42	40	82
Total	140	180	320

The number of penguins in a zoo exhibit, sorted by gender and type of penguin, is shown in the table above. Which type of penguin has a female population that is the $\frac{1}{3}$ closest to being $\frac{1}{3}$ of the total female penguin population in the exhibit?

- A. Chinstrap
- B. Emperor
- C. Gentoo
- D. Macaroni

ID: a3384df0 Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that there are 180 female penguins in the exhibit. Therefore, $\frac{1}{3}$ of the female penguins is $\frac{1}{3} \times 180 = 60$ penguins. According to the table, there are 59 female chinstrap penguins, 27 female emperor penguins, 54 female gentoo penguins, and 40 female macaroni penguins. So the female chinstrap penguin population is the closest to 60, or $\frac{1}{3}$ of the total female population in the exhibit.

Choices B, C, and D are incorrect and may result from reading data from the table incorrectly. Since the total female penguin population is 180, $\frac{1}{3}$ of the total female penguin population is 60. The numbers of female emperor (27), female gentoo (54), and female macaroni (40) penguins are not as close to 60 as the number of female chinstrap penguins (59).

Question Difficulty:

Medium

Question ID 6670e407

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 6670e407

Number of High School Students Who Completed Summer Internships

High school	Year				
	2008	2009	2010	2011	2012
Foothill	87	80	75	76	70
Valley	44	54	65	76	82
Total	131	134	140	152	152

The table above shows the number of students from two different high schools who completed summer internships in each of five years. No student attended both schools. Which of the following statements are true about the number of students who completed summer internships for the 5 years shown?

1. The mean number from Foothill High School is greater than the mean number from Valley High School.
2. The median number from Foothill High School is greater than the median number from Valley High School.

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: 6670e407 Answer

Correct Answer:

C

Rationale

Choice C is correct. The mean of a data set is found by dividing the sum of the values by the number of values. Therefore, the mean number of students who completed summer internships from Foothill High School is $\frac{87+80+75+76+70}{5} = \frac{388}{5} = 77.6$, or 77.6. Similarly, the mean number from Valley High School is $\frac{44+54+65+76+82}{5} = \frac{321}{5} = 64.2$. Thus, the mean number from Foothill High School is greater than the mean number from Valley High School. When a data set has an odd number of elements, the median can be found by ordering the values from least to greatest and determining the value in the middle. Since

there are five values in each data set, the third value in each ordered list is the median. Therefore, the median number from Foothill High School is 76 and the median number from Valley High School is 65. Thus, the median number from Foothill High School is greater than the median number from Valley High School.

Choices A, B, and D are incorrect and may result from various misconceptions or miscalculations.

Question Difficulty:

Easy

Question ID 808f7d6c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 808f7d6c

If $t = 4u$, which of the following is equivalent to $2t$?

- A. $8u$
- B. $2u$
- C. u
- D. $\frac{1}{2}u$

ID: 808f7d6c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that $t = 4u$. Multiplying both sides of this equation by 2 yields $2t = 2(4u)$, or $2t = 8u$.

Choice B is incorrect and may result from dividing, instead of multiplying, the right-hand side of the equation by 2. Choices C and D are incorrect and may result from calculation errors.

Question Difficulty:

Easy

Question ID af142f8d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 30%; background-color: #005a99; height: 10px;"></div> <div style="width: 35%; background-color: #005a99; height: 10px;"></div> <div style="width: 35%; background-color: #005a99; height: 10px;"></div>

ID: af142f8d

	Amount invested	Balance increase
Account A	\$500	6% annual interest
Account B	\$1,000	\$25 per year

Two investments were made as shown in the table above. The interest in Account A is compounded once per year. Which of the following is true about the investments?

- A. Account A always earns more money per year than Account B.
- B. Account A always earns less money per year than Account B.
- C. Account A earns more money per year than Account B at first but eventually earns less money per year.
- D. Account A earns less money per year than Account B at first but eventually earns more money per year.

ID: af142f8d Answer

Correct Answer:

A

Rationale

Choice A is correct. Account A starts with \$500 and earns interest at 6% per year, so in the first year Account A earns $(500)(0.06) = \$30$, which is greater than the \$25 that Account B earns that year. Compounding interest can be modeled by an increasing exponential function, so each year Account A will earn more money than it did the previous year. Therefore, each year Account A earns at least \$30 in interest. Since Account B always earns \$25 each year, Account A always earns more money per year than Account B.

Choices B and D are incorrect. Account A earns \$30 in the first year, which is greater than the \$25 Account B earns in the first year. Therefore, neither the statement that Account A always earns less money per year than Account B nor the statement that Account A earns less money than Account B at first can be true. Choice C is incorrect. Since compounding interest can be modeled by an increasing exponential function, each year Account A will earn more money than it did the previous year. Therefore, Account A always earns at least \$30 per year, which is more than the \$25 per year that Account B earns.

Question Difficulty:

Hard

Question ID 566759ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 566759ef

Thomas installed a new stove in his restaurant. At the time of installation, the stove had a value of \$800. Thomas estimates that each year the value of the stove will depreciate by 20% of the previous year's estimated value. What is the estimated value of the stove exactly 2 years after Thomas installed it?

- A. \$480
- B. \$512
- C. \$556
- D. \$640

ID: 566759ef Answer

Rationale

Choice B is correct. If the stove's value depreciates by 20% of the previous year's estimated value, then each year it retains $100\% - 20\% = 80\%$, or 0.80, of the previous year's estimated value. Since the stove's value was \$800 when Thomas installed it, the estimated value after two years would be $(0.80)(0.80)(\$800) = \512 .

Choice A is incorrect. This is the value of the stove if each year it had depreciated by 20% of the original value rather than by 20% of the previous year's estimated value. Choice C is incorrect and may be the result of a computational error. Choice D is incorrect. This is the estimated value of the stove 1 year after Thomas installed it, not 2 years.

Question Difficulty:

Medium

Question ID 6e4a60dd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e4a60dd

Rita's total bill at a restaurant was \$25.00, including tax. If she left a tip of 20% of the total bill, what was the amount of the tip?

- A. \$3.50
- B. \$4.00
- C. \$4.50
- D. \$5.00

ID: 6e4a60dd Answer

Correct Answer:

D

Rationale

Choice D is correct. The total bill was \$25.00. The percentage 20% is equivalent to the decimal 0.2. The tip is the product of the percentage and the total bill; therefore, $0.2 \times 25 = 5$, so the tip was \$5.00.

Choices A, B, and C are incorrect and may be the result of incorrectly converting the given percentage or a calculation error.

Question Difficulty:

Easy

Question ID 9ee22c16

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 9ee22c16

A random sample of 400 town voters were asked if they plan to vote for Candidate A or Candidate B for mayor. The results were sorted by gender and are shown in the table below.

	Plan to vote for Candidate A	Plan to vote for Candidate B
Female	202	20
Male	34	144

The town has a total of 6,000 voters. Based on the table, what is the best estimate of the number of voters who plan to vote for Candidate A?

ID: 9ee22c16 Answer

Rationale

The correct answer is 3,540. According to the table, of 400 voters randomly sampled, the total number of men and women who plan to vote for Candidate A is $202 + 34 = 236$. The best estimate of the total number of voters in the town who plan to vote for Candidate A is the fraction of voters in the sample who plan to vote for Candidate A, $\frac{236}{400}$, multiplied by the total voter population of 6000. Therefore, the answer is $\left(\frac{236}{400}\right)(6,000) = 3,540$.

Question Difficulty:

Medium

Question ID 41b71b4e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 41b71b4e

What number is 20% greater than 60?

- A. 50
- B. 72
- C. 75
- D. 132

ID: 41b71b4e Answer

Correct Answer:

B

Rationale

Choice B is correct. The decimal equivalent of 20% is 0.2. The number that is 20% greater than 60 is also 120% of 60. The decimal equivalent of 120% is 1.2, and $1.2(60) = 72$.

Alternate approach: 10% of 60 is 6, and 20% of 60 is double that amount, or 12. It follows that the number that is 20% greater than 60 is 12 more than 60, or $60 + 12 = 72$.

Choice A is incorrect and may result from dividing, instead of multiplying, 60 by 1.2. Choice C is incorrect because it's 25% greater than 60, rather than 20% greater than 60. Choice D is incorrect and may result from multiplying 60 by 2.2 instead of 1.2.

Question Difficulty:

Easy

Question ID 46b2e169

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 46b2e169

A box contains **13** red pens and **37** blue pens. If one of these pens is selected at random, what is the probability of selecting a red pen? (Express your answer as a decimal or fraction, not as a percent.)

ID: 46b2e169 Answer

Correct Answer:

.26, 13/50

Rationale

The correct answer is $\frac{13}{50}$. It's given that a box contains 13 red pens and 37 blue pens. If one of these pens is selected at random, the probability of selecting a red pen is the number of red pens in the box divided by the number of red and blue pens in the box. The number of red and blue pens in the box is $13 + 37$, or 50. Since there are 13 red pens in the box, it follows that the probability of selecting a red pen is $\frac{13}{50}$. Note that 13/50 and .26 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 8213b1b3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 8213b1b3

According to a set of standards, a certain type of substance can contain a maximum of **0.001%** phosphorus by mass. If a sample of this substance has a mass of **140** grams, what is the maximum mass, in grams, of phosphorus the sample can contain to meet these standards?

ID: 8213b1b3 Answer

Correct Answer:

.0014

Rationale

The correct answer is .0014 . It's given that a certain type of substance can contain a maximum of 0.001% phosphorus by mass to meet a set of standards. If a sample of the substance has a mass of 140 grams, it follows that the maximum mass, in grams, of phosphorus the sample can contain to meet the standards is 0.001% of 140, or $\frac{0.001}{100} \times 140$, which is equivalent to 0.00001140, or 0.0014. Note that .0014 and 0.001 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID f8696cd8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: f8696cd8

	Human Resources	Accounting
Bachelor's degree	4	3
Master's degree	2	6

The table above shows the number of people who work in the Human Resources and Accounting departments of a company and the highest level of education they have completed. A person from one of these departments is to be chosen at random. If the person chosen works in the Human Resources department, what is the probability that the highest level of education the person completed is a master's degree?

A. $\frac{2}{15}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{8}{15}$

ID: f8696cd8 Answer

Correct Answer:

B

Rationale

Choice B is correct. In total, there are 6 people in the Human Resources department. Of those 6, 2 have a master's degree as their highest level of education. Therefore, the probability of an employee selected at random from the Human Resources department

having a master's degree is $\frac{2}{6}$, which simplifies to $\frac{1}{3}$.

Choice A is incorrect; it is the probability that an employee selected at random from either department will be in the Human Resources department and have a master's degree. Choice C is incorrect; it is the probability that an employee with a master's degree selected at random will be in the Human Resources department. Choice D is incorrect; it is the probability that an employee selected at random from either department will have a master's degree.

Question Difficulty:

Medium

Question ID 34f8cd89

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 34f8cd89

37% of the items in a box are green. Of those, 37% are also rectangular. Of the green rectangular items, 42% are also metal. Which of the following is closest to the percentage of the items in the box that are not rectangular green metal items?

- A. 1.16%
- B. 57.50%
- C. 94.25%
- D. 98.84%

ID: 34f8cd89 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that 37% of the items in a box are green. Let x represent the total number of items in the box. It follows that $\frac{37}{100}x$, or $0.37x$, items in the box are green. It's also given that of those, 37% are also rectangular. Therefore, $\frac{37}{100}0.37x$, or $0.1369x$, items in the box are green rectangular items. It's also given that of the green rectangular items, 42% are also metal. Therefore, $\frac{42}{100}0.1369x$, or $0.057498x$, items in the box are rectangular green metal items. The number of the items in the box that are not rectangular green metal items is the total number of items in the box minus the number of rectangular green metal items in the box. Therefore, the number of items in the box that are not rectangular green metal items is $x - 0.057498x$, or $0.942502x$. The percentage of items in the box that are not rectangular green metal items is the percentage that $0.942502x$ is of x . If $p\%$ represents this percentage, the value of p is $100 \frac{0.942502x}{x}$, or 94.2502. Of the given choices, 94.25% is closest to the percentage of items in the box that are not rectangular green metal items.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6fca0144

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 6fca0144

For a baobab tree habitat in South Africa, a scientist randomly selected **50** baobab trees that were **17** years old and randomly assigned them to two groups. Each group was subjected to a different watering pattern for **2** consecutive years to observe whether the watering pattern affects the trees' growth rate. Based on the design of the study, what is the largest group to which these results can be applied?

- A. All the **50** baobab trees that were selected in this habitat
- B. All the baobab trees that were **19** years old in this habitat
- C. All the baobab trees that were **17** years old in South Africa
- D. All the baobab trees that were **17** years old in this habitat

ID: 6fca0144 Answer

Correct Answer:

D

Rationale

Choice D is correct. When a study uses a randomly selected sample, the largest group to which the results of the study can be applied is the population from which the sample was selected. It's given that the scientist randomly selected the trees from the baobab trees in a certain habitat that were 17 years old. Therefore, the largest group to which the results of this study can be applied is all the baobab trees that were 17 years old in this habitat.

Choice A is incorrect. Since the sample was randomly selected from a population, the results can be applied to a larger group than the sample.

Choice B is incorrect. The sample was selected from a population of baobab trees that were 17 years old, not 19 years old.

Choice C is incorrect. The sample was selected from a certain tree habitat in South Africa, not from all the baobab trees that were 17 years old in South Africa.

Question Difficulty:

Hard

Question ID 20b69297

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 20b69297

Anita created a batch of green paint by mixing 2 ounces of blue paint with 3 ounces of yellow paint. She must mix a second batch using the same ratio of blue and yellow paint as the first batch. If she uses 5 ounces of blue paint for the second batch, how much yellow paint should Anita use?

- A. Exactly 5 ounces
- B. 3 ounces more than the amount of yellow paint used in the first batch
- C. 1.5 times the amount of yellow paint used in the first batch
- D. 1.5 times the amount of blue paint used in the second batch

ID: 20b69297 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that Anita used a ratio of 2 ounces of blue paint to 3 ounces of yellow paint for the first batch. For any batch of paint that uses the same ratio, the amount of yellow paint used will be $\frac{3}{2}$, or 1.5, times the amount of blue paint used in the batch. Therefore, the amount of yellow paint Anita will use in the second batch will be 1.5 times the amount of blue paint used in the second batch.

Alternate approach: It's given that Anita used a ratio of 2 ounces of blue paint to 3 ounces of yellow paint for the first batch and that she will use 5 ounces of blue paint for the second batch. A proportion can be set up to solve for x , the amount of yellow paint she will use for the second batch: $\frac{2}{3} = \frac{5}{x}$. Multiplying both sides of this equation by 3 yields $2 = \frac{15}{x}$, and multiplying both sides of this equation by x yields $2x = 15$. Dividing both sides of this equation by 2 yields $x = 7.5$. Since Anita will use 7.5 ounces of yellow paint for the second batch, this is $\frac{7.5}{5} = 1.5$ times the amount of blue paint (5 ounces) used in the second batch.

Choices A, B, and C are incorrect and may result from incorrectly interpreting the ratio of blue paint to yellow paint used.

Question Difficulty:

Hard

Question ID 94237701

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%;"><div style="width: 100px; height: 10px; background-color: #005a9f;"></div><div style="width: 100px; height: 10px; background-color: #005a9f;"></div><div style="width: 100px; height: 10px; background-color: #005a9f;"></div></div>

ID: 94237701

For a certain computer game, individuals receive an integer score that ranges from 2 through 10. The table below shows the frequency distribution of the scores of the 9 players in group A and the 11 players in group B.

Score	Score Frequencies	
	Group A	Group B
2	1	0
3	1	0
4	2	0
5	1	4
6	3	2
7	0	0
8	0	2
9	1	1
10	0	2
Total	9	11

The median of the scores for group B is how much greater than the median of the scores for group A?

ID: 94237701 Answer

Rationale

The correct answer is 1. When there are an odd number of values in a data set, the median of the data set is the middle number when the data values are ordered from least to greatest. The scores for group A, ordered from least to greatest, are 2, 3, 4, 4, 5, 6, 6, and 9. The median of the scores for group A is therefore 5. The scores for group B, ordered from least to greatest, are 5, 5, 5, 5, 6, 6, 8, 8, 9, 10, and 10. The median of the scores for group B is therefore 6. The median score for group B is $6 - 5 = 1$ more than the median score for group A.

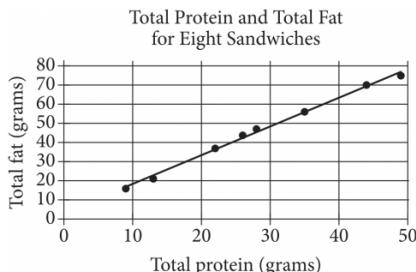
Question Difficulty:

Hard

Question ID 9d95e7ad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 9d95e7ad



The scatterplot above shows the numbers of grams of both total protein and total fat for eight sandwiches on a restaurant menu. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total fat, in grams, for every increase of 1 gram in total protein?

- A. 2.5
- B. 2.0
- C. 1.5
- D. 1.0

ID: 9d95e7ad Answer

Correct Answer:

C

Rationale

Choice C is correct. The predicted increase in total fat, in grams, for every increase of 1 gram in total protein is represented by the slope of the line of best fit. Any two points on the line can be used to calculate the slope of the line as the change in total fat over the change in total protein. For instance, it can be estimated that the points $(20, 34)$ and $(30, 48)$ are on the line of best fit, and the

slope of the line that passes through them is $\frac{48 - 34}{30 - 20} = \frac{14}{10}$, or 1.4. Of the choices given, 1.5 is the closest to the slope of the line of best fit.

Choices A, B, and D are incorrect and may be the result of incorrectly finding ordered pairs that lie on the line of best fit or of incorrectly calculating the slope.

Question Difficulty:

Hard

Question ID 11b06e35

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 11b06e35

The density of a certain solid substance is **813** kilograms per cubic meter. A sample of this substance is in the shape of a cube, where each edge has a length of **0.60** meters. To the nearest whole number, what is the mass, in kilograms, of this sample?

- A. **176**
- B. **488**
- C. **1,355**
- D. **3,764**

ID: 11b06e35 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the sample is in the shape of a cube with edge lengths of 0.60 meters. Therefore, the volume of the sample is 0.60^3 , or 0.216, cubic meters. It's also given that the sample has a density of 813 kilograms per 1 cubic meter. Therefore, the mass of this sample is $0.216 \text{ cubic meters} \times \frac{813 \text{ kilograms}}{1 \text{ cubic meter}}$, or 175.608 kilograms. Rounding this mass to the nearest whole number gives 176 kilograms. Therefore, to the nearest whole number, the mass, in kilograms, of this sample is 176.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID d6456c7a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: d6456c7a

A certain park has an area of **11,863,808** square yards. What is the area, in square miles, of this park? (**1 mile = 1,760 yards**)

- A. **1.96**
- B. **3.83**
- C. **3,444.39**
- D. **6,740.8**

ID: d6456c7a Answer

Correct Answer:

B

Rationale

Choice B is correct. Since 1 mile is equal to 1,760 yards, 1 square mile is equal to $1,760^2$, or 3,097,600, square yards. It's given that the park has an area of 11,863,808 square yards. Therefore, the park has an area of $\frac{11,863,808}{3,097,600}$ square yards $\frac{1 \text{ square mile}}{3,097,600 \text{ square yards}}$, or $\frac{11,863,808}{3,097,600}$ square miles. Thus, the area, in square miles, of the park is 3.83.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the square root of the area of the park in square yards, not the area of the park in square miles.

Choice D is incorrect and may result from converting 11,863,808 yards to miles, rather than converting 11,863,808 square yards to square miles.

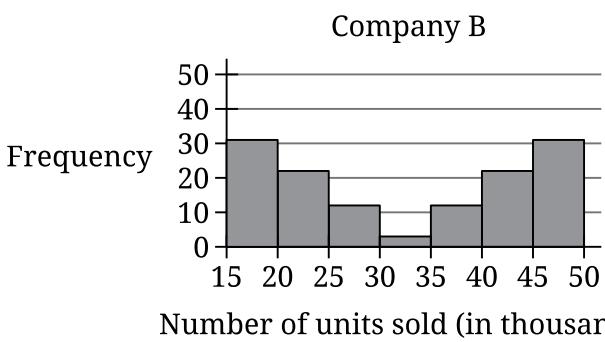
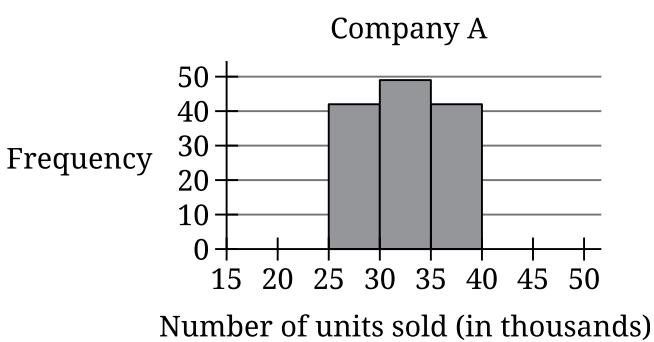
Question Difficulty:

Hard

Question ID 25fc031a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a7a; height: 10px;"></div> <div style="width: 25%; background-color: #005a7a; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 25fc031a



The histograms summarize the distributions of number of units sold, in thousands, for company A and company B. Which statement best compares the standard deviations of number of units sold for these companies?

- A. The standard deviation of number of units sold for company A is less than the standard deviation of number of units sold for company B.
- B. The standard deviation of number of units sold for company A is greater than the standard deviation of number of units sold for company B.
- C. The standard deviation of number of units sold for company A is equal to the standard deviation of number of units sold for company B.
- D. There is not enough information to compare the standard deviations.

ID: 25fc031a Answer

Correct Answer:

A

Rationale

Choice A is correct. Standard deviation measures the spread of a given data set from its mean. In a data set with a smaller standard deviation, there are more values close to the mean. In a data set with a greater standard deviation, there are more values farther from the mean. The two histograms shown have the same scale on the horizontal axis. Therefore, their standard deviations can be compared by visually comparing the spreads of their histograms. The distribution summarized by each histogram is

symmetric. Therefore, the mean of the data set for each histogram is a value in the middle bar of that histogram. The middle bar of each histogram has a value of at least 30 thousand units sold but less than 35 thousand units sold. Therefore, the mean of the data set for each histogram is at least 30 thousand and less than 35 thousand. The histogram for company A shows all the values in that data set are close to the mean. For company B, the histogram shows there are fewer values close to the mean and more values farther from the mean. Therefore, the standard deviation of number of units sold for company A is less than the standard deviation of number of units sold for company B.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

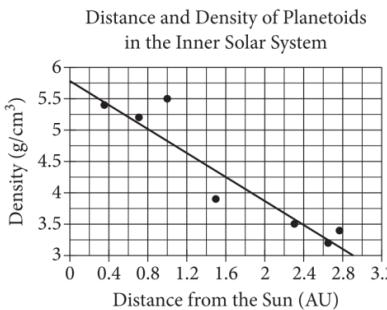
Question Difficulty:

Medium

Question ID cf0ae57a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: cf0ae57a



The scatterplot above shows the densities of 7 planetoids, in grams per cubic centimeter, with respect to their average distances from the Sun in astronomical units (AU). The line of best fit is also shown. An astronomer has discovered a new planetoid about 1.2 AU from the Sun. According to the line of best fit, which of the following best approximates the density of the planetoid, in grams per cubic centimeter?

- A. 3.6
- B. 4.1
- C. 4.6
- D. 5.5

ID: cf0ae57a Answer

Correct Answer:

C

Rationale

Choice C is correct. According to the line of best fit, a planetoid with a distance from the Sun of 1.2 AU has a predicted density between 4.5 g/cm^3 and 4.75 g/cm^3 . The only choice in this range is 4.6.

Choices A, B, and D are incorrect and may result from misreading the information in the scatterplot.

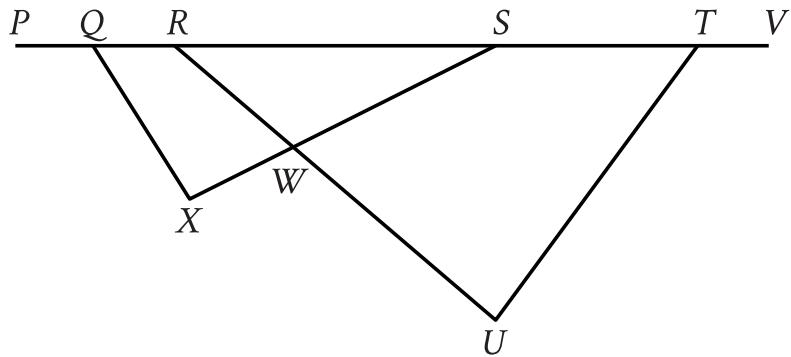
Question Difficulty:

Easy

Question ID e10d8313

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e10d8313



Note: Figure not drawn to scale.

In the figure shown, points Q , R , S , and T lie on line segment PV , and line segment RU intersects line segment SX at point W . The measure of $\angle SQX$ is 48° , the measure of $\angle SXQ$ is 86° , the measure of $\angle SWU$ is 85° , and the measure of $\angle VTU$ is 162° . What is the measure, in degrees, of $\angle TUR$?

ID: e10d8313 Answer

Correct Answer:

123

Rationale

The correct answer is 123. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180 degrees. It's given that the measure of $\angle SQX$ is 48° and the measure of $\angle SXQ$ is 86° . Since points S , Q , and X form a triangle, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle QSX$ is $180 - 48 - 86$, or 46 . It's also given that the measure of $\angle SWU$ is 85° . Since $\angle SWU$ and $\angle SWR$ are supplementary angles, the sum of their measures is 180 degrees. It follows that the measure, in degrees, of $\angle SWR$ is $180 - 85$, or 95 . Since points R , S , and W form a triangle, and $\angle RSW$ is the same angle as $\angle QSX$, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle WRS$ is $180 - 46 - 95$, or 39 . It's given that the measure of $\angle VTU$ is 162° . Since $\angle VTU$ and $\angle STU$ are supplementary angles, the sum of their measures is 180 degrees. It follows that the measure, in degrees, of $\angle STU$ is $180 - 162$, or 18 . Since points R , T , and U form a triangle, and $\angle URT$ is the same angle as $\angle WRS$, it follows from the triangle angle sum theorem that the measure, in degrees, of $\angle TUR$ is $180 - 39 - 18$, or 123 .

Question Difficulty:

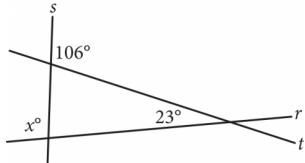
Hard

Question ID f88f27e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: f88f27e5

Intersecting lines r , s , and t are shown below.



What is the value of x ?

ID: f88f27e5 Answer

Rationale

The correct answer is 97. The intersecting lines form a triangle, and the angle with measure of x° is an exterior angle of this triangle. The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles of the triangle. One of these angles has measure of 23° and the other, which is supplementary to the angle with measure 106° , has measure of $180^\circ - 106^\circ = 74^\circ$. Therefore, the value of x is $23 + 74 = 97$.

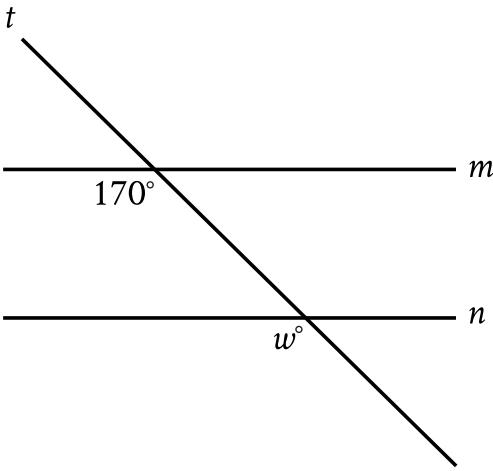
Question Difficulty:

Hard

Question ID 5207e508

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5207e508



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n . What is the value of w ?

- A. 17
- B. 30
- C. 70
- D. 170

ID: 5207e508 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that lines m and n are parallel. Since line t intersects both lines m and n , it's a transversal. The angles in the figure marked as 170° and w° are on the same side of the transversal, where one is an interior angle with line m as a side, and the other is an exterior angle with line n as a side. Thus, the marked angles are corresponding angles. When two parallel lines are intersected by a transversal, corresponding angles are congruent and, therefore, have equal measure. It follows that $w^\circ = 170^\circ$. Therefore, the value of w is 170.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f67e4efc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f67e4efc

A right circular cylinder has a volume of 45π . If the height of the cylinder is 5, what is the radius of the cylinder?

- A. 3
- B. 4.5
- C. 9
- D. 40

ID: f67e4efc Answer

Correct Answer:

A

Rationale

Choice A is correct. The volume of a right circular cylinder with a radius of r is the product of the area of the base, πr^2 , and the height, h . The volume of the right circular cylinder described is 45π and its height is 5. If the radius is r , it follows that $45\pi = \pi(r)^2(5)$. Dividing both sides of this equation by 5π yields $9 = r^2$. Taking the square root of both sides yields $r = 3$ or $r = -3$. Since r represents the radius, the value must be positive. Therefore, the radius is 3.

Choice B is incorrect and may result from finding that the square of the radius is 9, but then from dividing 9 by 2, rather than taking the square root of 9. Choice C is incorrect. This represents the square of the radius. Choice D is incorrect and may result from solving the equation $45\pi = \pi(r)^2(5)$ for r^2 , not r , by dividing by π on both sides and then by subtracting, not dividing, 5 from both sides.

Question Difficulty:

Medium

Question ID bb560789

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bb560789

Triangle R has an area of 80 square centimeters (cm^2). Square S has side lengths of 4 cm. What is the total area of triangle R and square S, in cm^2 ?

- A. 42
- B. 44
- C. 84
- D. 96

ID: bb560789 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that triangle R has an area of 80 cm^2 . The area of a square is l^2 , where l is the side length of the square. It's given that square S has side lengths of 4 cm. It follows that the area, in cm^2 , of square S is 4^2 , or 16. Therefore, the total area, in cm^2 , of triangle R and square S is $80 + 16$, or 96.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 5afbd8e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 5afbd8e

What is the length of one side of a square that has the same area as a circle with radius 2?

- A. 2
- B. $\sqrt{2\pi}$
- C. $2\sqrt{\pi}$
- D. 2π

ID: 5afbd8e Answer

Correct Answer:

C

Rationale

Choice C is correct. The area A of a circle with radius r is given by the formula $A = \pi r^2$. Thus, a circle with radius 2 has area $\pi(2^2)$, which can be rewritten as 4π . The area of a square with side length s is given by the formula $A = s^2$. Thus, if a square has the same area as a circle with radius 2, then $s^2 = 4\pi$. Since the side length of a square must be a positive number, taking the square root of both sides of $s^2 = 4\pi$ gives $s = \sqrt{4\pi}$. Using the properties of square roots, $\sqrt{4\pi}$ can be rewritten as $(\sqrt{4})(\sqrt{\pi})$, which is equivalent to $2\sqrt{\pi}$. Therefore, $s = 2\sqrt{\pi}$.

Choice A is incorrect. The side length of the square isn't equal to the radius of the circle. Choices B and D are incorrect and may result from incorrectly simplifying the expression $\sqrt{4\pi}$.

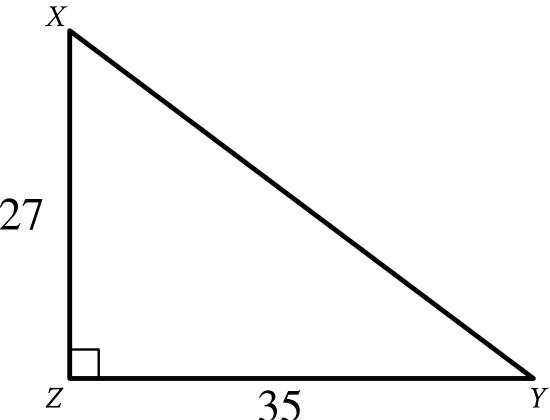
Question Difficulty:

Medium

Question ID 659cb706

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 659cb706



Note: Figure not drawn to scale.

Triangle XYZ shown is a right triangle. Which of the following has the same value as $\sin X$?

- A. $\tan X$
- B. $\tan Y$
- C. $\cos X$
- D. $\cos Y$

ID: 659cb706 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sine of an angle is equal to the cosine of its complementary angle. In the triangle shown, angle Z is a right angle; thus, angles X and Y are complementary angles. Therefore, $\cos Y$ has the same value as $\sin X$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

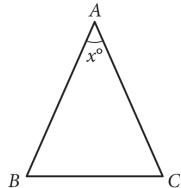
Question Difficulty:

Medium

Question ID c8d60e48

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c8d60e48



In the given triangle, $AB = AC$ and $\angle ABC$ has a measure of 67° . What is the value of x ?

- A. 36
- B. 46
- C. 58
- D. 70

ID: c8d60e48 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since $AB = AC$, the measures of their corresponding angles, $\angle ABC$ and $\angle ACB$, are equal. Since $\angle ABC$ has a measure of 67° , the measure of $\angle ACB$ is also 67° . Since the sum of the measures of the interior angles in a triangle is 180° , it follows that $67 + 67 + x = 180$, or $134 + x = 180$. Subtracting by 134 on both sides of this equation yields $x = 46$.

Choices A, C, and D are incorrect and may result from calculation errors.

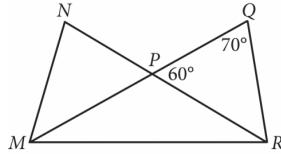
Question Difficulty:

Easy

Question ID 947a3cde

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 947a3cde



In the figure above, \overline{MQ} and \overline{NR} intersect at point P , $NP = QP$, and $MP = PR$. What is the measure, in degrees, of $\angle QMR$? (Disregard the degree symbol when gridding your answer.)

ID: 947a3cde Answer

Rationale

The correct answer is 30. It is given that the measure of $\angle QPR$ is 60° . Angle MPR and $\angle QPR$ are collinear and therefore are supplementary angles. This means that the sum of the two angle measures is 180° , and so the measure of $\angle MPR$ is 120° . The sum of the angles in a triangle is 180° . Subtracting the measure of $\angle MPR$ from 180° yields the sum of the other angles in the triangle MPR . Since $180 - 120 = 60$, the sum of the measures of $\angle QMR$ and $\angle NRM$ is 60° . It is given that $MP = PR$, so it follows that triangle MPR is isosceles. Therefore $\angle QMR$ and $\angle NRM$ must be congruent. Since the sum of the measure of these two angles is 60° , it follows that the measure of each angle is 30° .

An alternate approach would be to use the exterior angle theorem, noting that the measure of $\angle QPR$ is equal to the sum of the measures of $\angle QMR$ and $\angle NRM$. Since both angles are equal, each of them has a measure of 30° .

Question Difficulty:

Hard

Question ID deff8a2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: deff8a2f

The circumference of the base of a right circular cylinder is 20π meters, and the height of the cylinder is 6 meters. What is the volume, in cubic meters, of the cylinder?

- A. 60π
- B. 120π
- C. 600π
- D. $2,400\pi$

ID: deff8a2f Answer

Correct Answer:

C

Rationale

Choice C is correct. The volume, V , of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. It's given that a right circular cylinder has a height of 6 meters. Therefore, $h = 6$. It's also given that the right circular cylinder has a base with a circumference of 20π meters. The circumference, C , of a circle is given by $C = 2\pi r$, where r is the radius of the circle. Substituting 20π for C in the formula $C = 2\pi r$ yields $20\pi = 2\pi r$. Dividing each side of this equation by 2π yields $10 = r$. Substituting 10 for r and 6 for h in the formula $V = \pi r^2 h$ yields $V = \pi (10)^2 6$, or $V = 600\pi$. Therefore, the volume, in cubic meters, of the cylinder is 600π .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the lateral surface area, not the volume, of the cylinder.

Choice D is incorrect. This is the result of using the diameter, not the radius, for the value of r in the formula $V = \pi r^2 h$.

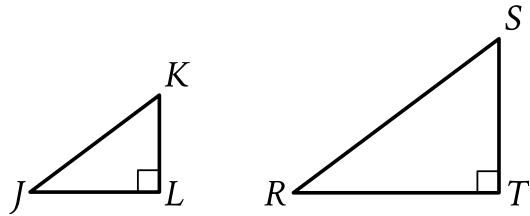
Question Difficulty:

Hard

Question ID babd7461

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: babd7461



Note: Figure not drawn to scale.

In the figure shown, triangle JKL is similar to triangle RST , where J corresponds to R and K corresponds to S . The length of \overline{JK} is 15, and the perimeter of triangle JKL is 36. The length of \overline{RS} is 135. What is the perimeter of triangle RST ?

- A. 324
- B. 540
- C. 2,916
- D. 8,100

ID: babd7461 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that triangle JKL is similar to triangle RST , where J corresponds to R and K corresponds to S . It follows that \overline{JK} corresponds to \overline{RS} . If two triangles are similar, then the scale factor between their perimeters is equal to the scale factor between the lengths of their corresponding sides. It's given that the length of \overline{JK} is 15 and the length of \overline{RS} is 135. Therefore, the scale factor from the length of \overline{JK} to the length of \overline{RS} is $\frac{135}{15}$, or 9. It's given that the perimeter of triangle JKL is 36. Let p represent the perimeter of triangle RST . It follows that $\frac{p}{36} = 9$. Multiplying each side of this equation by 36 yields $p = 324$. Therefore, the perimeter of triangle RST is 324.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

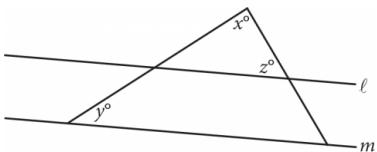
Question Difficulty:

Easy

Question ID a6dbad6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a6dbad6b



Note: Figure not drawn to scale.

In the figure above, lines ℓ and m are parallel, $y = 20$, and

$z = 60$. What is the value of x ?

- A. 120
- B. 100
- C. 90
- D. 80

ID: a6dbad6b Answer

Correct Answer:

B

Rationale

Choice B is correct. Let the measure of the third angle in the smaller triangle be a° . Since lines ℓ and m are parallel and cut by transversals, it follows that the corresponding angles formed are congruent. So $a^\circ = y^\circ = 20^\circ$. The sum of the measures of the interior angles of a triangle is 180° , which for the interior angles in the smaller triangle yields $a + x + z = 180$. Given that $z = 60$ and $a = 20$, it follows that $20 + x + 60 = 180$. Solving for x gives $x = 180 - 60 - 20$, or $x = 100$.

Choice A is incorrect and may result from incorrectly assuming that angles $x + z = 180$. Choice C is incorrect and may result from incorrectly assuming that the smaller triangle is a right triangle, with x as the right angle. Choice D is incorrect and may result from a misunderstanding of the exterior angle theorem and incorrectly assuming that $x = y + z$.

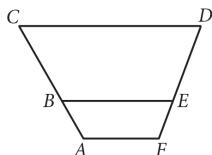
Question Difficulty:

Easy

Question ID 81b664bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 81b664bc



In the figure above, \overline{AF} , \overline{BE} , and \overline{CD} are parallel. Points B and E lie on \overline{AC} and \overline{FD} , respectively. If $AB = 9$, $BC = 18.5$, and $FE = 8.5$, what is the length of \overline{ED} , to the nearest tenth?

- A. 16.8
- B. 17.5
- C. 18.4
- D. 19.6

ID: 81b664bc Answer

Correct Answer:

B

Rationale

Choice B is correct. Since \overline{AF} , \overline{BE} , and \overline{CD} are parallel, quadrilaterals $AFEB$ and $BEDC$ are similar. Let x represent the length of \overline{ED} . With similar figures, the ratios of the lengths of corresponding sides are equal. It follows that $\frac{9}{18.5} = \frac{8.5}{x}$. Multiplying both sides of this equation by 18.5 and by x yields $9x = (18.5)(8.5)$, or $9x = 157.25$. Dividing both sides of this equation by 9 yields $x = 17.47$, which to the nearest tenth is 17.5.

Choices A, C, and D are incorrect and may result from errors made when setting up the proportion.

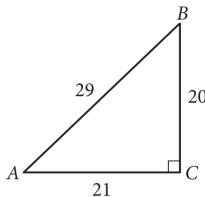
Question Difficulty:

Medium

Question ID 902dc959

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 902dc959



In the figure above, what is the value of $\tan(A)$?

A. $\frac{20}{29}$

B. $\frac{21}{29}$

C. $\frac{20}{21}$

D. $\frac{21}{20}$

ID: 902dc959 Answer

Correct Answer:

C

Rationale

Choice C is correct. Angle A is an acute angle in a right triangle, so the value of $\tan(A)$ is equivalent to the ratio of the length of the side opposite angle A, 20, to the length of the nonhypotenuse side adjacent to angle A, 21. Therefore, $\tan(A) = \frac{20}{21}$.

Choice A is incorrect. This is the value of $\sin(A)$. Choice B is incorrect. This is the value of $\cos(A)$. Choice D is incorrect. This is the value of $\tan(B)$.

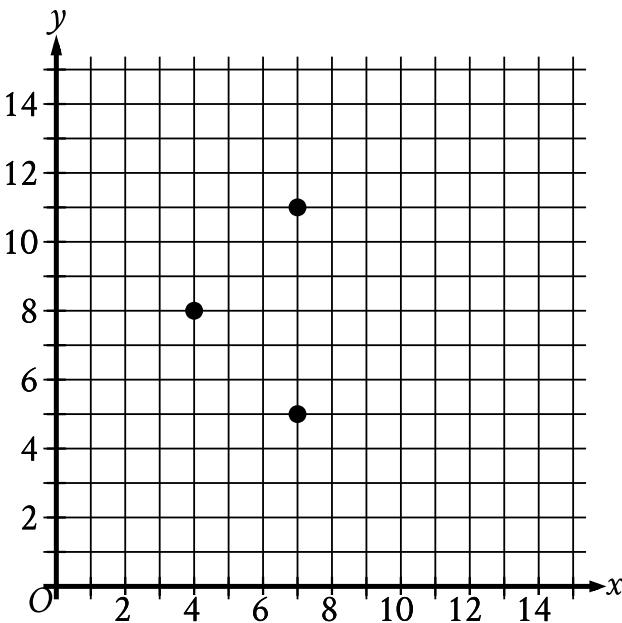
Question Difficulty:

Medium

Question ID 096c7ef5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 096c7ef5



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k ?

- A. 3
- B. 6
- C. 7
- D. 9

ID: 096c7ef5 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(7, 8)$ is halfway between the points $(7, 5)$ and $(7, 11)$ and is a distance of 3 units from each of those two points. The point $(7, 8)$ is also a distance of 3 units from $(4, 8)$. Because the point $(7, 8)$ is the same distance from all three given points, it must be the center of the circle. The radius of a circle is the distance from the center to any point on the circle. Since that distance is 3, it follows that the radius of the circle is 3. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the circle is $2(\pi)(3)$, or 6π . It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 6.

Choice A is incorrect. This is the radius of the circle, not the value of k in the expression $k\pi$.

Choice C is incorrect. This is the x -coordinate of the center of the circle, not the value of k in the expression $k\pi$.

Choice D is incorrect. This is the value of k for which $k\pi$ represents the area of the circle, in square units, not the circumference of the circle, in units.

Question Difficulty:

Medium

Question ID ec5d4823

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ec5d4823

What is the volume, in cubic centimeters, of a right rectangular prism that has a length of 4 centimeters, a width of 9 centimeters, and a height of 10 centimeters?

ID: ec5d4823 Answer

Rationale

The correct answer is 360. The volume of a right rectangular prism is calculated by multiplying its dimensions: length, width, and height. Multiplying the values given for these dimensions yields a volume of $(4)(9)(10) = 360$ cubic centimeters.

Question Difficulty:

Medium

Question ID 2b41a4c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2b41a4c4

A right rectangular prism has a length of **11** meters, a width of **8** meters, and a height of **10** meters. What is the volume, in cubic meters, of the prism?

ID: 2b41a4c4 Answer

Correct Answer:

880

Rationale

The correct answer is 880. The volume, V , of a right rectangular prism is given by the formula $V = lwh$, where l is the length, w is the width, and h is the height of the prism. It's given that a right rectangular prism has a length of 11 meters, a width of 8 meters, and a height of 10 meters. Substituting 11 for l , 8 for w , and 10 for h in the formula $V = lwh$ yields $V = (11)(8)(10)$, or $V = 880$. Therefore, the volume, in cubic meters, of the prism is 880.

Question Difficulty:

Easy

Question ID cbe8ca31

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: cbe8ca31

In $\triangle XYZ$, the measure of $\angle X$ is 24° and the measure of $\angle Y$ is 98° . What is the measure of $\angle Z$?

- A. 58°
- B. 74°
- C. 122°
- D. 212°

ID: cbe8ca31 Answer

Correct Answer:

A

Rationale

Choice A is correct. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180° . It's given that in $\triangle XYZ$, the measure of $\angle X$ is 24° and the measure of $\angle Y$ is 98° . It follows that the measure of $\angle Z$ is $180 - 24 - 98^\circ$, or 58° .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the sum of the measures of $\angle X$ and $\angle Y$, not the measure of $\angle Z$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 94364a79

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 94364a79

Two nearby trees are perpendicular to the ground, which is flat. One of these trees is 10 feet tall and has a shadow that is 5 feet long. At the same time, the shadow of the other tree is 2 feet long. How tall, in feet, is the other tree?

- A. 3
- B. 4
- C. 8
- D. 27

ID: 94364a79 Answer

Correct Answer:

B

Rationale

Choice B is correct. Each tree and its shadow can be modeled using a right triangle, where the height of the tree and the length of its shadow are the legs of the triangle. At a given point in time, the right triangles formed by two nearby trees and their respective shadows will be similar. Therefore, if the height of the other tree is x , in feet, the value of x can be calculated by solving the proportional relationship $\frac{10 \text{ feet tall}}{5 \text{ feet long}} = \frac{x \text{ feet tall}}{2 \text{ feet long}}$. This equation is equivalent to $\frac{10}{5} = \frac{x}{2}$, or $2 = \frac{x}{2}$. Multiplying each side of the equation $2 = \frac{x}{2}$ by 2 yields $4 = x$. Therefore, the other tree is 4 feet tall.

Choice A is incorrect and may result from calculating the difference between the lengths of the shadows, rather than the height of the other tree.

Choice C is incorrect and may result from calculating the difference between the height of the 10-foot-tall tree and the length of the shadow of the other tree, rather than calculating the height of the other tree.

Choice D is incorrect and may result from a conceptual or calculation error.

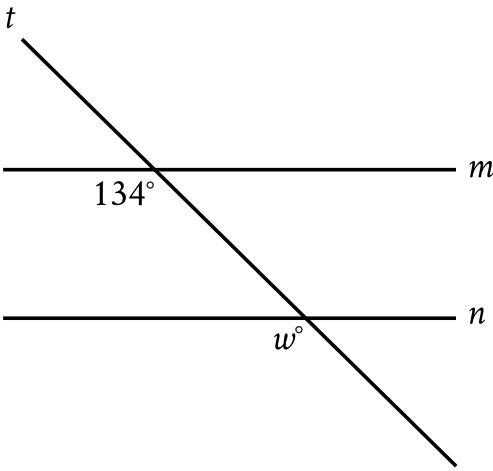
Question Difficulty:

Medium

Question ID c24e1bda

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c24e1bda



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n . What is the value of w ?

- A. 13
- B. 34
- C. 66
- D. 134

ID: c24e1bda Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that lines m and n are parallel. Since line t intersects both lines m and n , it's a transversal. The angles in the figure marked as 134° and w° are on the same side of the transversal, where one is an interior angle with line m as a side, and the other is an exterior angle with line n as a side. Thus, the marked angles are corresponding angles. When two parallel lines are intersected by a transversal, corresponding angles are congruent and, therefore, have equal measure. It follows that $w^\circ = 134^\circ$. Therefore, the value of w is 134.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

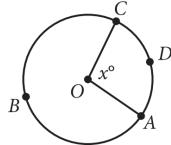
Question Difficulty:

Easy

Question ID c8345903

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c8345903



The circle above has center O , the length of arc $\overset{\frown}{ADC}$ is 5π , and

$x = 100$. What is the length of arc $\overset{\frown}{ABC}$?

- A. 9π
- B. 13π
- C. 18π
- D. $\frac{13}{2}\pi$

ID: c8345903 Answer

Correct Answer:

B

Rationale

Choice B is correct. The ratio of the lengths of two arcs of a circle is equal to the ratio of the measures of the central angles that subtend the arcs. It's given that arc $\overset{\frown}{ADC}$ is subtended by a central angle with measure 100° . Since the sum of the measures of the angles about a point is 360° , it follows that arc $\overset{\frown}{ABC}$ is subtended by a central angle with measure $360^\circ - 100^\circ = 260^\circ$. If s

is the length of arc $\overset{\frown}{ABC}$, then s must satisfy the ratio $\frac{s}{5\pi} = \frac{260}{100}$. Reducing the fraction $\frac{260}{100}$ to its simplest form gives $\frac{13}{5}$.

Therefore, $\frac{s}{5\pi} = \frac{13}{5}$. Multiplying both sides of $\frac{s}{5\pi} = \frac{13}{5}$ by 5π yields $s = 13\pi$.

Choice A is incorrect. This is the length of an arc consisting of exactly half of the circle, but arc $\overset{\frown}{ABC}$ is greater than half of the circle. Choice C is incorrect. This is the total circumference of the circle. Choice D is incorrect. This is half the length of arc $\overset{\frown}{ABC}$, not its full length.

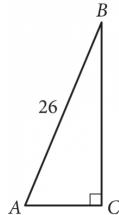
Question Difficulty:

Hard

Question ID bd87bc09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bd87bc09



Triangle ABC above is a right triangle, and $\sin(B) = \frac{5}{13}$.

What is the length of side \overline{BC} ?

ID: bd87bc09 Answer

Rationale

The correct answer is 24. The sine of an acute angle in a right triangle is equal to the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the sine of angle B, or $\sin(B)$, is equal to the ratio of the length of side

\overline{AC} to the length of side \overline{AB} . It's given that the length of side \overline{AB} is 26 and that $\sin(B) = \frac{5}{13}$. Therefore, $\frac{5}{13} = \frac{AC}{26}$.

Multiplying both sides of this equation by 26 yields $AC = 10$.

By the Pythagorean Theorem, the relationship between the lengths of the sides of triangle ABC is as follows: $26^2 = 10^2 + BC^2$, or $676 = 100 + BC^2$. Subtracting 100 from both sides of $676 = 100 + BC^2$ yields $576 = BC^2$. Taking the square root of both sides of $576 = BC^2$ yields $24 = BC$.

Question Difficulty:

Hard

Question ID f7dbde16

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f7dbde16

In triangles LMN and RST , angles L and R each have measure 60° , $LN = 10$, and $RT = 30$. Which additional piece of information is sufficient to prove that triangle LMN is similar to triangle RST ?

- A. $MN = 7$ and $ST = 7$
- B. $MN = 7$ and $ST = 21$
- C. The measures of angles M and S are 70° and 60° , respectively.
- D. The measures of angles M and T are 70° and 50° , respectively.

ID: f7dbde16 Answer

Correct Answer:

D

Rationale

Choice D is correct. Two triangles are similar if they have three pairs of congruent corresponding angles. It's given that angles L and R each measure 60° , and so these corresponding angles are congruent. If angle M is 70° , then angle N must be 50° so that the sum of the angles in triangle LMN is 180° . If angle T is 50° , then angle S must be 70° so that the sum of the angles in triangle RST is 180° . Therefore, if the measures of angles M and T are 70° and 50° , respectively, then corresponding angles M and S are both 70° , and corresponding angles N and T are both 50° . It follows that triangles LMN and RST have three pairs of congruent corresponding angles, and so the triangles are similar. Therefore, the additional piece of information that is sufficient to prove that triangle LMN is similar to triangle RST is that the measures of angles M and T are 70° and 50° , respectively.

Choice A is incorrect. If the measures of two sides in one triangle are proportional to the corresponding sides in another triangle and the included angles are congruent, then the triangles are similar. However, the two sides given are not proportional and the angle given is not included by the given sides.

Choice B is incorrect. If the measures of two sides in one triangle are proportional to the corresponding sides in another triangle and the included angles are congruent, then the triangles are similar. However, the angle given is not included between the proportional sides.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 58c26db8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58c26db8

The perimeter of an isosceles right triangle is $18 + 18\sqrt{2}$ inches. What is the length, in inches, of the hypotenuse of this triangle?

- A. 9
- B. $9\sqrt{2}$
- C. 18
- D. $18\sqrt{2}$

ID: 58c26db8 Answer

Correct Answer:

C

Rationale

Choice C is correct. The perimeter of a triangle is the sum of the lengths of its sides. Since the given triangle is an isosceles right triangle, the length of each leg is the same and the length of the hypotenuse is equal to $\sqrt{2}$ times the length of a leg. Let x represent the length, in inches, of a leg of this isosceles right triangle. Therefore, the perimeter, in inches, of the triangle is $x + x + x\sqrt{2}$, or $2x + x\sqrt{2}$, which is equivalent to $x(2 + \sqrt{2})$. It's given that the perimeter of this triangle is $18 + 18\sqrt{2}$ inches. Thus, $x + \sqrt{2} = 18 + 18\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $x = \frac{18 + 18\sqrt{2}}{2 + \sqrt{2}}$. Multiplying the right-hand side of this equation by $\frac{2 - \sqrt{2}}{2 - \sqrt{2}}$ yields $x = \frac{36 + 36\sqrt{2} - 18\sqrt{2} - 36}{2}$, or $x = 9\sqrt{2}$. It follows that the length, in inches, of a leg of this isosceles right triangle is $9\sqrt{2}$. Therefore, the length, in inches, of the hypotenuse of this isosceles right triangle is $9\sqrt{2}\sqrt{2}$, or 18.

Choice A is incorrect. If this were the length of the hypotenuse, the perimeter would be $9 + 9\sqrt{2}$ inches.

Choice B is incorrect. This is the length, in inches, of a leg of this triangle, not the hypotenuse.

Choice D is incorrect. If this were the length of the hypotenuse, the perimeter would be $36 + 18\sqrt{2}$ inches.

Question Difficulty:

Hard

Question ID e336a1d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: e336a1d2

A cube has an edge length of 41 inches. What is the volume, in cubic inches, of the cube?

- A. 164
- B. 1,681
- C. 10,086
- D. 68,921

ID: e336a1d2 Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a cube can be found using the formula $V = s^3$, where s is the edge length of the cube. It's given that a cube has an edge length of 41 inches. Substituting 41 inches for s in this equation yields $V = 41^3$ cubic inches, or $V = 68,921$ cubic inches. Therefore, the volume of the cube is 68,921 cubic inches.

Choice A is incorrect. This is the perimeter, in inches, of the cube.

Choice B is incorrect. This is the area, in square inches, of a face of the cube.

Choice C is incorrect. This is the surface area, in square inches, of the cube.

Question Difficulty:

Medium

Question ID c0586eb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c0586eb5

A cylinder has a diameter of **8** inches and a height of **12** inches. What is the volume, in cubic inches, of the cylinder?

- A. 16π
- B. 96π
- C. 192π
- D. 768π

ID: c0586eb5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The base of a cylinder is a circle with a diameter equal to the diameter of the cylinder. The volume, V , of a cylinder can be found by multiplying the area of the circular base, A , by the height of the cylinder, h , or $V = Ah$. The area of a circle can be found using the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the diameter of the cylinder is 8 inches. Thus, the radius of this circle is 4 inches. Therefore, the area of the circular base of the cylinder is $A = \pi 4^2$, or 16π square inches. It's given that the height h of the cylinder is 12 inches. Substituting 16π for A and 12 for h in the formula $V = Ah$ gives $V = 16\pi 12$, or 192π cubic inches.

Choice A is incorrect. This is the area of the circular base of the cylinder.

Choice B is incorrect and may result from using 8, instead of 16, as the value of r^2 in the formula for the area of a circle.

Choice D is incorrect and may result from using 8, instead of 4, for the radius of the circular base.

Question Difficulty:

Medium

Question ID 03c6994f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 03c6994f

Square A has side lengths that are **246** times the side lengths of square B. The area of square A is k times the area of square B. What is the value of k ?

- A. **60,516**
- B. **492**
- C. **246**
- D. **123**

ID: 03c6994f Answer

Correct Answer:

A

Rationale

Choice A is correct. The area of a square is s^2 , where s is the side length of the square. Therefore, the area of square B is b^2 , where b is the side length of square B. It's given that square A has side lengths that are 246 times the side lengths of square B. Therefore, the side length of square A can be represented by the expression $246b$. It follows that the area of square A is $(246b)^2$, or $60,516b^2$. It's given that the area of square A is k times the area of square B, so $60,516b^2 = kb^2$. Therefore, the value of k is 60,516.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 151eda3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 151eda3c

A manufacturing company produces two sizes of cylindrical containers that each have a height of 50 centimeters. The radius of container A is 16 centimeters, and the radius of container B is 25% longer than the radius of container A. What is the volume, in cubic centimeters, of container B?

- A. $16,000\pi$
- B. $20,000\pi$
- C. $25,000\pi$
- D. $31,250\pi$

ID: 151eda3c Answer

Correct Answer:

B

Rationale

Choice B is correct. If the radius of container A is 16 centimeters and the radius of container B is 25% longer than the radius of container A, then the radius of container B is $16 + (0.25)(16) = 20$ centimeters. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the cylinder and h is its height. Substituting $r = 20$ and $h = 50$ into $\pi r^2 h$ yields that the volume of cylinder B is $\pi(20)^2(50) = 20,000\pi$ cubic centimeters.

Choice A is incorrect and may result from multiplying the radius of cylinder B by the radius of cylinder A rather than squaring the radius of cylinder B. Choice C is incorrect and may result from multiplying the radius of cylinder B by 25 rather than squaring it. Choice D is incorrect and may result from taking the radius of cylinder B to be 25 centimeters rather than 20 centimeters.

Question Difficulty:

Medium

Question ID 35d37640

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 35d37640

Point F lies on a unit circle in the xy -plane and has coordinates $(1, 0)$. Point G is the center of the circle and has coordinates $(0, 0)$. Point H also lies on the circle and has coordinates $(-1, y)$, where y is a constant. Which of the following could be the positive measure of angle FGH , in radians?

- A. $\frac{27\pi}{2}$
- B. $\frac{29\pi}{2}$
- C. 24π
- D. 25π

ID: 35d37640 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the circle is a unit circle, which means the circle has a radius of 1. It's also given that point G is the center of the circle and has coordinates $(0, 0)$ and that point H lies on the circle and has coordinates $(-1, y)$. Since the radius of the circle is 1, the value of y must be 0, as all other points with an x -coordinate of -1 are a distance greater than 1 away from point G . Since F and H are points on the unit circle centered at G , let side FG be the starting side of the angle and side GH be the terminal side of the angle. Since side FG is on the positive x -axis and side GH is on the negative x -axis, side FG is half of a rotation around the unit circle, or π radians, away from side GH . Therefore, the positive measure of angle FGH , in radians, is equal to π plus an integer multiple of 2π . In other words, the positive measure of angle FGH , in radians, is an odd integer multiple of π . Of the given choices, only 25π is an odd integer multiple of π .

Choice A is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(0, -1)$, not $(-1, 0)$.

Choice B is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(0, 1)$, not $(-1, 0)$.

Choice C is incorrect. This could be the positive measure of an angle where the starting side is FG and the terminal side contains the point $(1, 0)$, not $(-1, 0)$.

Question Difficulty:

Hard

Question ID 2266984b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2266984b

$$x^2 + 20x + y^2 + 16y = -20$$

The equation above defines a circle in the xy -plane. What are the coordinates of the center of the circle?

- A. $(-20, -16)$
- B. $(-10, -8)$
- C. $(10, 8)$
- D. $(20, 16)$

ID: 2266984b Answer

Correct Answer:

B

Rationale

Choice B is correct. The standard equation of a circle in the xy -plane is of the form $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) are the coordinates of the center of the circle and r is the radius. The given equation can be rewritten in standard form by completing the squares. So the sum of the first two terms, $x^2 + 20x$, needs a 100 to complete the square, and the sum of the second two terms, $y^2 + 16y$, needs a 64 to complete the square. Adding 100 and 64 to both sides of the given equation yields $(x^2 + 20x + 100) + (y^2 + 16y + 64) = -20 + 100 + 64$, which is equivalent to $(x + 10)^2 + (y + 8)^2 = 144$. Therefore, the coordinates of the center of the circle are $(-10, -8)$.

Choices A, C, and D are incorrect and may result from computational errors made when attempting to complete the squares or when identifying the coordinates of the center.

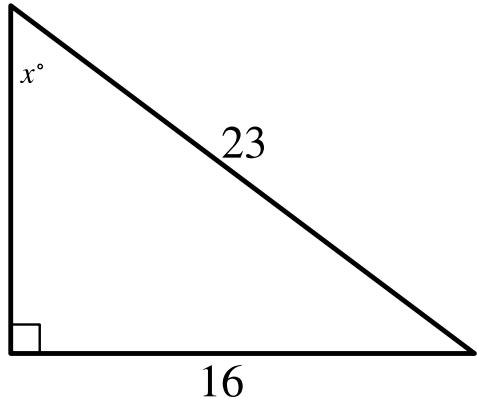
Question Difficulty:

Hard

Question ID 1429dcdf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1429dcdf



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\sin x^\circ$?

ID: 1429dcdf Answer

Correct Answer:

.6956, .6957, 16/23

Rationale

The correct answer is $\frac{16}{23}$. In a right triangle, the sine of an acute angle is defined as the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the length of the side opposite the angle with measure x° is 16 units and the length of the hypotenuse is 23 units. Therefore, the value of $\sin x^\circ$ is $\frac{16}{23}$. Note that 16/23, .6956, .6957, 0.695, and 0.696 are examples of ways to enter a correct answer.

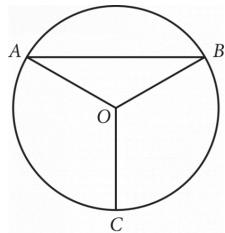
Question Difficulty:

Hard

Question ID 69b0d79d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 69b0d79d



Point O is the center of the circle above, and the measure of $\angle OAB$ is 30° . If the

length of \overline{OC} is 18, what is the length of arc $\overset{\frown}{AB}$?

- A. 9π
- B. 12π
- C. 15π
- D. 18π

ID: 69b0d79d Answer

Correct Answer:

B

Rationale

Choice B is correct. Because segments OA and OB are radii of the circle centered at point O, these segments have equal lengths. Therefore, triangle AOB is an isosceles triangle, where angles OAB and OBA are congruent base angles of the triangle. It's given that angle OAB measures 30° . Therefore, angle OBA also measures 30° . Let x° represent the measure of angle AOB. Since the sum of the measures of the three angles of any triangle is 180° , it follows that $30^\circ + 30^\circ + x^\circ = 180^\circ$, or $60^\circ + x^\circ = 180^\circ$.

Subtracting 60° from both sides of this equation yields $x^\circ = 120^\circ$, or $\frac{2\pi}{3}$ radians. Therefore, the measure of angle AOB, and

thus the measure of arc $\overset{\frown}{AB}$, is $\frac{2\pi}{3}$ radians. Since \overline{OC} is a radius of the given circle and its length is 18, the length of the radius of the circle is 18. Therefore, the length of arc $\overset{\frown}{AB}$ can be calculated as $\left(\frac{2\pi}{3}\right)(18)$, or 12π .

Choices A, C, and D are incorrect and may result from conceptual or computational errors.

Question Difficulty:

Hard

Question ID 5a7e3b46

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5a7e3b46

In $\triangle ABC$, $\angle B$ is a right angle and the length of \overline{BC} is 136 millimeters. If $\cos A = \frac{3}{5}$, what is the length, in millimeters, of \overline{AB} ?

- A. 34
- B. 102
- C. 136
- D. 170

ID: 5a7e3b46 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that in $\triangle ABC$, $\angle B$ is a right angle. Therefore, $\triangle ABC$ is a right triangle, and \overline{AC} is the hypotenuse of the triangle. It's also given that $\cos A = \frac{3}{5}$. Since the cosine of an acute angle in a right triangle is defined as the ratio of the length of the side adjacent to the angle to the length of the hypotenuse, the ratio of the length of \overline{AB} to the length of \overline{AC} is 3 to 5. It follows that the length of \overline{AB} can be represented as $3a$ and the length of \overline{AC} can be represented as $5a$, where a is a constant. The Pythagorean theorem states that the sum of the squares of the length of the legs of a right triangle is equal to the square of the length of its hypotenuse, so it follows that $AB^2 + BC^2 = AC^2$. Substituting $3a$ for AB and $5a$ for AC in this equation yields $3a^2 + BC^2 = 5a^2$, or $9a^2 + BC^2 = 25a^2$. Subtracting $9a^2$ from both sides of this equation yields $BC^2 = 16a^2$, or $BC = 4a$. It follows that the ratio of the length of \overline{AB} to the length of \overline{BC} is 3 to 4. Let x represent the length, in millimeters, of \overline{AB} . It's given that the length of \overline{BC} is 136 millimeters. Since the ratio of the length of \overline{AB} to the length of \overline{BC} is 3 to 4, $\frac{x}{136} = \frac{3}{4}$. Multiplying both sides of this equation by 136 yields $x = \frac{3(136)}{4}$, or $x = 102$. Therefore, the length of \overline{AB} is 102 millimeters.

Choice A is incorrect. This is the scale factor by which the 3 to 4 to 5 ratio is multiplied that results in the side lengths of $\triangle ABC$.

Choice C is incorrect. This is the length of \overline{BC} , not the length of \overline{AB} .

Choice D is incorrect. This is the length of \overline{AC} , not the length of \overline{AB} .

Question Difficulty:

Medium

Question ID a2659088

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a2659088

A right circular cylinder has a height of **8 meters (m)** and a base with a radius of **12 m**. What is the volume, **in m^3** , of the cylinder?

- A. 8π
- B. 20π
- C. 768π
- D. $1,152\pi$

ID: a2659088 Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a right circular cylinder is given by $V = \pi r^2 h$, where r is the radius of the circular base and h is the height of the cylinder. It's given that the cylinder has a height of 8 meters and a base with a radius of 12 meters. Substituting 12 for r and 8 for h in $V = \pi r^2 h$ yields $V = \pi (12)^2 8$, or $V = 1,152\pi$. Therefore, the volume, in m^3 , of the cylinder is $1,152\pi$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the volume, in m^3 , of a cylinder with a radius of 8 meters and a height of 12 meters.

Question Difficulty:

Medium

Question ID 502d9690

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; height: 10px; background-color: #005a9f;"></div> <div style="width: 30%; height: 10px; background-color: #005a9f;"></div> <div style="width: 30%; height: 10px; background-color: #005a9f;"></div>

ID: 502d9690

Rectangle $ABCD$ is similar to rectangle $EFGH$. The area of rectangle $ABCD$ is 648 square inches, and the area of rectangle $EFGH$ is 72 square inches. The length of the longest side of rectangle $ABCD$ is 36 inches. What is the length, in inches, of the longest side of rectangle $EFGH$?

- A. 4
- B. 9
- C. 12
- D. 36

ID: 502d9690 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that rectangle $ABCD$ is similar to rectangle $EFGH$. Therefore, if the length of each side of rectangle $ABCD$ is k times the length of the corresponding side of rectangle $EFGH$, then the area of rectangle $ABCD$ is k^2 times the area of rectangle $EFGH$. It's given that the area of rectangle $ABCD$ is 648 square inches and the area of rectangle $EFGH$ is 72 square inches. It follows that $k^2 = \frac{648}{72}$, or $k^2 = 9$. Taking the square root of each side of this equation yields $k = \sqrt{9}$, or $k = 3$. It follows that the length of each side of rectangle $ABCD$ is 3 times the length of the corresponding side of rectangle $EFGH$. It's given that the length of the longest side of rectangle $ABCD$ is 36 inches. Therefore, 36 inches is 3 times the length of the longest side of rectangle $EFGH$, and the longest side of rectangle $EFGH$ is equal to $\frac{36}{3}$, or 12, inches.

Choice A is incorrect. This is the length, in inches, of the longest side of a rectangle with side lengths that are $\frac{1}{9}$ the corresponding side lengths of rectangle $ABCD$, rather than a rectangle with an area that is $\frac{1}{9}$ the area of rectangle $ABCD$.

Choice B is incorrect. This is the factor by which the area of rectangle $ABCD$ is larger than the area of rectangle $EFGH$, not the length, in inches, of the longest side of rectangle $EFGH$.

Choice D is incorrect. This is the length, in inches, of the longest side of rectangle $ABCD$, not rectangle $EFGH$.

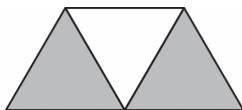
Question Difficulty:

Hard

Question ID 4c95c7d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4c95c7d4



A graphic designer is creating a logo for a company. The logo is shown in the figure above. The logo is in the shape of a trapezoid and consists of three congruent equilateral triangles. If the perimeter of the logo is 20 centimeters, what is the combined area of the shaded regions, in square centimeters, of the logo?

- A. $2\sqrt{3}$
- B. $4\sqrt{3}$
- C. $8\sqrt{3}$
- D. 16

ID: 4c95c7d4 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the logo is in the shape of a trapezoid that consists of three congruent equilateral triangles, and that the perimeter of the trapezoid is 20 centimeters (cm). Since the perimeter of the trapezoid is the sum of the lengths of 5 of the sides of the triangles, the length of each side of an equilateral triangle is $\frac{20}{5} = 4 \text{ cm}$. Dividing up one equilateral triangle into two right triangles yields a pair of congruent $30^\circ-60^\circ-90^\circ$ triangles. The shorter leg of each right triangle is half the length of the side of an equilateral triangle, or 2 cm. Using the Pythagorean Theorem, $a^2 + b^2 = c^2$, the height of the equilateral triangle can be found. Substituting $a = 2$ and $c = 4$ and solving for b yields $\sqrt{4^2 - 2^2} = \sqrt{12} = 2\sqrt{3}$ cm. The area of one equilateral triangle is $\frac{1}{2}bh$, where $b = 2$ and $h = 2\sqrt{3}$. Therefore, the area of one equilateral triangle is $\frac{1}{2}(4)(2\sqrt{3}) = 4\sqrt{3} \text{ cm}^2$. The shaded area consists of two such triangles, so its area is $(2)(4)\sqrt{3} = 8\sqrt{3} \text{ cm}^2$.

Alternate approach: The area of a trapezoid can be found by evaluating the expression $\frac{1}{2}(b_1 + b_2)h$, where b_1 is the length of one base, b_2 is the length of the other base, and h is the height of the trapezoid. Substituting $b_1 = 8$, $b_2 = 4$, and $h = 2\sqrt{3}$ yields the expression $\frac{1}{2}(8+4)(2\sqrt{3})$, or $\frac{1}{2}(12)(2\sqrt{3})$, which gives an area of $12\sqrt{3} \text{ cm}^2$ for the trapezoid. Since two-thirds of the trapezoid is shaded, the area of the shaded region is $\frac{2}{3} \times 12\sqrt{3} = 8\sqrt{3}$.

Choice A is incorrect. This is the height of the trapezoid. Choice B is incorrect. This is the area of one of the equilateral triangles, not two. Choice D is incorrect and may result from using a height of 4 for each triangle rather than the height of $2\sqrt{3}$.

Question Difficulty:

Hard

Question ID b8a225ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: b8a225ff

Circle A in the xy -plane has the equation $(x + 5)^2 + (y - 5)^2 = 4$. Circle B has the same center as circle A. The radius of circle B is two times the radius of circle A. The equation defining circle B in the xy -plane is $(x + 5)^2 + (y - 5)^2 = k$, where k is a constant. What is the value of k ?

ID: b8a225ff Answer

Correct Answer:

16

Rationale

The correct answer is 16. An equation of a circle in the xy -plane can be written as $x - t^2 + y - u^2 = r^2$, where the center of the circle is t, u , the radius of the circle is r , and where t, u , and r are constants. It's given that the equation of circle A is $x + 5^2 + y - 5^2 = 4$, which is equivalent to $x + 5^2 + y - 5^2 = 2^2$. Therefore, the center of circle A is $-5, 5$ and the radius of circle A is 2. It's given that circle B has the same center as circle A and that the radius of circle B is two times the radius of circle A. Therefore, the center of circle B is $-5, 5$ and the radius of circle B is 22, or 4. Substituting -5 for t , 5 for u , and 4 for r into the equation $x - t^2 + y - u^2 = r^2$ yields $x + 5^2 + y - 5^2 = 4^2$, which is equivalent to $x + 5^2 + y - 5^2 = 16$. It follows that the equation of circle B in the xy -plane is $x + 5^2 + y - 5^2 = 16$. Therefore, the value of k is 16.

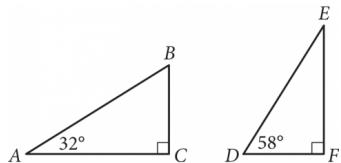
Question Difficulty:

Hard

Question ID 933fee1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 933fee1a



Triangles ABC and DEF are shown above. Which of the

following is equal to the ratio $\frac{BC}{AB}$?

A. $\frac{DE}{DF}$

B. $\frac{DF}{DE}$

C. $\frac{DF}{EF}$

D. $\frac{EF}{DE}$

ID: 933fee1a Answer

Correct Answer:

B

Rationale

Choice B is correct. In right triangle ABC , the measure of angle B must be 58° because the sum of the measure of angle A , which is 32° , and the measure of angle B is 90° . Angle D in the right triangle DEF has measure 58° . Hence, triangles ABC and DEF are similar (by angle-angle similarity). Since \overline{BC} is the side opposite to the angle with measure 32° and AB is the hypotenuse in right triangle ABC , the ratio $\frac{BC}{AB}$ is equal to $\frac{DF}{DE}$.

Alternate approach: The trigonometric ratios can be used to answer this question. In right triangle ABC , the ratio $\frac{BC}{AB} = \sin(32^\circ)$.

The angle E in triangle DEF has measure 32° because $M(\angle D) + M(\angle E) = 90^\circ$. In triangle DEF , the ratio $\frac{DF}{DE} = \sin(32^\circ)$.

Therefore, $\frac{DF}{DE} = \frac{BC}{AB}$.

Choice A is incorrect because $\frac{DE}{DF}$ is the reciprocal of the ratio $\frac{BC}{AB}$. Choice C is incorrect because $\frac{DF}{EF} = \frac{BC}{AC}$, not $\frac{BC}{AB}$.
Choice D is incorrect because $\frac{EF}{DE} = \frac{AC}{AB}$, not $\frac{BC}{AB}$.

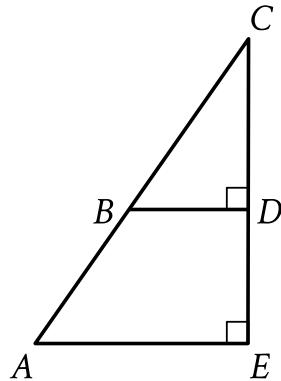
Question Difficulty:

Medium

Question ID 2f7c92ad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2f7c92ad



Note: Figure not drawn to scale.

In the figure shown, triangle CAE is similar to triangle CBD . The measure of angle CBD is 57° , and $AE = 26(BD)$. What is the measure of angle CAE ?

- A. $(26 \cdot 57)^\circ$
- B. $(26 + 57)^\circ$
- C. 57°
- D. 26°

ID: 2f7c92ad Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that triangle CAE is similar to triangle CBD . Corresponding angles in similar triangles have equal measure. Angle BCD and angle ACE represent the same angle. It follows that angle BCD and angle ACE have equal measure and are corresponding angles. It's given in the figure that angle BDC and angle AEC are right angles and therefore have equal measure. It follows that angle BDC and angle AEC are corresponding angles. Therefore, angle CBD and angle CAE are corresponding angles and have equal measure. It's given that the measure of angle CBD is 57° , so the measure of angle CAE is 57° .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

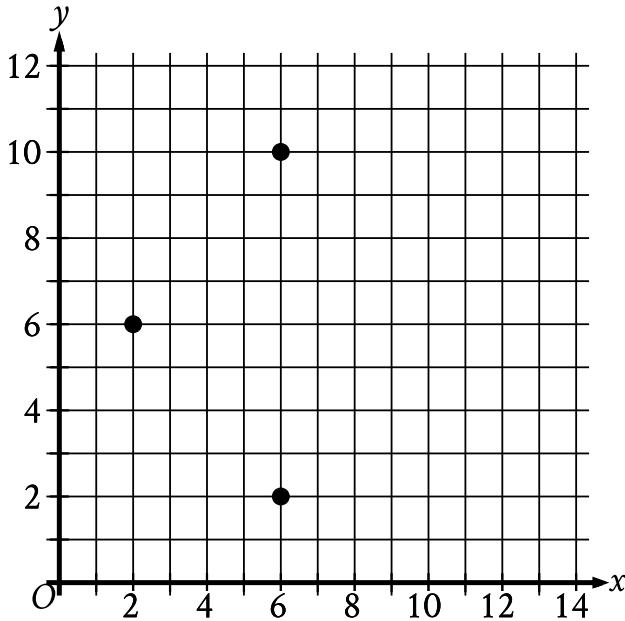
Question Difficulty:

Medium

Question ID b2528e6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: b2528e6b



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k ?

ID: b2528e6b Answer

Correct Answer:

8

Rationale

The correct answer is 8. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(6, 6)$ is halfway between the points $(6, 2)$ and $(6, 10)$, and is a distance of 4 units from each of those two points. The point $(6, 6)$ is also a distance of 4 units from $(2, 6)$. Because the point $(6, 6)$ is the same distance from all three points shown, it must be the center of the circle. Since that distance is 4, it follows that the radius of the circle is 4. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the given circle is $2\pi(4)$, or 8π . It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 8.

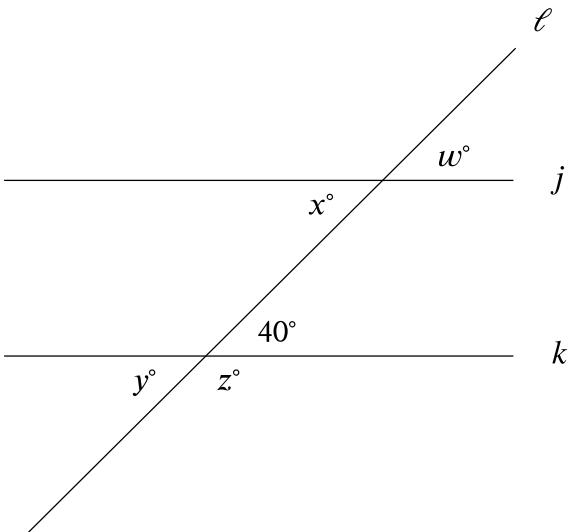
Question Difficulty:

Hard

Question ID 9d078710

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9d078710



Note: Figure not drawn to scale.

In the figure shown, line ℓ intersects lines j and k . Which additional piece of information is sufficient to prove that lines j and k are parallel?

- A. $w = 40$
- B. $x = 140$
- C. $y = 40$
- D. $z = 140$

ID: 9d078710 Answer

Correct Answer:

A

Rationale

Choice A is correct. In the figure shown, lines j and k are parallel if and only if a pair of corresponding angles are congruent. It's given that one angle has a measure of 40° and that the corresponding angle has a measure of w° . Therefore, $w = 40$ is sufficient to prove that lines j and k are parallel.

Choice B is incorrect. The angle measuring x° and the angle measuring 40° are alternate interior angles. Thus, if lines j and k are parallel, x is equal to 40 , not 140 .

Choice C is incorrect. The angle measuring y° and the angle measuring 40° are vertical angles. Thus, $y = 40$, whether lines j and k are parallel or not.

Choice D is incorrect. The angle measuring z° is supplementary to the angle measuring 40° . Thus, $z = 180 - 40$, or $z = 140$, whether lines j and k are parallel or not.

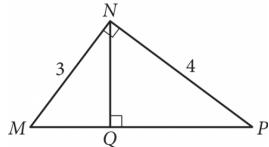
Question Difficulty:

Easy

Question ID 740bf79f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 740bf79f



In the figure above, what is the length of NQ ?

- A. 2.2
- B. 2.3
- C. 2.4
- D. 2.5

ID: 740bf79f Answer

Correct Answer:

C

Rationale

Choice C is correct. First, \overline{MP} is the hypotenuse of right $\triangle MNP$, whose legs have lengths 3 and 4. Therefore, $(MP)^2 = 3^2 + 4^2$, so $(MP)^2 = 25$ and $MP = 5$. Second, because $\angle MNP$ corresponds to $\angle NQP$ and because $\angle MPN$ corresponds to $\angle NPQ$, $\triangle MNP$ is similar to $\triangle NQP$. The ratio of corresponding sides of similar triangles is constant, so $\frac{NQ}{MN} = \frac{NP}{MP}$. Since $MP = 5$ and it's given that $MN = 3$ and $NP = 4$, $\frac{NQ}{3} = \frac{4}{5}$. Solving for NQ results in $NQ = \frac{12}{5}$, or 2.4.

Choices A, B, and D are incorrect and may result from setting up incorrect ratios.

Question Difficulty:

Hard

Question ID 0e40dfb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 0e40dfb0

A rectangle has a length of **3** units and a width of **39** units. Which expression gives the area, in square units, of this rectangle?

- A. $2(3 + 39)$
- B. $2(3 \cdot 39)$
- C. $3 + 39$
- D. $3 \cdot 39$

ID: 0e40dfb0 Answer

Correct Answer:

D

Rationale

Choice D is correct. The area of a rectangle is given by lw , where l is the length of the rectangle and w is the width of the rectangle. It's given that a rectangle has a length of 3 units and a width of 39 units. It follows that the area of the rectangle is $3 \cdot 39$ square units. Therefore, the expression that gives the area, in square units, of this rectangle, is $3 \cdot 39$.

Choice A is incorrect. This expression gives the perimeter, in units, of this rectangle.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID fc5ef8d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: fc5ef8d3

The table gives the perimeters of similar triangles TUV and XYZ , where \overline{TU} corresponds to \overline{XY} . The length of \overline{TU} is 6.

	Perimeter
Triangle TUV	50
Triangle XYZ	150

What is the length of \overline{XY} ?

- A. 2
- B. 6
- C. 18
- D. 56

ID: fc5ef8d3 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that triangle TUV is similar to triangle XYZ , and \overline{TU} corresponds to \overline{XY} . If two triangles are similar, then the ratio of their perimeters is equal to the ratio of their corresponding sides. It's given that the perimeter of triangle TUV is 50, the perimeter of triangle XYZ is 150, and the length of \overline{TU} is 6. Let n represent the length of \overline{XY} . It follows that $\frac{50}{150} = \frac{6}{n}$, or $\frac{1}{3} = \frac{6}{n}$. Multiplying each side of this equation by n yields $\frac{n}{3} = 6$. Multiplying each side of this equation by 3 yields $n = 18$. Therefore, the length of \overline{XY} is 18.

Choice A is incorrect. This is the solution to $\frac{3}{1} = \frac{6}{n}$, not $\frac{1}{3} = \frac{6}{n}$.

Choice B is incorrect. This is the length of \overline{TU} , not \overline{XY} .

Choice D is incorrect. This is the sum of the length of \overline{TU} and the perimeter of triangle TUV , not the length of \overline{XY} .

Question Difficulty:

Easy

Question ID 38517165

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 38517165

A circle has a circumference of 31π centimeters. What is the diameter, in centimeters, of the circle?

ID: 38517165 Answer

Correct Answer:

31

Rationale

The correct answer is 31. The circumference of a circle is equal to $2\pi r$ centimeters, where r represents the radius, in centimeters, of the circle, and the diameter of the circle is equal to $2r$ centimeters. It's given that a circle has a circumference of 31π centimeters. Therefore, $31\pi = 2\pi r$. Dividing both sides of this equation by π yields $31 = 2r$. Since the diameter of the circle is equal to $2r$ centimeters, it follows that the diameter, in centimeters, of the circle is 31.

Question Difficulty:

Medium

Question ID ab176ad6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: ab176ad6

The equation $(x + 6)^2 + (y + 3)^2 = 121$ defines a circle in the xy-plane. What is the radius of the circle?

ID: ab176ad6 Answer

Rationale

The correct answer is 11. A circle with equation $(x - a)^2 + (y - b)^2 = r^2$, where a, b, and r are constants, has center (a, b) and radius r. Therefore, the radius of the given circle is $\sqrt{121}$, or 11.

Question Difficulty:

Hard

Question ID d3fe472f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: d3fe472f

Triangle ABC is similar to triangle XYZ , such that A , B , and C correspond to X , Y , and Z respectively. The length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC . The measure of side AB is 16. What is the measure of side XY ?

- A. 14
- B. 16
- C. 18
- D. 32

ID: d3fe472f Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that triangle ABC is similar to triangle XYZ , such that A , B , and C correspond to X , Y , and Z , respectively. Therefore, side AB corresponds to side XY . Since the length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC , it follows that the measure of side XY is 2 times the measure of side AB . Thus, since the measure of side AB is 16, then the measure of side XY is 32.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the measure of side AB , not side XY .

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 3e577e4a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3e577e4a

A circle in the xy -plane has its center at $(-4, -6)$. Line k is tangent to this circle at the point $(-7, -7)$. What is the slope of line k ?

- A. -3
- B. $-\frac{1}{3}$
- C. $\frac{1}{3}$
- D. 3

ID: 3e577e4a Answer

Correct Answer:

A

Rationale

Choice A is correct. A line that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. It's given that the circle has its center at $-4, -6$ and line k is tangent to the circle at the point $-7, -7$. The slope of a radius defined by the points q, r and s, t can be calculated as $\frac{t-r}{s-q}$. The points $-7, -7$ and $-4, -6$ define the radius of the circle at the point of tangency.

Therefore, the slope of this radius can be calculated as $\frac{-6--7}{-4--7}$, or $\frac{1}{3}$. If a line and a radius are perpendicular, the slope of the line must be the negative reciprocal of the slope of the radius. The negative reciprocal of $\frac{1}{3}$ is -3 . Thus, the slope of line k is -3 .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the slope of the radius of the circle at the point of tangency, not the slope of line k .

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID b0dc920d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: b0dc920d

A manufacturer determined that right cylindrical containers with a height that is 4 inches longer than the radius offer the optimal number of containers to be displayed on a shelf. Which of the following expresses the volume, V , in cubic inches, of such containers, where r is the radius, in inches?

- A. $V = 4\pi r^3$
- B. $V = \pi(2r)^3$
- C. $V = \pi r^2 + 4\pi r$
- D. $V = \pi r^3 + 4\pi r^2$

ID: b0dc920d Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a right cylinder is given by the formula $V = \pi r^2 h$, where r represents the radius of the base of the cylinder and h represents the height. Since the height is 4 inches longer than the radius, the expression $r + 4$ represents the height of each cylindrical container. It follows that the volume of each container is represented by the equation $V = \pi r^2(r + 4)$.

Distributing the expression πr^2 into each term in the parentheses yields $V = \pi r^3 + 4\pi r^2$.

Choice A is incorrect and may result from representing the height as $4r$ instead of $r + 4$. Choice B is incorrect and may result from representing the height as $2r$ instead of $r + 4$. Choice C is incorrect and may result from representing the volume of a right cylinder as $V = \pi rh$ instead of $V = \pi r^2 h$.

Question Difficulty:

Hard

Question ID 2085e10e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2085e10e

In triangle DEF , the measure of angle D is 47° and the measure of angle E is 97° . In triangle RST , the measure of angle R is 47° and the measure of angle S is 97° . Which of the following additional pieces of information is needed to determine whether triangle DEF is similar to triangle RST ?

- A. The measure of angle F
- B. The measure of angle T
- C. The measure of angle F and the measure of angle T
- D. No additional information is needed.

ID: 2085e10e Answer

Correct Answer:

D

Rationale

Choice D is correct. When two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. It's given that in triangle DEF , the measure of angle D is 47° and the measure of angle E is 97° . It's also given that in triangle RST , the measure of angle R is 47° and the measure of angle S is 97° . It follows that angle D is congruent to angle R and that angle E is congruent to angle S . Therefore, triangle DEF is similar to triangle RST and no additional information is needed.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID fa2771d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fa2771d5

Circle A has equation $(x - 7)^2 + (y + 3)^2 = 1$. In the xy -plane, circle B is obtained by translating circle A to the right 4 units. Which equation represents circle B?

- A. $(x - 7)^2 + (y + 7)^2 = 1$
- B. $(x - 3)^2 + (y + 3)^2 = 1$
- C. $(x - 11)^2 + (y + 3)^2 = 1$
- D. $(x - 7)^2 + (y - 1)^2 = 1$

ID: fa2771d5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r units. It's given that circle A has the equation $(x - 7)^2 + (y + 3)^2 = 1$, which can be written as $(x - 7)^2 + (y - (-3))^2 = 1^2$. It follows that $h = 7$, $k = -3$, and $r = 1$. Therefore, the center of circle A is $(7, -3)$ and its radius is 1 unit. If circle A is translated 4 units to the right, the x -coordinate of the center will increase by 4, while the y -coordinate and the radius of the circle will remain unchanged. Translating the center of circle A to the right 4 units yields $(7 + 4, -3)$, or $(11, -3)$. Therefore, the center of circle B is $(11, -3)$. Substituting 11 for h , -3 for k , and 1 for r into the equation $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - 11)^2 + (y - (-3))^2 = 1$, or $(x - 11)^2 + (y + 3)^2 = 1$. Therefore, the equation $(x - 11)^2 + (y + 3)^2 = 1$ represents circle B.

Choice A is incorrect. This equation represents a circle obtained by shifting circle A down, rather than right, 4 units.

Choice B is incorrect. This equation represents a circle obtained by shifting circle A left, rather than right, 4 units.

Choice D is incorrect. This equation represents a circle obtained by shifting circle A up, rather than right, 4 units.

Question Difficulty:

Hard

Question ID bbaac300

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bbaac300

Triangle ABC is similar to triangle DEF , where angle A corresponds to angle D , and angles C and F are right angles. If $\cos B = \frac{1}{22}$, what is the value of $\cos E$?

- A. $\frac{1}{22}$
- B. $\frac{1}{23}$
- C. $\frac{21}{22}$
- D. $\frac{22}{23}$

ID: bbaac300 Answer

Correct Answer:

A

Rationale

Choice A is correct. The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to that angle to the length of the hypotenuse. It's given that angle C is a right angle in triangle ABC and that angle F is a right angle in triangle DEF . Therefore, $\cos B$ is equal to the ratio of the length of side BC to the length of side AB , and $\cos E$ is equal to the ratio of the length of side EF to the length of side DE . It's also given that triangle ABC is similar to triangle DEF , where angle A corresponds to angle D . Since similar triangles have proportional side lengths, $\frac{BC}{AB} = \frac{EF}{DE}$. Therefore, the value of $\cos B$ is equal to the value of $\cos E$. Since $\cos B = \frac{1}{22}$, the value of $\cos E$ is $\frac{1}{22}$.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

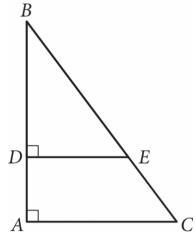
Question Difficulty:

Easy

Question ID 55bb437a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 55bb437a



In the figure above, $\tan B = \frac{3}{4}$. If $BC = 15$ and $DA = 4$, what is the length of \overline{DE} ?

ID: 55bb437a Answer

Rationale

The correct answer is 6. Since $\tan B = \frac{3}{4}$, $\triangle ABC$ and $\triangle DBE$ are both similar to 3-4-5 triangles. This means that they are both similar to the right triangle with sides of lengths 3, 4, and 5. Since $BC = 15$, which is 3 times as long as the hypotenuse of the 3-4-5 triangle, the similarity ratio of $\triangle ABC$ to the 3-4-5 triangle is 3:1. Therefore, the length of \overline{AC} (the side opposite to $\angle B$) is $3 \times 3 = 9$, and the length of \overline{AB} (the side adjacent to $\angle B$) is $4 \times 3 = 12$. It is also given that $DA = 4$. Since $AB = DA + DB$ and $AB = 12$, it follows that $DB = 8$, which means that the similarity ratio of $\triangle DBE$ to the 3-4-5 triangle is 2:1 (\overline{DB} is the side adjacent to $\angle B$). Therefore, the length of \overline{DE} , which is the side opposite to $\angle B$, is $3 \times 2 = 6$.

Question Difficulty:

Hard

Question ID fecc446d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 33%; background-color: #0056b3; height: 10px;"></div> <div style="width: 37%; background-color: #0056b3; height: 10px;"></div>

ID: fecc446d

A line intersects two parallel lines, forming four acute angles and four obtuse angles. The measure of one of these eight angles is $(7x - 250)^\circ$. The sum of the measures of four of the eight angles is k° . Which of the following could NOT be equivalent to k , for all values of x ?

- A. $-14x + 1,540$
- B. $14x - 320$
- C. $-28x + 1,720$
- D. 360

ID: fecc446d Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a line intersects two parallel lines, forming four acute angles and four obtuse angles. Since there are two parallel lines intersected by a transversal, all four acute angles have the same measure and all four obtuse angles have the same measure. Additionally, each acute angle is supplementary to each obtuse angle. It's given that the measure of one of these eight angles is $(7x - 250)^\circ$. It follows that a supplementary angle has measure $(180 - (7x - 250))^\circ$, or $(-7x + 430)^\circ$. It's also given that the sum of the measures of four of the eight angles is k° . It follows that the possible values of k are $4(7x - 250)$; $(7x - 250) + 3(-7x + 430)$; $2(7x - 250) + 2(-7x + 430)$; $3(7x - 250) + (-7x + 430)$; and $4(-7x + 430)$. These values are equivalent to $28x - 1,000$; $-14x + 1,040$; 360 ; $14x - 320$; and $-28x + 1,720$, respectively. It follows that of the given choices, only $-14x + 1,540$ could NOT be equivalent to k , for all values of x .

Choice B is incorrect. This is the sum of three angles with measure $(7x - 250)^\circ$ and one angle with measure $(-7x + 430)^\circ$.

Choice C is incorrect. This is the sum of four angles with measure $(-7x + 430)^\circ$.

Choice D is incorrect. This is the sum of two angles with measure $(7x - 250)^\circ$ and two angles with measure $(-7x + 430)^\circ$.

Question Difficulty:

Hard

Question ID 8e7689e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8e7689e0

The number of radians in a 720-degree angle can be written as $a\pi$, where a is a constant. What is the value of a ?

ID: 8e7689e0 Answer

Rationale

The correct answer is 4. There are π radians in a 180° angle. An angle measure of 720° is 4 times greater than an angle measure of 180° . Therefore, the number of radians in a 720° angle is 4π .

Question Difficulty:

Medium

Question ID 3563d76d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 3563d76d

At a certain time and day, the Washington Monument in Washington, DC, casts a shadow that is 300 feet long. At the same time, a nearby cherry tree casts a shadow that is 16 feet long. Given that the Washington Monument is approximately 555 feet tall, which of the following is closest to the height, in feet, of the cherry tree?

- A. 10
- B. 20
- C. 30
- D. 35

ID: 3563d76d Answer

Rationale

Choice C is correct. There is a proportional relationship between the height of an object and the length of its shadow. Let c represent the height, in feet, of the cherry tree. The given relationship can be expressed by the proportion $\frac{555}{300} = \frac{c}{16}$. Multiplying both sides of this equation by 16 yields $c = 29.6$. This height is closest to the value given in choice C, 30.

Choices A, B, and D are incorrect and may result from calculation errors.

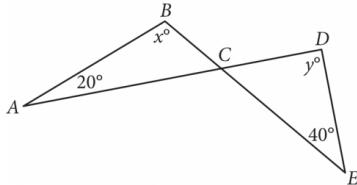
Question Difficulty:

Easy

Question ID dfc420b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: dfc420b2



Note: Figure not drawn to scale.

In the figure above, \overline{AD} intersects \overline{BE} at C . If

$x = 100$, what is the value of y ?

- A. 100
- B. 90
- C. 80
- D. 60

ID: dfc420b2 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that $x = 100$; therefore, substituting 100 for x in triangle ABC gives two known angle measures for this triangle. The sum of the measures of the interior angles of any triangle equals 180° . Subtracting the two known angle measures of triangle ABC from 180° gives the third angle measure: $180^\circ - 100^\circ - 20^\circ = 60^\circ$. This is the measure of angle BCA. Since vertical angles are congruent, the measure of angle DCE is also 60° . Subtracting the two known angle measures of triangle CDE from 180° gives the third angle measure: $180^\circ - 60^\circ - 40^\circ = 80^\circ$. Therefore, the value of y is 80.

Choice A is incorrect and may result from a calculation error. Choice B is incorrect and may result from classifying angle CDE as a right angle. Choice D is incorrect and may result from finding the measure of angle BCA or DCE instead of the measure of angle CDE.

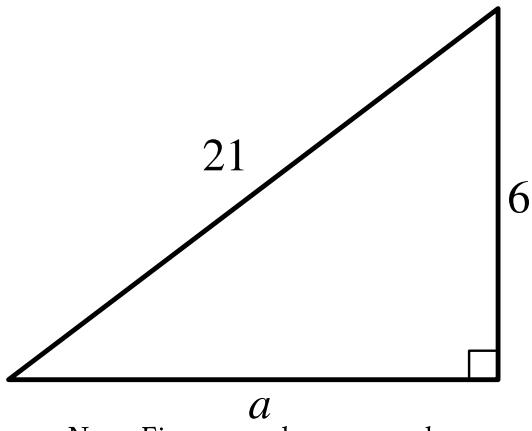
Question Difficulty:

Easy

Question ID de550be0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: de550be0



Note: Figure not drawn to scale.

For the triangle shown, which expression represents the value of a ?

- A. $\sqrt{21^2 - 6^2}$
- B. $21^2 - 6^2$
- C. $\sqrt{21 - 6}$
- D. $21 - 6$

ID: de550be0 Answer

Correct Answer:

A

Rationale

Choice A is correct. For the right triangle shown, the lengths of the legs are a units and 6 units, and the length of the hypotenuse is 21 units. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. Therefore, $a^2 + 6^2 = 21^2$. Subtracting 6^2 from both sides of this equation yields $a^2 = 21^2 - 6^2$. Taking the square root of both sides of this equation yields $a = \pm \sqrt{21^2 - 6^2}$. Since a is a length, a must be positive. Therefore, $a = \sqrt{21^2 - 6^2}$. Thus, for the triangle shown, $\sqrt{21^2 - 6^2}$ represents the value of a .

Choice B is incorrect. For the triangle shown, this expression represents the value of a^2 , not a .

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID f2495de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: f2495de4

What is the value of $\cos \frac{565\pi}{6}$?

- A. $\frac{1}{2}$
- B. 1
- C. $\frac{\sqrt{3}}{2}$
- D. $\sqrt{3}$

ID: f2495de4 Answer

Correct Answer:

C

Rationale

Choice C is correct. The cosine of an angle is equal to the cosine of $n(2\pi)$ radians more than the angle, where n is an integer constant. Since $\frac{565\pi}{6}$ is equivalent to $47(2\pi) + \frac{\pi}{6}$, $\cos\left(\frac{565\pi}{6}\right)$ can be rewritten as $\cos\left(47(2\pi) + \frac{\pi}{6}\right)$, which is equal to $\cos\left(\frac{\pi}{6}\right)$. Therefore, the value of $\cos\left(\frac{565\pi}{6}\right)$ is equal to the value of $\cos\left(\frac{\pi}{6}\right)$, which is $\frac{\sqrt{3}}{2}$.

Alternate approach: A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. The cosine of a number t is the x -coordinate of the point resulting from traveling a distance of t counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the xy -plane. A unit circle has a circumference of 2π . It follows that since $\frac{565\pi}{6}$ is equal to $47(2\pi) + \frac{\pi}{6}$, traveling a distance of $\frac{565\pi}{6}$ counterclockwise around a unit circle means traveling around the circle completely 47 times and then another $\frac{\pi}{6}$ beyond that. That is, traveling $\frac{565\pi}{6}$ results in the same point as traveling $\frac{\pi}{6}$. Traveling $\frac{\pi}{6}$ counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the xy -plane results in the point $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$. Thus, the value of $\cos\frac{565\pi}{6}$ is the x -coordinate of the point $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$, which is $\frac{\sqrt{3}}{2}$.

Choice A is incorrect. This is the value of $\sin\frac{565\pi}{6}$, not $\cos\frac{565\pi}{6}$.

Choice B is incorrect. This is the value of the cosine of a multiple of 2π , not $\frac{565\pi}{6}$.

Choice D is incorrect. This is the value of $\tan\frac{565\pi}{6}$, not $\cos\frac{565\pi}{6}$.

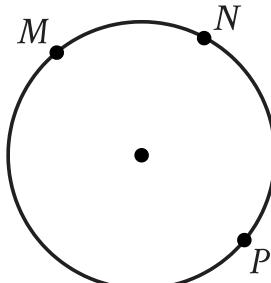
Question Difficulty:

Easy

Question ID 800e71b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 800e71b8



Points M , N , and P lie on the circle shown. On this circle, minor arc MN has a length of 39 centimeters and major arc MPN has a length of 195 centimeters. What is the circumference, in centimeters, of the circle shown?

- A. 39
- B. 156
- C. 195
- D. 234

ID: 800e71b8 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the endpoints of minor arc MN and major arc MPN are the same, and the arcs together form a full circle, the sum of the lengths of these two arcs is equal to the circumference of the circle. It's given that the length of minor arc MN is 39 centimeters and the length of major arc MPN is 195 centimeters. Therefore, the circumference of the circle, in centimeters, is $39 + 195$, or 234.

Choice A is incorrect. This is the length, in centimeters, of minor arc MN , not the circumference, in centimeters, of the circle.

Choice B is incorrect. This is the difference of the lengths of major arc MPN and minor arc MN , in centimeters.

Choice C is incorrect. This is the length, in centimeters, of major arc MPN , not the circumference, in centimeters, of the circle.

Question Difficulty:

Medium

Question ID 901e3285

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 901e3285

In triangle ABC , the measure of angle A is 50° . If triangle ABC is isosceles, which of the following is NOT a possible measure of angle B ?

- A. 50°
- B. 65°
- C. 80°
- D. 100°

ID: 901e3285 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sum of the three interior angles in a triangle is 180° . It's given that angle A measures 50° . If angle B measured 100° , the measure of angle C would be $180^\circ - (50^\circ + 100^\circ) = 30^\circ$. Thus, the measures of the angles in the triangle would be 50° , 100° , and 30° . However, an isosceles triangle has two angles of equal measure. Therefore, angle B can't measure 100° .

Choice A is incorrect. If angle B has measure 50° , then angle C would measure $180^\circ - (50^\circ + 50^\circ) = 80^\circ$, and 50° , 50° , and 80° could be the angle measures of an isosceles triangle. Choice B is incorrect. If angle B has measure 65° , then angle C would measure $180^\circ - (65^\circ + 50^\circ) = 65^\circ$, and 50° , 65° , and 65° could be the angle measures of an isosceles triangle. Choice C is incorrect. If angle B has measure 80° , then angle C would measure $180^\circ - (80^\circ + 50^\circ) = 50^\circ$, and 50° , 80° , and 50° could be the angle measures of an isosceles triangle.

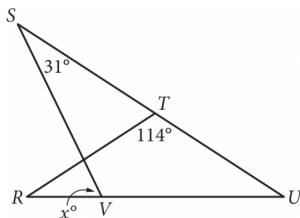
Question Difficulty:

Medium

Question ID bd7f6e30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bd7f6e30



In the figure above, $RT = TU$.

What is the value of x ?

- A. 72
- B. 66
- C. 64
- D. 58

ID: bd7f6e30 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since $RT = TU$, it follows that $\triangle RTU$ is an isosceles triangle with base RU. Therefore, $\angle TRU$ and $\angle TUR$ are the base angles of an isosceles triangle and are congruent. Let the measures of both $\angle TRU$ and $\angle TUR$ be t° . According to the triangle sum theorem, the sum of the measures of the three angles of a triangle is 180° . Therefore, $114^\circ + 2t^\circ = 180^\circ$, so $t = 33$.

Note that $\angle TUR$ is the same angle as $\angle SUV$. Thus, the measure of $\angle SUV$ is 33° . According to the triangle exterior angle theorem, an external angle of a triangle is equal to the sum of the opposite interior angles. Therefore, x° is equal to the sum of the measures of $\angle VSU$ and $\angle SUV$; that is, $31^\circ + 33^\circ = 64^\circ$. Thus, the value of x is 64.

Choice B is incorrect. This is the measure of $\angle STR$, but $\angle STR$ is not congruent to $\angle SVR$. Choices A and D are incorrect and may result from a calculation error.

Question Difficulty:

Hard

Question ID 6708546e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: 6708546e

Parallelogram $ABCD$ is similar to parallelogram $PQRS$. The length of each side of parallelogram $PQRS$ is 2 times the length of its corresponding side of parallelogram $ABCD$. The area of parallelogram $ABCD$ is 5 square centimeters. What is the area, in square centimeters, of parallelogram $PQRS$?

- A. 7
- B. 10
- C. 20
- D. 25

ID: 6708546e Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that parallelogram $ABCD$ is similar to parallelogram $PQRS$. When two parallelograms are similar, if the scale factor between their corresponding side lengths is k , the scale factor between their areas is k^2 . It's given that the length of each side of parallelogram $PQRS$ is 2 times the length of its corresponding side of parallelogram $ABCD$, so the scale factor between their corresponding side lengths is 2. It follows that the scale factor between their areas is 2^2 , or 4. It's given that the area, in square centimeters, of parallelogram $ABCD$ is 5. It follows that the area, in square centimeters, of parallelogram $PQRS$ is $5(4)$, or 20.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 0837c3b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0837c3b9

Triangle ABC and triangle DEF are similar triangles, where \overline{AB} and \overline{DE} are corresponding sides. If $DE = 2AB$ and the perimeter of triangle ABC is 20, what is the perimeter of triangle DEF?

- A. 10
- B. 40
- C. 80
- D. 120

ID: 0837c3b9 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since triangles ABC and DEF are similar and $DE = 2AB$, the length of each side of triangle DEF is two times the length of its corresponding side in triangle ABC. Therefore, the perimeter of triangle DEF is two times the perimeter of triangle ABC. Since the perimeter of triangle ABC is 20, the perimeter of triangle DEF is 40.

Choice A is incorrect. This is half, not two times, the perimeter of triangle ABC. Choice C is incorrect. This is two times the perimeter of triangle DEF rather than two times the perimeter of triangle ABC. Choice D is incorrect. This is six times, not two times, the perimeter of triangle ABC.

Question Difficulty:

Easy

Question ID 9e44284b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9e44284b

In the xy -plane, the graph of $2x^2 - 6x + 2y^2 + 2y = 45$ is a

circle. What is the radius of the circle?

- A. 5
- B. 6.5
- C. $\sqrt{40}$
- D. $\sqrt{50}$

ID: 9e44284b Answer

Correct Answer:

A

Rationale

Choice A is correct. One way to find the radius of the circle is to rewrite the given equation in standard form, $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) is the center of the circle and the radius of the circle is r . To do this, divide the original equation, $2x^2 - 6x + 2y^2 + 2y = 45$, by 2 to make the leading coefficients of x^2 and y^2 each equal to 1: $x^2 - 3x + y^2 + y = 22.5$. Then complete the square to put the equation in standard form. To do so, first rewrite $x^2 - 3x + y^2 + y = 22.5$ as $(x^2 - 3x + 2.25) - 2.25 + (y^2 + y + 0.25) - 0.25 = 22.5$. Second, add 2.25 and 0.25 to both sides of the equation: $(x^2 - 3x + 2.25) + (y^2 + y + 0.25) = 25$. Since $x^2 - 3x + 2.25 = (x - 1.5)^2$, $y^2 + y + 0.25 = (y + 0.5)^2$, and $25 = 5^2$, it follows that $(x - 1.5)^2 + (y + 0.5)^2 = 5^2$. Therefore, the radius of the circle is 5.

Choices B, C, and D are incorrect and may be the result of errors in manipulating the equation or of a misconception about the standard form of the equation of a circle in the xy -plane.

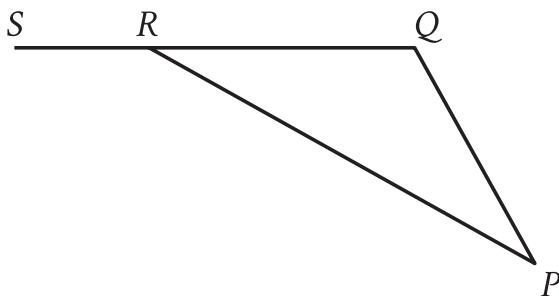
Question Difficulty:

Hard

Question ID 014edcb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 014edcb7



Note: Figure not drawn to scale.

In triangle PQR , \overline{QR} is extended to point S . The measure of $\angle PQR$ is 132° , and the measure of $\angle PRS$ is 163° . What is the measure of $\angle QPR$?

- A. 48°
- B. 31°
- C. 24°
- D. 17°

ID: 014edcb7 Answer

Correct Answer:

B

Rationale

Choice B is correct. In the figure shown, since \overline{QS} is a line segment, the sum of the measures of $\angle PRS$ and $\angle PRQ$ is 180° . It's given that the measure of $\angle PRS$ is 163° . Thus, the measure of $\angle PRQ$ is $(180 - 163)^\circ$, or 17° . The sum of the measures of the interior angles of a triangle is 180° . It's given that the measure of $\angle PQR$ is 132° . Therefore, the measure of $\angle QPR$ is $(180 - 17 - 132)^\circ$, or 31° .

Choice A is incorrect. This is the measure of the supplement of $\angle PQR$, not the measure of $\angle QPR$.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the measure of $\angle PRQ$, not the measure of $\angle QPR$.

Question Difficulty:

Medium

Question ID 568d66a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 568d66a7

An isosceles right triangle has a perimeter of $94 + 94\sqrt{2}$ inches. What is the length, in inches, of one leg of this triangle?

- A. 47
- B. $47\sqrt{2}$
- C. 94
- D. $94\sqrt{2}$

ID: 568d66a7 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the right triangle is isosceles. In an isosceles right triangle, the two legs have equal lengths, and the length of the hypotenuse is $\sqrt{2}$ times the length of one of the legs. Let l represent the length, in inches, of each leg of the isosceles right triangle. It follows that the length of the hypotenuse is $l\sqrt{2}$ inches. The perimeter of a figure is the sum of the lengths of the sides of the figure. Therefore, the perimeter of the isosceles right triangle is $l + l + l\sqrt{2}$ inches. It's given that the perimeter of the triangle is $94 + 94\sqrt{2}$ inches. It follows that $l + l + l\sqrt{2} = 94 + 94\sqrt{2}$. Factoring the left-hand side of this equation yields $1 + 1 + \sqrt{2}l = 94 + 94\sqrt{2}$, or $2 + \sqrt{2}l = 94 + 94\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $l = \frac{94 + 94\sqrt{2}}{2 + \sqrt{2}}$. Rationalizing the denominator of the right-hand side of this equation by multiplying the right-hand side of the equation by $\frac{2 - \sqrt{2}}{2 - \sqrt{2}}$ yields $l = \frac{94 + 94\sqrt{2}(2 - \sqrt{2})}{2 + \sqrt{2}(2 - \sqrt{2})}$. Applying the distributive property to the numerator and to the denominator of the right-hand side of this equation yields $l = \frac{188 - 94\sqrt{2} + 188\sqrt{2} - 94\sqrt{4}}{4 - 2\sqrt{2} + 2\sqrt{2} - \sqrt{4}}$. This is equivalent to $l = \frac{94\sqrt{2}}{2}$, or $l = 47\sqrt{2}$. Therefore, the length, in inches, of one leg of the isosceles right triangle is $47\sqrt{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the length, in inches, of the hypotenuse.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 322a6dfe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 322a6dfe

Quadrilaterals $PQRS$ and $WXYZ$ are similar, where P, Q , and R correspond to W, X , and Y , respectively. The measure of $\angle S$ is 135° , $PS = 45$, and $WZ = 9$. What is the measure of $\angle Z$?

- A. 5°
- B. 27°
- C. 45°
- D. 135°

ID: 322a6dfe Answer

Correct Answer:

D

Rationale

Choice D is correct. Corresponding angles in similar figures have equal measure. It's given that quadrilaterals $PQRS$ and $WXYZ$ are similar and that P, Q , and R correspond to W, X , and Y . It follows that $\angle S$ corresponds to $\angle Z$. It's also given that the measure of $\angle S$ is 135° . Therefore, the measure of $\angle Z$ is 135° .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. This is the supplement of the measure of $\angle Z$, not the measure of $\angle Z$.

Question Difficulty:

Hard

Question ID 0e709a29

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0e709a29

$$RS = 440$$

$$ST = 384$$

$$TR = 584$$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . What is the value of $\tan W$?

- A. $\frac{48}{73}$
- B. $\frac{55}{73}$
- C. $\frac{48}{55}$
- D. $\frac{55}{48}$

ID: 0e709a29 Answer

Correct Answer:

D

Rationale

Choice D is correct. The hypotenuse of triangle RST is the longest side and is across from the right angle. The longest side length given is 584, which is the length of side TR . Therefore, the hypotenuse of triangle RST is side TR , so the right angle is angle S . The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side, which is the side across from the angle, to the length of the adjacent side, which is the side closest to the angle that is not the hypotenuse. It follows that the opposite side of angle T is side RS and the adjacent side of angle T is side ST . Therefore, $\tan T = \frac{RS}{ST}$. Substituting 440 for RS and 384 for ST in this equation yields $\tan T = \frac{440}{384}$. This is equivalent to $\tan T = \frac{55}{48}$. It's given that triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . It follows that R corresponds to U . Therefore, the hypotenuse of triangle UVW is side WU , which means $\tan W = \frac{UV}{VW}$. Since the lengths of corresponding sides of similar triangles are proportional, $\frac{RS}{ST} = \frac{UV}{VW}$. Therefore, $\tan W = \frac{UV}{VW}$ is equivalent to $\tan W = \frac{RS}{ST}$, or $\tan W = \tan T$. Thus, $\tan W = \frac{55}{48}$.

Choice A is incorrect. This is the value of $\cos W$, not $\tan W$.

Choice B is incorrect. This is the value of $\sin W$, not $\tan W$.

Choice C is incorrect. This is the value of $\frac{1}{\tan W}$, not $\tan W$.

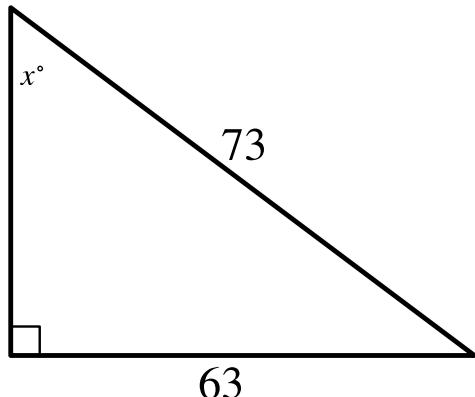
Question Difficulty:

Hard

Question ID a6097ec2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a6097ec2



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin x^\circ$?

- A. $\frac{1}{73}$
- B. $\frac{10}{73}$
- C. $\frac{63}{73}$
- D. $\frac{136}{73}$

ID: a6097ec2 Answer

Correct Answer:

C

Rationale

Choice C is correct. The sine of an acute angle in a right triangle is the ratio of the length of the side opposite that angle to the length of the hypotenuse. In the right triangle shown, it's given that the length of the side opposite the angle with measure x° is 63 units and the length of the hypotenuse is 73 units. Therefore, the value of $\sin x^\circ$ is $\frac{63}{73}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

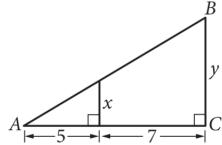
Question Difficulty:

Easy

Question ID eeb4143c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: eeb4143c



Note: Figure not drawn to scale.

The area of triangle ABC above is at least 48 but no more than 60. If y is an integer, what is one possible value of x?

ID: eeb4143c Answer

Rationale

The correct answer is either $\frac{10}{3}$, $\frac{15}{4}$, or $\frac{25}{6}$. The area of triangle ABC can be expressed as $\frac{1}{2}(5+7)y$ or $6y$. It's given that the area of triangle ABC is at least 48 but no more than 60. It follows that $48 \leq 6y \leq 60$. Dividing by 6 to isolate y in this compound inequality yields $8 \leq y \leq 10$. Since y is an integer, $y = 8, 9$, or 10 . In the given figure, the two right triangles shown are similar because they have two pairs of congruent angles: their respective right angles and angle A. Therefore, the following proportion is true: $\frac{x}{y} = \frac{5}{12}$. Substituting 8 for y in the proportion results in $\frac{x}{8} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{10}{3}$.

Substituting 9 for y in the proportion results in $\frac{x}{9} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{15}{4}$. Substituting 10 for y in the proportion results in $\frac{x}{10} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{25}{6}$. Note that $10/3$, $15/4$, $25/6$, 3.333 , 3.75 , 4.166 , and 4.167 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 5b2b8866

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: 5b2b8866

A rectangular poster has an area of **360** square inches. A copy of the poster is made in which the length and width of the original poster are each increased by **20%**. What is the area of the copy, in square inches?

ID: 5b2b8866 Answer

Correct Answer:

2592/5, 518.4

Rationale

The correct answer is 518.4. It's given that the area of the original poster is 360 square inches. Let l represent the length, in inches, of the original poster, and let w represent the width, in inches, of the original poster. Since the area of a rectangle is equal to its length times its width, it follows that $360 = lw$. It's also given that a copy of the poster is made in which the length and width of the original poster are each increased by 20%. It follows that the length of the copy is the length of the original poster plus 20% of the length of the original poster, which is equivalent to $l + \frac{20}{100}l$ inches. This length can be rewritten as $l + 0.2l$ inches, or $1.2l$ inches. Similarly, the width of the copy is the width of the original poster plus 20% of the width of the original poster, which is equivalent to $w + \frac{20}{100}w$ inches. This width can be rewritten as $w + 0.2w$ inches, or $1.2w$ inches. Since the area of a rectangle is equal to its length times its width, it follows that the area, in square inches, of the copy is equal to $1.2l \cdot 1.2w$, which can be rewritten as $1.2 \cdot 1.2 \cdot lw$. Since $360 = lw$, the area, in square inches, of the copy can be found by substituting 360 for lw in the expression $1.2 \cdot 1.2 \cdot lw$, which yields $1.2 \cdot 1.2 \cdot 360$, or 518.4. Therefore, the area of the copy, in square inches, is 518.4.

Question Difficulty:

Hard

Question ID fc8aa563

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: fc8aa563

What is the center of the circle in the xy -plane defined by the equation $(x - 1)^2 + (y + 7)^2 = 1$?

- A. $(-1, -7)$
- B. $(-1, 7)$
- C. $(1, -7)$
- D. $(1, 7)$

ID: fc8aa563 Answer

Correct Answer:

C

Rationale

Choice C is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . It's given that the circle in the xy -plane is defined by the equation $(x - 1)^2 + (y + 7)^2 = 1$. This equation can be written as $(x - 1)^2 + (y - (-7))^2 = 1$. For this equation, it follows that $h = 1$ and $k = -7$. Therefore, the center of the circle in the xy -plane defined by the given equation is $(1, -7)$.

Choice A is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x + 1)^2 + (y + 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Choice B is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x + 1)^2 + (y - 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Choice D is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x - 1)^2 + (y - 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Question Difficulty:

Medium

Question ID 2855cb58

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2855cb58

A circle in the xy -plane has its center at $(16, 17)$ and has a radius of $7k$. Which equation represents this circle?

- A. $(x - 16)^2 + (y - 17)^2 = 49k$
- B. $(x - 16)^2 + (y - 17)^2 = 49k^2$
- C. $(x - 16)^2 + (y - 17)^2 = 7k$
- D. $(x - 16)^2 + (y - 17)^2 = 7k^2$

ID: 2855cb58 Answer

Correct Answer:

B

Rationale

Choice B is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . It's given that this circle has a center at $(16, 17)$ and a radius of $7k$. Substituting 16 for h , 17 for k , and $7k$ for r in $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - 16)^2 + (y - 17)^2 = (7k)^2$, or $(x - 16)^2 + (y - 17)^2 = 49k^2$. Therefore, the equation that represents this circle is $(x - 16)^2 + (y - 17)^2 = 49k^2$.

Choice A is incorrect. This equation represents a circle with radius $7\sqrt{k}$, not $7k$.

Choice C is incorrect. This equation represents a circle with radius $\sqrt{7k}$, not $7k$.

Choice D is incorrect. This equation represents a circle with radius $\sqrt{7}k$, not $7k$.

Question Difficulty:

Hard

Question ID 74d8b897

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 74d8b897

An angle has a measure of $\frac{9\pi}{20}$ radians. What is the measure of the angle in degrees?

ID: 74d8b897 Answer

Correct Answer:

81

Rationale

The correct answer is 81. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$. Multiplying the given angle measure, $\frac{9\pi}{20}$ radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ yields $\frac{9\pi}{20} \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}}$, which is equivalent to 81 degrees.

Question Difficulty:

Medium

Question ID ee540927

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ee540927

$$x^2 + 58x + y^2 = 0$$

In the xy -plane, the graph of the given equation is a circle. What are the coordinates (x, y) of the center of the circle?

- A. $(0, 29)$
- B. $(0, -29)$
- C. $(29, 0)$
- D. $(-29, 0)$

ID: ee540927 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that in the xy -plane, the graph of $x^2 + 58x + y^2 = 0$ is a circle. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the radius of the circle is r . By completing the square, the equation $x^2 + 58x + y^2 = 0$ can be rewritten as $x^2 + 58x + \frac{58^2}{2} + y^2 = 0 + \frac{58^2}{2}$, or $x^2 + 58x + 841 + y^2 = 841$. This equation is equivalent to $(x + 29)^2 + y^2 = 841$, or $x - (-29)^2 + (y - 0)^2 = 841$. Therefore, h is -29 and k is 0 , and the coordinates (x, y) of the center of the circle are $(-29, 0)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID dc71597b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: dc71597b

A right circular cone has a volume of $\frac{1}{3} \pi$ cubic feet and a height of 9 feet. What is the radius, in feet, of the base of the cone?

A. $\frac{1}{3}$

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. 3

ID: dc71597b Answer

Correct Answer:

A

Rationale

Choice A is correct. The equation for the volume of a right circular cone is $V = \frac{1}{3} \pi r^2 h$. It's given that the volume of the right circular cone is $\frac{1}{3} \pi$ cubic feet and the height is 9 feet. Substituting these values for V and h, respectively, gives

$\frac{1}{3} \pi = \frac{1}{3} \pi r^2 (9)$. Dividing both sides of the equation by $\frac{1}{3} \pi$ gives $1 = r^2 (9)$. Dividing both sides of the equation by 9 gives

$\frac{1}{9} = r^2$. Taking the square root of both sides results in two possible values for the radius, $\sqrt{\left(\frac{1}{9}\right)}$ or $-\sqrt{\left(\frac{1}{9}\right)}$. Since the radius

can't have a negative value, that leaves $\sqrt{\left(\frac{1}{9}\right)}$ as the only possibility. Applying the quotient property of square roots,

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$, results in $r = \frac{\sqrt{1}}{\sqrt{9}}$, or $r = \frac{1}{3}$.

Choices B and C are incorrect and may result from incorrectly evaluating $\sqrt{\left(\frac{1}{9}\right)}$. Choice D is incorrect and may result from solving $r^2 = 9$ instead of $r^2 = \frac{1}{9}$.

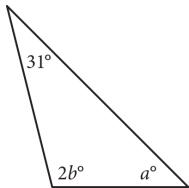
Question Difficulty:

Hard

Question ID 410bdb6e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 410bdb6e6



In the triangle above, $a = 45$. What is the value of b ?

- A. 52
- B. 59
- C. 76
- D. 104

ID: 410bdb6e6 Answer

Correct Answer:

A

Rationale

Choice A is correct. The sum of the measures of the three interior angles of a triangle is 180° . Therefore, $31 + 2b + a = 180$. Since it's given that $a = 45$, it follows that $31 + 2b + 45 = 180$, or $2b = 104$. Dividing both sides of this equation by 2 yields $b = 52$.

Choice B is incorrect and may result from a calculation error. Choice C is incorrect. This is the value of $a + 31$. Choice D is incorrect. This is the value of $2b$.

Question Difficulty:

Easy

Question ID a0cacec1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a0cacec1

An angle has a measure of $\frac{16\pi}{15}$ radians. What is the measure of the angle, in degrees?

ID: a0cacec1 Answer

Correct Answer:

192

Rationale

The correct answer is 192. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180}{\pi}$ degrees/radians. Multiplying the given angle measure, $\frac{16\pi}{15}$ radians, by $\frac{180}{\pi}$ degrees/radians yields $\frac{16\pi}{15} \cdot \frac{180}{\pi}$ degrees/radians, which simplifies to 192 degrees.

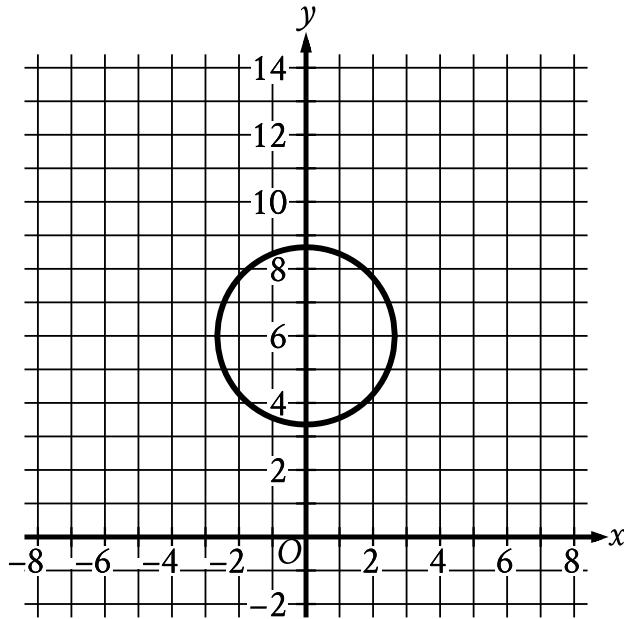
Question Difficulty:

Medium

Question ID 1b2b20b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 1b2b20b9



Circle A shown is defined by the equation $x^2 + (y - 6)^2 = 7$. Circle B (not shown) has the same radius but is translated 96 units to the right. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, where h , k , and a are constants, what is the value of $4a$?

ID: 1b2b20b9 Answer

Correct Answer:

28

Rationale

The correct answer is 28. The equation of a circle in the xy -plane can be written as $(x - t)^2 + (y - s)^2 = r^2$, where the center of the circle is (t, s) and the radius of the circle is r . It's given that circle A is defined by the equation $x^2 + (y - 6)^2 = 7$, which can be written as $(x - 0)^2 + (y - 6)^2 = \sqrt{7}^2$. It follows that $r = \sqrt{7}$ and the radius of circle A is $\sqrt{7}$. It's also given that circle B has the same radius as circle A. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, then $a = r^2$. Substituting $\sqrt{7}$ for r in this equation yields $a = \sqrt{7}^2$, or $a = 7$. It follows that the value of $4a$ is $4(7)$, or 28.

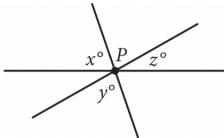
Question Difficulty:

Hard

Question ID 087cdcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 087cdcf



Note: Figure not drawn to scale.

In the figure, three lines intersect at point P. If $x = 65$ and $y = 75$, what is the value of z ?

- A. 140
- B. 80
- C. 40
- D. 20

ID: 087cdcf Answer

Correct Answer:

C

Rationale

Choice C is correct. The angle that is shown as lying between the y° angle and the z° angle is a vertical angle with the x° angle. Since vertical angles are congruent and $x = 65$, the angle between the y° angle and the z° angle measures 65° . Since the 65° angle, the y° angle, and the z° angle are adjacent and form a straight angle, it follows that the sum of the measures of these three angles is 180° , which is represented by the equation $65^\circ + y^\circ + z^\circ = 180^\circ$. It's given that $y = 75$. Substituting 75 for y yields $65^\circ + 75^\circ + z^\circ = 180^\circ$, which can be rewritten as $140^\circ + z^\circ = 180^\circ$. Subtracting 140° from both sides of this equation yields $z^\circ = 40^\circ$. Therefore, $z = 40$.

Choice A is incorrect and may result from finding the value of $x + y$ rather than z . Choices B and D are incorrect and may result from conceptual or computational errors.

Question Difficulty:

Easy

Question ID c88183f7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c88183f7

A rectangle has a length of **13** and a width of **6**. What is the perimeter of the rectangle?

- A. **12**
- B. **26**
- C. **38**
- D. **52**

ID: c88183f7 Answer

Correct Answer:

C

Rationale

Choice C is correct. The perimeter of a quadrilateral is the sum of the lengths of its four sides. It's given that the rectangle has a length of 13 and a width of 6. It follows that the rectangle has two sides with length 13 and two sides with length 6. Therefore, the perimeter of the rectangle is $13 + 13 + 6 + 6$, or 38.

Choice A is incorrect. This is the sum of the lengths of the two sides with length 6, not the sum of the lengths of all four sides of the rectangle.

Choice B is incorrect. This is the sum of the lengths of the two sides with length 13, not the sum of the lengths of all four sides of the rectangle.

Choice D is incorrect. This is the perimeter of a rectangle that has four sides with length 13, not two sides with length 13 and two sides with length 6.

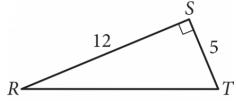
Question Difficulty:

Easy

Question ID 6933b3d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6933b3d9



In triangle RST above, point W (not shown) lies on \overline{RT} . What is the value of $\cos(\angle RSW) - \sin(\angle WST)$?

ID: 6933b3d9 Answer

Rationale

The correct answer is 0. Note that no matter where point W is on \overline{RT} , the sum of the measures of $\angle RSW$ and $\angle WST$ is equal to the measure of $\angle RST$, which is 90° . Thus, $\angle RSW$ and $\angle WST$ are complementary angles. Since the cosine of an angle is equal to the sine of its complementary angle, $\cos(\angle RSW) = \sin(\angle WST)$. Therefore, $\cos(\angle RSW) - \sin(\angle WST) = 0$.

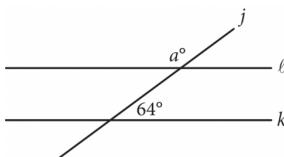
Question Difficulty:

Hard

Question ID 992f4e93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 992f4e93



Note: Figure not drawn to scale.

In the figure above, lines ℓ and k are parallel.

What is the value of a ?

- A. 26
- B. 64
- C. 116
- D. 154

ID: 992f4e93 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since lines ℓ and k are parallel, corresponding angles formed by the intersection of line j with lines ℓ and k are congruent. Therefore, the angle with measure a° must be the supplement of the angle with measure 64° . The sum of two supplementary angles is 180° , so $a = 180 - 64 = 116$.

Choice A is incorrect and likely results from thinking the angle with measure a° is the complement of the angle with measure 64° . Choice B is incorrect and likely results from thinking the angle with measure a° is congruent to the angle with measure 64° . Choice D is incorrect and likely results from a conceptual or computational error.

Question Difficulty:

Easy

Question ID f1747a6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: f1747a6a

In triangle ABC , the measure of angle B is 52° and the measure of angle C is 17° . What is the measure of angle A ?

- A. 21°
- B. 35°
- C. 69°
- D. 111°

ID: f1747a6a Answer

Correct Answer:

D

Rationale

Choice D is correct. The sum of the angle measures of a triangle is 180° . Adding the measures of angles B and C gives $52 + 17 = 69^\circ$. Therefore, the measure of angle A is $180 - 69 = 111^\circ$.

Choice A is incorrect and may result from subtracting the sum of the measures of angles B and C from 90° , instead of from 180° .

Choice B is incorrect and may result from subtracting the measure of angle C from the measure of angle B .

Choice C is incorrect and may result from adding the measures of angles B and C but not subtracting the result from 180° .

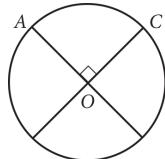
Question Difficulty:

Easy

Question ID 23c5fcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 23c5fcce



The circle above with center O has a circumference of 36.

What is the length of minor arc \overarc{AC} ?

- A. 9
- B. 12
- C. 18
- D. 36

ID: 23c5fcce Answer

Correct Answer:

A

Rationale

Choice A is correct. A circle has 360 degrees of arc. In the circle shown, O is the center of the circle and $\angle AOC$ is a central angle of the circle. From the figure, the two diameters that meet to form $\angle AOC$ are perpendicular, so the measure of $\angle AOC$ is 90° .

Therefore, the length of minor arc \overarc{AC} is $\frac{90}{360}$ of the circumference of the circle. Since the circumference of the circle is 36, the

$$\text{length of minor arc } \overarc{AC} \text{ is } \frac{90}{360} \times 36 = 9.$$

Choices B, C, and D are incorrect. The perpendicular diameters divide the circumference of the circle into four equal arcs; therefore, minor arc \overarc{AC} is $\frac{1}{4}$ of the circumference. However, the lengths in choices B and C are, respectively, $\frac{1}{3}$ and $\frac{1}{2}$ the circumference of the circle, and the length in choice D is the length of the entire circumference. None of these lengths is $\frac{1}{4}$ the circumference.

Question Difficulty:

Easy

Question ID 6ab30ce3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6ab30ce3

Triangle ABC is similar to triangle DEF , where A corresponds to D and C corresponds to F . Angles C and F are right angles. If $\tan(A) = \sqrt{3}$ and $DF = 125$, what is the length of \overline{DE} ?

- A. $125\frac{\sqrt{3}}{3}$
- B. $125\frac{\sqrt{3}}{2}$
- C. $125\sqrt{3}$
- D. 250

ID: 6ab30ce3 Answer

Correct Answer:

D

Rationale

Choice D is correct. Corresponding angles in similar triangles have equal measures. It's given that triangle ABC is similar to triangle DEF , where A corresponds to D , so the measure of angle A is equal to the measure of angle D . Therefore, if $\tan A = \sqrt{3}$, then $\tan D = \sqrt{3}$. It's given that angles C and F are right angles, so triangles ABC and DEF are right triangles. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle D is side DF . The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle D is side EF . The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. Therefore, $\tan D = \frac{EF}{DF}$. If $DF = 125$, the length of side EF can be found by substituting $\sqrt{3}$ for $\tan D$ and 125 for DF in the equation $\tan D = \frac{EF}{DF}$, which yields $\sqrt{3} = \frac{EF}{125}$. Multiplying both sides of this equation by 125 yields $125\sqrt{3} = EF$. Since the length of side EF is $\sqrt{3}$ times the length of side DF , it follows that triangle DEF is a special right triangle with angle measures 30° , 60° , and 90° . Therefore, the length of the hypotenuse, DE , is 2 times the length of side DF , or $DE = 2DF$. Substituting 125 for DF in this equation yields $DE = 250$, or $DE = 250$. Thus, if $\tan A = \sqrt{3}$ and $DF = 125$, the length of DE is 250.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the length of EF , not DE .

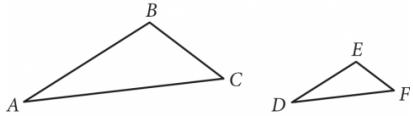
Question Difficulty:

Hard

Question ID 1c3d613c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1c3d613c



Note: Figures not drawn to scale.

Triangle ABC and triangle DEF are shown. The relationship between the side lengths of the two triangles is such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = 3$. If the measure of angle BAC is 20° , what is the measure, in degrees, of angle EDF ? (Disregard the degree symbol when gridding your answer.)

ID: 1c3d613c Answer

Rationale

The correct answer is 20. By the equality given, the three pairs of corresponding sides of the two triangles are in the same proportion. By the side-side-side (SSS) similarity theorem, triangle ABC is similar to triangle DEF . In similar triangles, the measures of corresponding angles are congruent. Since angle BAC corresponds to angle EDF , these two angles are congruent and their measures are equal. It's given that the measure of angle BAC is 20° , so the measure of angle EDF is also 20° .

Question Difficulty:

Medium

Question ID 2d521ca9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 2d521ca9

The measure of angle Z is 60° . What is the measure, in radians, of angle Z ?

- A. $\frac{1}{6}\pi$
- B. $\frac{1}{3}\pi$
- C. $\frac{2}{3}\pi$
- D. 1π

ID: 2d521ca9 Answer

Correct Answer:

B

Rationale

Choice B is correct. The measure of an angle, in radians, can be found by multiplying its measure, in degrees, by $\frac{\pi}{180}$. It's given that the measure of angle Z is 60° . It follows that the measure, in radians, of angle Z is $60 \frac{\pi}{180}$, or $\frac{1}{3}\pi$.

Choice A is incorrect. This is the measure, in radians, of an angle whose measure is 30° , not 60° .

Choice C is incorrect. This is the measure, in radians, of an angle whose measure is 120° , not 60° .

Choice D is incorrect. This is the measure, in radians, of an angle whose measure is 180° , not 60° .

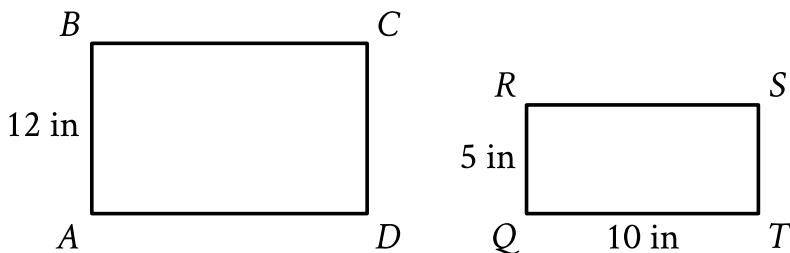
Question Difficulty:

Medium

Question ID e9c5fb2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e9c5fb2



Note: Figure not drawn to scale.

Rectangles $ABCD$ and $QRST$ shown are similar, where A, B, C , and D correspond to Q, R, S , and T , respectively. What is the length, in inches (in), of \overline{AD} ?

- A. 60
- B. 24
- C. 17
- D. 10

ID: e9c5fb2 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that rectangles $ABCD$ and $QRST$ are similar, where A, B, C , and D correspond to Q, R, S , and T , respectively. It follows that \overline{AB} corresponds to \overline{QR} and \overline{AD} corresponds to \overline{QT} . If two rectangles are similar, then the lengths of their corresponding sides are proportional. It's given in the figure that the length of \overline{AB} is 12 inches, the length of \overline{QR} is 5 inches, and the length of \overline{QT} is 10 inches. If x is the length, in inches, of \overline{AD} , then $\frac{12}{5}$ is equivalent to $\frac{x}{10}$. Therefore, the value of x can be found using the equation $\frac{12}{5} = \frac{x}{10}$. Multiplying each side of this equation by 10 yields $\frac{120}{5} = x$, or $24 = x$. Therefore, the length, in inches, of \overline{AD} is 24.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the length, in inches, of \overline{QT} , not \overline{AD} .

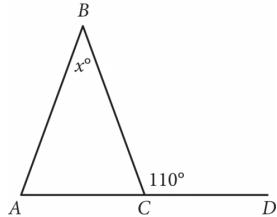
Question Difficulty:

Medium

Question ID 5733ce30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5733ce30



In the given figure, \overline{AC} extends to point D. If the measure of $\angle BAC$ is equal to the measure of $\angle BCA$, what is the value of x?

- A. 110
- B. 70
- C. 55
- D. 40

ID: 5733ce30 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since $\angle BCD$ and $\angle BCA$ form a linear pair of angles, their measures sum to 180° . It's given that the measure of $\angle BCD$ is 110° . Therefore, $110^\circ + \angle BCA = 180^\circ$. Subtracting 110° from both sides of this equation gives the measure of $\angle BCA$ as 70° . It's also given that the measure of $\angle BAC$ is equal to the measure of $\angle BCA$. Thus, the measure of $\angle BAC$ is also 70° . The measures of the interior angles of a triangle sum to 180° . Thus, $70^\circ + 70^\circ + x^\circ = 180^\circ$. Combining like terms on the left-hand side of this equation yields $140^\circ + x^\circ = 180^\circ$. Subtracting 140° from both sides of this equation yields $x^\circ = 40^\circ$, or $x = 40$.

Choice A is incorrect. This is the value of the measure of $\angle BCD$. Choice B is incorrect. This is the value of the measure of each of the other two interior angles, $\angle BCA$ and $\angle BAC$. Choice C is incorrect and may result from an error made when identifying the relationship between the exterior angle of a triangle and the interior angles of the triangle.

Question Difficulty:

Easy

Question ID 7a8ad237

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7a8ad237

Triangles ABC and DEF are congruent, where A corresponds to D , and B and E are right angles. The measure of angle A is 69° . What is the measure, in degrees, of angle F ?

ID: 7a8ad237 Answer

Correct Answer:

21

Rationale

The correct answer is 21. It's given that triangles ABC and DEF are congruent with angle A corresponding to angle D . Corresponding angles of congruent triangles are congruent and, therefore, have equal measure. It's given that the measure of angle A is 69° . It follows that the measure of angle D is also 69° . It's given that angle E is a right angle. Therefore, the measure of angle E is 90° . Let x represent the measure, in degrees, of angle F . Since the measures of the angles in a triangle sum to 180° , it follows that $69 + 90 + x = 180$, or $159 + x = 180$. Subtracting 159 from both sides of this equation yields $x = 21$. Therefore, the measure, in degrees, of angle F is 21.

Question Difficulty:

Medium

Question ID 50774285

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 50774285

Each base of a right rectangular prism has a length of **19** inches and a width of **8** inches. The prism has a volume of **2,736** cubic inches. What is the height, in inches, of the prism?

- A. **18**
- B. **27**
- C. **144**
- D. **152**

ID: 50774285 Answer

Correct Answer:

A

Rationale

Choice A is correct. The volume, V , of a rectangular prism is given by the formula $V = lwh$, where l is the length of the base, w is the width of the base, and h is the height of the prism. It's given that each base of a right rectangular prism has a length of 19 inches and a width of 8 inches, and that the prism has a volume of 2,736 cubic inches. Substituting 19 for l , 8 for w , and 2,736 for V in the formula $V = lwh$ gives $2,736 = (19)(8)(h)$, or $2,736 = 152h$. Dividing each side of this equation by 152 yields $18 = h$. Therefore, the height, in inches, of the prism is 18.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the area, in square inches, of the base of the prism, not the height, in inches, of the prism.

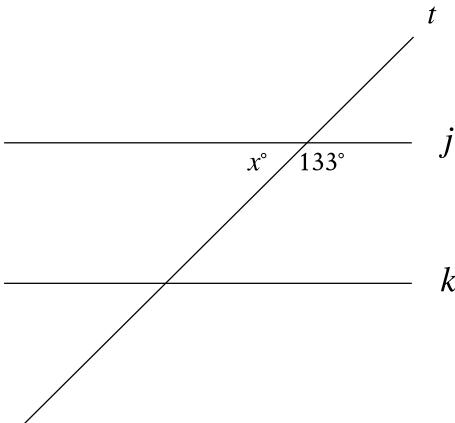
Question Difficulty:

Easy

Question ID 3b4b5b1e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 3b4b5b1e



Note: Figure not drawn to scale.

In the figure, line **j** is parallel to line **k**. What is the value of **x**?

ID: 3b4b5b1e Answer

Correct Answer:

47

Rationale

The correct answer is 47. Based on the figure, the angle with measure x° and the angle with measure 133° together form a straight line. Therefore, these two angles are supplementary, so the sum of their measures is 180° . It follows that $x + 133 = 180$. Subtracting 133 from both sides of this equation yields $x = 47$.

Question Difficulty:

Easy

Question ID 5b4757df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 5b4757df

In triangle RST , angle T is a right angle, point L lies on \overline{RS} , point K lies on \overline{ST} , and \overline{LK} is parallel to \overline{RT} . If the length of \overline{RT} is 72 units, the length of \overline{LK} is 24 units, and the area of triangle RST is 792 square units, what is the length of \overline{KT} , in units?

ID: 5b4757df Answer

Correct Answer:

14.66, 14.67, 44/3

Rationale

The correct answer is $\frac{44}{3}$. It's given that in triangle RST , angle T is a right angle. The area of a right triangle can be found using the formula $A = \frac{1}{2}l_1l_2$, where A represents the area of the right triangle, l_1 represents the length of one leg of the triangle, and l_2 represents the length of the other leg of the triangle. In triangle RST , the two legs are \overline{RT} and \overline{ST} . Therefore, if the length of \overline{RT} is 72 and the area of triangle RST is 792, then $792 = \frac{1}{2}72\overline{ST}$, or $792 = 36\overline{ST}$. Dividing both sides of this equation by 36 yields $22 = \overline{ST}$. Therefore, the length of \overline{ST} is 22. It's also given that point L lies on \overline{RS} , point K lies on \overline{ST} , and \overline{LK} is parallel to \overline{RT} . It follows that angle LKS is a right angle. Since triangles RST and LSK share angle S and have right angles T and K , respectively, triangles RST and LSK are similar triangles. Therefore, the ratio of the length of \overline{RT} to the length of \overline{LK} is equal to the ratio of the length of \overline{ST} to the length of \overline{SK} . If the length of \overline{RT} is 72 and the length of \overline{LK} is 24, it follows that the ratio of the length of \overline{RT} to the length of \overline{LK} is $\frac{72}{24}$, or 3, so the ratio of the length of \overline{ST} to the length of \overline{SK} is 3. Therefore, $\frac{22}{\overline{SK}} = 3$. Multiplying both sides of this equation by \overline{SK} yields $22 = 3\overline{SK}$. Dividing both sides of this equation by 3 yields $\frac{22}{3} = \overline{SK}$. Since the length of \overline{ST} , 22, is the sum of the length of \overline{SK} , $\frac{22}{3}$, and the length of \overline{KT} , it follows that the length of \overline{KT} is $22 - \frac{22}{3}$, or $\frac{44}{3}$. Note that $44/3$, 14.66, and 14.67 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID ca2235f6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: ca2235f6

A circle has center O , and points A and B lie on the circle. The measure of arc AB is 45° and the length of arc AB is 3 inches. What is the circumference, in inches, of the circle?

- A. 3
- B. 6
- C. 9
- D. 24

ID: ca2235f6 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the measure of arc AB is 45° and the length of arc AB is 3 inches. The arc measure of the full circle is 360° . If x represents the circumference, in inches, of the circle, it follows that $\frac{45^\circ}{360^\circ} = \frac{3 \text{ inches}}{x \text{ inches}}$. This equation is equivalent to $\frac{45}{360} = \frac{3}{x}$, or $\frac{1}{8} = \frac{3}{x}$. Multiplying both sides of this equation by $8x$ yields $1(x) = 3(8)$, or $x = 24$. Therefore, the circumference of the circle is 24 inches.

Choice A is incorrect. This is the length of arc AB .

Choice B is incorrect and may result from multiplying the length of arc AB by 2.

Choice C is incorrect and may result from squaring the length of arc AB .

Question Difficulty:

Hard

Question ID 856372ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 856372ca

In the xy -plane, a circle with radius 5 has center $(-8, 6)$. Which of the following is an equation of the circle?

- A. $(x - 8)^2 + (y + 6)^2 = 25$
- B. $(x + 8)^2 + (y - 6)^2 = 25$
- C. $(x - 8)^2 + (y + 6)^2 = 5$
- D. $(x + 8)^2 + (y - 6)^2 = 5$

ID: 856372ca Answer

Correct Answer:

B

Rationale

Choice B is correct. An equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius is r . It's given that the center of this circle is $(-8, 6)$ and the radius is 5. Substituting these values into the equation gives $(x - (-8))^2 + (y - 6)^2 = 5^2$, or $(x + 8)^2 + (y - 6)^2 = 25$.

Choice A is incorrect. This is an equation of a circle that has center $(8, -6)$. Choice C is incorrect. This is an equation of a circle that has center $(8, -6)$ and radius $\sqrt{5}$. Choice D is incorrect. This is an equation of a circle that has radius $\sqrt{5}$.

Question Difficulty:

Medium

Question ID 9c0a0eca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9c0a0eca

A triangle has a base length of 10 centimeters and a corresponding height of 70 centimeters. What is the area, in square centimeters, of the triangle?

- A. 700
- B. 350
- C. 175
- D. 80

ID: 9c0a0eca Answer

Correct Answer:

B

Rationale

Choice B is correct. The area, A , of a triangle is given by $A = \frac{1}{2}bh$, where b is the length of a base of the triangle and h is the corresponding height of the triangle. It's given that a triangle has a base length of 10 centimeters and a corresponding height of 70 centimeters. Substituting 10 for b and 70 for h in the formula $A = \frac{1}{2}bh$ yields $A = \frac{1}{2}1070$, or $A = 350$. Therefore, the area, in square centimeters, of the triangle is 350.

Choice A is incorrect. This is the product of the given base and height of the triangle, not its area.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the sum of the given base and height of the triangle, not its area.

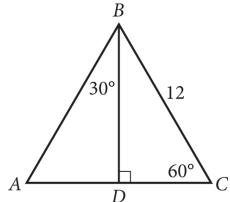
Question Difficulty:

Medium

Question ID bf8d843e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: bf8d843e



In $\triangle ABC$ above, what is the length of \overline{AD} ?

- A. 4
- B. 6
- C. $6\sqrt{2}$
- D. $6\sqrt{3}$

ID: bf8d843e Answer

Correct Answer:

B

Rationale

Choice B is correct. Triangles ADB and CDB are both $30^\circ - 60^\circ - 90^\circ$ triangles and share \overline{BD} . Therefore, triangles ADB and CDB are congruent by the angle-side-angle postulate. Using the properties of $30^\circ - 60^\circ - 90^\circ$ triangles, the length of \overline{AD} is half the length of hypotenuse \overline{AB} . Since the triangles are congruent, $AB = BC = 12$. So the length of \overline{AD} is $\frac{12}{2} = 6$.

Alternate approach: Since angle CBD has a measure of 30° , angle ABC must have a measure of 60° . It follows that triangle ABC is equilateral, so side AC also has length 12. It also follows that the altitude BD is also a median, and therefore the length of AD is half of the length of AC, which is 6.

Choice A is incorrect. If the length of \overline{AD} were 4, then the length of \overline{AB} would be 8. However, this is incorrect because \overline{AB} is congruent to \overline{BC} , which has a length of 12. Choices C and D are also incorrect. Following the same procedures as used to test choice A gives \overline{AB} a length of $12\sqrt{2}$ for choice C and $12\sqrt{3}$ for choice D. However, these results cannot be true because \overline{AB} is congruent to \overline{BC} , which has a length of 12.

Question Difficulty:

Medium

Question ID aef4fd8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: aef4fd8a

The length of each side of a square is **94** centimeters (cm). Which expression gives the area, in **cm²**, of the square?

- A. $2 \cdot 94$
- B. $2 \cdot 94 \cdot 94$
- C. $4 \cdot 94$
- D. $94 \cdot 94$

ID: aef4fd8a Answer

Correct Answer:

D

Rationale

Choice D is correct. The area of a square is given by s^2 , where s is the length of each side of the square. It's given that the length of each side of a square is 94 cm. It follows that the area, in cm^2 , of the square is 94^2 , or $94 \cdot 94$. Therefore, the expression that gives the area, in cm^2 , of the square is $94 \cdot 94$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. This expression gives the perimeter, in cm, of the square.

Question Difficulty:

Medium

Question ID 981275d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 981275d2

$$(x - 6)^2 + (y + 5)^2 = 16$$

In the xy -plane, the graph of the equation above is a circle. Point P is on the circle and has coordinates $(10, -5)$. If \overline{PQ} is a diameter of the circle, what are the coordinates of point Q ?

- A. $(2, -5)$
- B. $(6, -1)$
- C. $(6, -5)$
- D. $(6, -9)$

ID: 981275d2 Answer

Correct Answer:

A

Rationale

Choice A is correct. The standard form for the equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) are the coordinates of the center and r is the length of the radius. According to the given equation, the center of the circle is $(6, -5)$. Let (x_1, y_1) represent the coordinates of point Q. Since point P $(10, -5)$ and point Q (x_1, y_1) are the endpoints of a diameter of the circle, the

center $(6, -5)$ lies on the diameter, halfway between P and Q. Therefore, the following relationships hold: $\frac{x_1 + 10}{2} = 6$ and $\frac{y_1 + (-5)}{2} = -5$. Solving the equations for x_1 and y_1 , respectively, yields $x_1 = 2$ and $y_1 = -5$. Therefore, the coordinates of point Q are $(2, -5)$.

Alternate approach: Since point P $(10, -5)$ on the circle and the center of the circle $(6, -5)$ have the same y-coordinate, it follows that the radius of the circle is $10 - 6 = 4$. In addition, the opposite end of the diameter \overline{PQ} must have the same y-coordinate as P and be 4 units away from the center. Hence, the coordinates of point Q must be $(2, -5)$.

Choices B and D are incorrect because the points given in these choices lie on a diameter that is perpendicular to the diameter \overline{PQ} . If either of these points were point Q, then \overline{PQ} would not be the diameter of the circle. Choice C is incorrect because $(6, -5)$ is the center of the circle and does not lie on the circle.

Question Difficulty:
Hard

Question ID 89661424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 89661424

A circle in the xy -plane has its center at $(-5, 2)$ and has a radius of 9 . An equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a , b , and c are constants. What is the value of c ?

ID: 89661424 Answer

Correct Answer:

-52

Rationale

The correct answer is -52. The equation of a circle in the xy -plane with its center at (h, k) and a radius of r can be written in the form $x - h^2 + y - k^2 = r^2$. It's given that a circle in the xy -plane has its center at $(-5, 2)$ and has a radius of 9. Substituting -5 for h , 2 for k , and 9 for r in the equation $x - h^2 + y - k^2 = r^2$ yields $x - (-5)^2 + y - 2^2 = 9^2$, or $x + 5^2 + y - 2^2 = 81$. It's also given that an equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a , b , and c are constants. Therefore, $x + 5^2 + y - 2^2 = 81$ can be rewritten in the form $x^2 + y^2 + ax + by + c = 0$. The equation $x + 5^2 + y - 2^2 = 81$, or $x + 5x + 5 + y - 2y - 2 = 81$, can be rewritten as $x^2 + 5x + 5x + 25 + y^2 - 2y - 2y + 4 = 81$. Combining like terms on the left-hand side of this equation yields $x^2 + y^2 + 10x - 4y + 29 = 81$. Subtracting 81 from both sides of this equation yields $x^2 + y^2 + 10x - 4y - 52 = 0$, which is equivalent to $x^2 + y^2 + 10x + -4y + -52 = 0$. This equation is in the form $x^2 + y^2 + ax + by + c = 0$. Therefore, the value of c is -52.

Question Difficulty:

Hard

Question ID d03e29f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: d03e29f1

$$(x - 6)^2 + (y - 3)^2 = 81$$

The graph of the given equation in the xy -plane is a circle. What is the length of the radius of this circle?

- A. 3
- B. 6
- C. 9
- D. 81

ID: d03e29f1 Answer

Correct Answer:

C

Rationale

Choice C is correct. The equation of a circle in the xy -plane can be written as $x - h^2 + y - k^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . The graph of the given equation, $x - 6^2 + y - 3^2 = 81$, is a circle in the xy -plane. This equation can be written as $x - 6^2 + y - 3^2 = 9^2$, where $h = 6$, $k = 3$, and $r = 9$. Therefore, the radius of this circle is 9.

Choice A is incorrect. This is the y -coordinate of the center, not the radius, of the circle defined by the given equation.

Choice B is incorrect. This is the x -coordinate of the center, not the radius, of the circle defined by the given equation.

Choice D is incorrect. This is the value of the radius squared, not the radius, of the circle defined by the given equation.

Question Difficulty:

Easy

Question ID 7c25b0dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 7c25b0dc

The length of a rectangle's diagonal is $3\sqrt{17}$, and the length of the rectangle's shorter side is 3. What is the length of the rectangle's longer side?

ID: 7c25b0dc Answer

Correct Answer:

12

Rationale

The correct answer is 12. The diagonal of a rectangle forms a right triangle, where the shorter side and the longer side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. It's given that the length of the rectangle's diagonal is $3\sqrt{17}$ and the length of the rectangle's shorter side is 3. Thus, the length of the hypotenuse of the right triangle formed by the diagonal is $3\sqrt{17}$ and the length of one of the legs is 3. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b , then $a^2 + b^2 = c^2$. Substituting $3\sqrt{17}$ for c and 3 for b in this equation yields $a^2 + 3^2 = (3\sqrt{17})^2$, or $a^2 + 9 = 153$. Subtracting 9 from both sides of this equation yields $a^2 = 144$. Taking the square root of both sides of this equation yields $a = \pm\sqrt{144}$, or $a = \pm 12$. Since a represents a length, which must be positive, the value of a is 12. Thus, the length of the rectangle's longer side is 12.

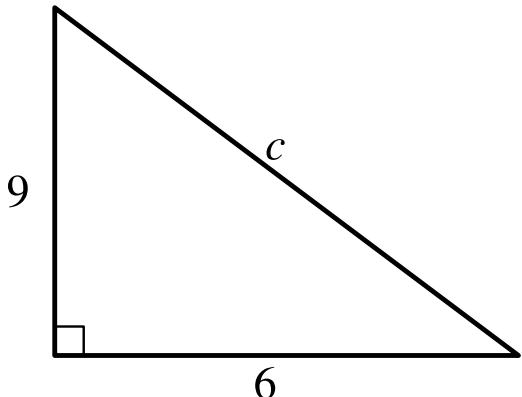
Question Difficulty:

Hard

Question ID 36661021

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 36661021



Note: Figure not drawn to scale.

In the right triangle shown, which of the following is closest to the value of c ?

- A. 7.5
- B. 10.8
- C. 15
- D. 58.5

ID: 36661021 Answer

Correct Answer:

B

Rationale

Choice B is correct. By the Pythagorean theorem, if a right triangle has a hypotenuse with length t and legs with lengths r and s , then $r^2 + s^2 = t^2$. It's given in the right triangle shown that the legs have lengths of 9 and 6 and the hypotenuse has a length of c . Substituting 9 for r , 6 for s , and c for t in $r^2 + s^2 = t^2$ yields $9^2 + 6^2 = c^2$, or $117 = c^2$. Taking the square root of both sides of this equation yields $\pm\sqrt{117} = c$. Since the length of a side of a triangle must be positive, the value of c is $\sqrt{117}$, which is approximately equal to 10.8167. Of the choices, 10.8 is the closest to the value of c .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

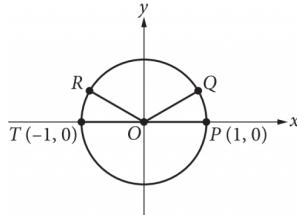
Question Difficulty:

Easy

Question ID 95ba2d09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 95ba2d09



In the xy -plane above, points P , Q , R , and T lie on the circle with center O . The degree measures of angles $\angle POQ$ and $\angle ROT$ are each 30° . What is the radian measure of angle $\angle QOR$?

A. $\frac{5}{6}\pi$

B. $\frac{3}{4}\pi$

C. $\frac{2}{3}\pi$

D. $\frac{1}{3}\pi$

ID: 95ba2d09 Answer

Correct Answer:

C

Rationale

Choice C is correct. Because points T , O , and P all lie on the x -axis, they form a line. Since the angles on a line add up to 180° , and it's given that angles $\angle POQ$ and $\angle ROT$ each measure 30° , it follows that the measure of angle $\angle QOR$ is $180^\circ - 30^\circ - 30^\circ = 120^\circ$.

Since the arc of a complete circle is 360° or 2π radians, a proportion can be set up to convert the measure of angle $\angle QOR$ from

degrees to radians:
$$\frac{360 \text{ degrees}}{2\pi \text{ radians}} = \frac{120 \text{ degrees}}{x \text{ radians}}$$
, where x is the radian measure of angle $\angle QOR$. Multiplying each side of the proportion by $2\pi x$ gives $360x = 240\pi$. Solving for x gives $\frac{240}{360}\pi$, or $\frac{2}{3}\pi$.

Choice A is incorrect and may result from subtracting only angle $\angle POQ$ from 180° to get a value of 150° and then finding the radian measure equivalent to that value. Choice B is incorrect and may result from a calculation error. Choice D is incorrect and may result from calculating the sum of the angle measures, in radians, of angles $\angle POQ$ and $\angle ROT$.

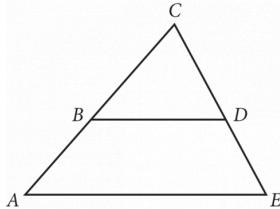
Question Difficulty:

Medium

Question ID 6dd463ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6dd463ca



Note: Figure not drawn to scale.

In the figure above, segments AE and BD are parallel. If angle BDC measures 58° and angle ACE measures 62° , what is the measure of angle CAE ?

- A. 58°
- B. 60°
- C. 62°
- D. 120°

ID: 6dd463ca Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that angle ACE measures 62° . Since segments AE and BD are parallel, angles BDC and CEA are congruent. Therefore, angle CEA measures 58° . The sum of the measures of angles ACE , CEA , and CAE is 180° since the sum of the interior angles of triangle ACE is equal to 180° . Let the measure of angle CAE be x° . Therefore, $62 + 58 + x = 180$, which simplifies to $x = 60$. Thus, the measure of angle CAE is 60° .

Choice A is incorrect. This is the measure of angle AEC , not that of angle CAE . Choice C is incorrect. This is the measure of angle ACE , not that of CAE . Choice D is incorrect. This is the sum of the measures of angles ACE and CEA .

Question Difficulty:

Medium

Question ID 93de3f84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 93de3f84

The volume of right circular cylinder A is 22 cubic centimeters. What is the volume, in cubic centimeters, of a right circular cylinder with twice the radius and half the height of cylinder A?

- A. 11
- B. 22
- C. 44
- D. 66

ID: 93de3f84 Answer

Correct Answer:

C

Rationale

Choice C is correct. The volume of right circular cylinder A is given by the expression $\pi r^2 h$, where r is the radius of its circular base and h is its height. The volume of a cylinder with twice the radius and half the height of cylinder A is given by $\pi(2r)^2 \left(\frac{1}{2}h\right)$, which is equivalent to $4\pi r^2 \left(\frac{1}{2}\right)h = 2\pi r^2 h$. Therefore, the volume is twice the volume of cylinder A, or $2 \times 22 = 44$.

Choice A is incorrect and likely results from not multiplying the radius of cylinder A by 2. Choice B is incorrect and likely results from not squaring the 2 in $2r$ when applying the volume formula. Choice D is incorrect and likely results from a conceptual error.

Question Difficulty:

Hard

Question ID f60bb551

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f60bb551

The area of a rectangle is **630** square inches. The length of the rectangle is **70** inches. What is the width, in inches, of this rectangle?

- A. **9**
- B. **70**
- C. **315**
- D. **560**

ID: f60bb551 Answer

Correct Answer:

A

Rationale

Choice A is correct. The area A , in square inches, of a rectangle is the product of its length l , in inches, and its width w , in inches; thus, $A = lw$. It's given that the area of a rectangle is 630 square inches and the length of the rectangle is 70 inches. Substituting 630 for A and 70 for l in the equation $A = lw$ yields $630 = 70w$. Dividing both sides of this equation by 70 yields $9 = w$. Therefore, the width, in inches, of this rectangle is 9.

Choice B is incorrect. This is the length, not the width, in inches, of the rectangle.

Choice C is incorrect. This is half the area, in square inches, not the width, in inches, of the rectangle.

Choice D is incorrect. This is the difference between the area, in square inches, and the length, in inches, of the rectangle, not the width, in inches, of the rectangle.

Question Difficulty:

Easy

Question ID d2047497

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d2047497

What is the area of a rectangle with a length of 17 centimeters (cm) and a width of 7 cm?

- A. 24 cm^2
- B. 48 cm^2
- C. 119 cm^2
- D. 576 cm^2

ID: d2047497 Answer

Correct Answer:

C

Rationale

Choice C is correct. The area of a rectangle with length l and width w can be found using the formula $A = lw$. It's given that the rectangle has a length of 17 cm and a width of 7 cm. Therefore, the area of this rectangle is $A = 17 \times 7$, or 119 cm^2 .

Choice A is incorrect. This is the sum of the length and width of the rectangle, not the area.

Choice B is incorrect. This is the perimeter of the rectangle, not the area.

Choice D is incorrect. This is the sum of the length and width of the rectangle squared, not the area.

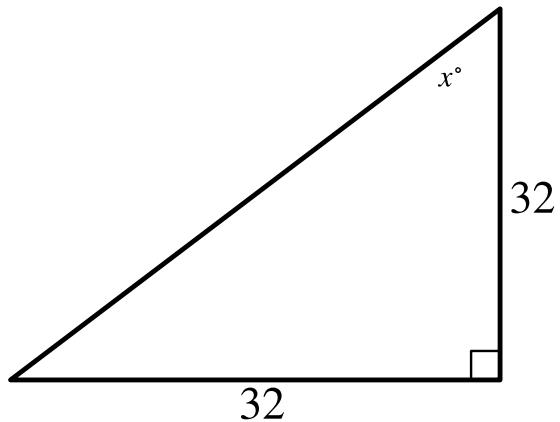
Question Difficulty:

Easy

Question ID a71617d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a71617d3



Note: Figure not drawn to scale.

In the triangle shown, what is the value of x ?

ID: a71617d3 Answer

Correct Answer:

45

Rationale

The correct answer is 45. An isosceles right triangle has a right angle and two legs of equal length. In the triangle shown, one angle is a right angle and the two legs each have a length of 32. Thus, the given triangle is an isosceles right triangle. In an isosceles right triangle, the measures of the two non-right angles are 45° . It follows that the value of x is 45.

Question Difficulty:

Medium

Question ID a5aee181

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a5aee181

The length of a rectangle's diagonal is $5\sqrt{17}$, and the length of the rectangle's shorter side is 5. What is the length of the rectangle's longer side?

- A. $\sqrt{17}$
- B. 20
- C. $15\sqrt{2}$
- D. 400

ID: a5aee181 Answer

Correct Answer:

B

Rationale

Choice B is correct. A rectangle's diagonal divides a rectangle into two congruent right triangles, where the diagonal is the hypotenuse of both triangles. It's given that the length of the diagonal is $5\sqrt{17}$ and the length of the rectangle's shorter side is 5. Therefore, each of the two right triangles formed by the rectangle's diagonal has a hypotenuse with length $5\sqrt{17}$, and a shorter leg with length 5. To calculate the length of the longer leg of each right triangle, the Pythagorean theorem, $a^2 + b^2 = c^2$, can be used, where a and b are the lengths of the legs and c is the length of the hypotenuse of the triangle. Substituting 5 for a and $5\sqrt{17}$ for c in the equation $a^2 + b^2 = c^2$ yields $5^2 + b^2 = 5\sqrt{17}^2$, which is equivalent to $25 + b^2 = 25 \cdot 17$, or $25 + b^2 = 425$. Subtracting 25 from each side of this equation yields $b^2 = 400$. Taking the positive square root of each side of this equation yields $b = 20$. Therefore, the length of the longer leg of each right triangle formed by the diagonal of the rectangle is 20. It follows that the length of the rectangle's longer side is 20.

Choice A is incorrect and may result from dividing the length of the rectangle's diagonal by the length of the rectangle's shorter side, rather than substituting these values into the Pythagorean theorem.

Choice C is incorrect and may result from using the length of the rectangle's diagonal as the length of a leg of the right triangle, rather than the length of the hypotenuse.

Choice D is incorrect. This is the square of the length of the rectangle's longer side.

Question Difficulty:

Medium

Question ID fb58c0db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%;"><div style="width: 100%; height: 10px; background-color: #0056b3;"></div></div>

ID: fb58c0db

Points A and B lie on a circle with radius 1, and arc \widehat{AB} has length $\frac{\pi}{3}$. What fraction of the circumference of the circle is the length of arc \widehat{AB} ?

ID: fb58c0db Answer

Rationale

$\frac{1}{6}$

The correct answer is $\frac{1}{6}$. The circumference, C, of a circle is $C = 2\pi r$, where r is the length of the radius of the circle. For the given circle with a radius of 1, the circumference is $C = 2(\pi)(1)$, or $C = 2\pi$. To find what fraction of the circumference the length of arc \widehat{AB} is, divide the length of the arc by the circumference, which gives $\frac{\pi}{3} \div 2\pi$. This division can be represented by $\frac{\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{6}$. Note that 1/6, .1666, .1667, 0.166, and 0.167 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID c6dff223

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: c6dff223

Triangle ABC is similar to triangle DEF , where angle A corresponds to angle D and angles C and F are right angles. The length of \overline{AB} is 2.9 times the length of \overline{DE} . If $\tan A = \frac{21}{20}$, what is the value of $\sin D$?

ID: c6dff223 Answer

Correct Answer:

.7241, 21/29

Rationale

The correct answer is $\frac{21}{29}$. It's given that triangle ABC is similar to triangle DEF , where angle A corresponds to angle D and angles C and F are right angles. In similar triangles, the tangents of corresponding angles are equal. Therefore, if $\tan A = \frac{21}{20}$, then $\tan D = \frac{21}{20}$. In a right triangle, the tangent of an acute angle is the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. Therefore, in triangle DEF , if $\tan D = \frac{21}{20}$, the ratio of the length of \overline{EF} to the length of \overline{DF} is $\frac{21}{20}$. If the lengths of \overline{EF} and \overline{DF} are 21 and 20, respectively, then the ratio of the length of \overline{EF} to the length of \overline{DF} is $\frac{21}{20}$. In a right triangle, the sine of an acute angle is the ratio of the length of the leg opposite the angle to the length of the hypotenuse. Therefore, the value of $\sin D$ is the ratio of the length of \overline{EF} to the length of \overline{DE} . The length of \overline{DE} can be calculated using the Pythagorean theorem, which states that if the lengths of the legs of a right triangle are a and b and the length of the hypotenuse is c , then $a^2 + b^2 = c^2$. Therefore, if the lengths of \overline{EF} and \overline{DF} are 21 and 20, respectively, then $21^2 + 20^2 = DE^2$, or $841 = DE^2$. Taking the positive square root of both sides of this equation yields $29 = DE$. Therefore, if the lengths of \overline{EF} and \overline{DF} are 21 and 20, respectively, then the length of \overline{DE} is 29 and the ratio of the length of \overline{EF} to the length of \overline{DE} is $\frac{21}{29}$. Thus, if $\tan A = \frac{21}{20}$, the value of $\sin D$ is $\frac{21}{29}$. Note that 21/29, .7241, and 0.724 are examples of ways to enter a correct answer.

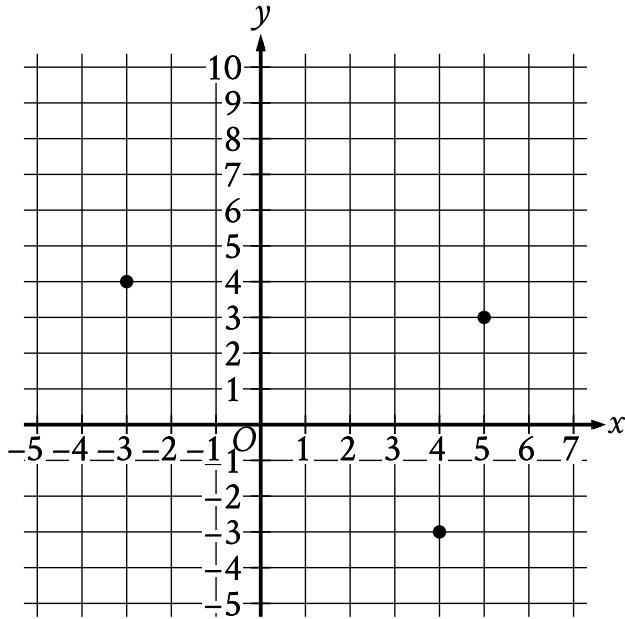
Question Difficulty:

Hard

Question ID eb70d2d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: eb70d2d0



What is the area, in square units, of the triangle formed by connecting the three points shown?

ID: eb70d2d0 Answer

Correct Answer:

24.5, 49/2

Rationale

The correct answer is 24.5. It's given that a triangle is formed by connecting the three points shown, which are -3, 4, 5, 3, and 4, -3. Let this triangle be triangle A. The area of triangle A can be found by calculating the area of the rectangle that circumscribes it and subtracting the areas of the three triangles that are inside the rectangle but outside triangle A. The rectangle formed by the points -3, 4, 5, 4, 5, -3, and -3, -3 circumscribes triangle A. The width, in units, of this rectangle can be found by calculating the distance between the points 5, 4 and 5, -3. This distance is 4 - -3, or 7. The length, in units, of this rectangle can be found by calculating the distance between the points 5, 4 and -3, 4. This distance is 5 - -3, or 8. It follows that the area, in square units, of the rectangle is 78, or 56. One of the triangles that lies inside the rectangle but outside triangle A is formed by the points -3, 4, 5, 4, and 5, 3. The length, in units, of a base of this triangle can be found by calculating the distance between the points 5, 4 and 5, 3. This distance is 4 - 3, or 1. The corresponding height, in units, of this triangle can be found by calculating the distance between the points 5, 4 and -3, 4. This distance is 5 - -3, or 8. It follows that the area, in square units, of this triangle is $\frac{1}{2} \times 8 \times 1 = 4$. A second triangle that lies inside the rectangle but outside triangle A is formed by the points 4, -3, 5, 3, and 5, -3. The length, in units, of a base of this triangle can be found by calculating the distance between the points 5, 3 and 5, -3. This distance is 3 - -3, or 6. The corresponding height, in units, of this triangle can be found by calculating the distance between the points 5, -3 and 4, -3. This distance is 5 - 4, or 1. It follows that the area, in square units, of this triangle is $\frac{1}{2} \times 6 \times 1 = 3$. The third triangle that lies inside the rectangle but outside triangle A is formed by the points -3, 4, -3, -3, and 4, -3. The length, in units, of a base of this triangle can be found by calculating the distance between the points 4, -3 and -3, -3. This distance is 4 - -3, or 7. The corresponding height, in units, of this triangle can be found by

calculating the distance between the points $-3, 4$ and $-3, -3$. This distance is $4 - -3$, or 7 . It follows that the area, in square units, of this triangle is $\frac{1}{2}77$, or 24.5 . Thus, the area, in square units, of the triangle formed by connecting the three points shown is $56 - 4 - 3 - 24.5$, or 24.5 . Note that 24.5 and $49/2$ are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 92eb236a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 92eb236a

$$\frac{\sqrt{3}}{3}$$

In a right triangle, the tangent of one of the two acute angles is $\frac{\sqrt{3}}{3}$. What is the tangent of the other acute angle?

A. $-\frac{\sqrt{3}}{3}$

B. $-\frac{3}{\sqrt{3}}$

C. $\frac{\sqrt{3}}{3}$

D. $\frac{3}{\sqrt{3}}$

ID: 92eb236a Answer

Correct Answer:

D

Rationale

Choice D is correct. The tangent of a nonright angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. Using that definition for tangent, in a right triangle with legs that have lengths a

and b , the tangent of one acute angle is $\frac{a}{b}$ and the tangent for the other acute angle is $\frac{b}{a}$. It follows that the tangents of the acute angles in a right triangle are reciprocals of each other. Therefore, the tangent of the other acute angle in the given triangle is

the reciprocal of $\frac{\sqrt{3}}{3}$ or $\frac{3}{\sqrt{3}}$.

Choice A is incorrect and may result from assuming that the tangent of the other acute angle is the negative of the tangent of the angle described. Choice B is incorrect and may result from assuming that the tangent of the other acute angle is the negative of the reciprocal of the tangent of the angle described. Choice C is incorrect and may result from interpreting the tangent of the other acute angle as equal to the tangent of the angle described.

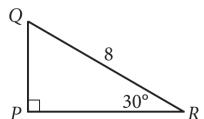
Question Difficulty:

Hard

Question ID 13d9a1c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 13d9a1c3



In the right triangle shown above, what is the length of \overline{PQ} ?

ID: 13d9a1c3 Answer

Rationale

The correct answer is 4. Triangle PQR has given angle measures of 30° and 90°, so the third angle must be 60° because the measures of the angles of a triangle sum to 180°. For any special right triangle with angles measuring 30°, 60°, and 90°, the length of the hypotenuse (the side opposite the right angle) is 2x, where x is the length of the side opposite the 30° angle. Segment PQ is opposite the 30° angle. Therefore, $2(PQ) = 8$ and $PQ = 4$.

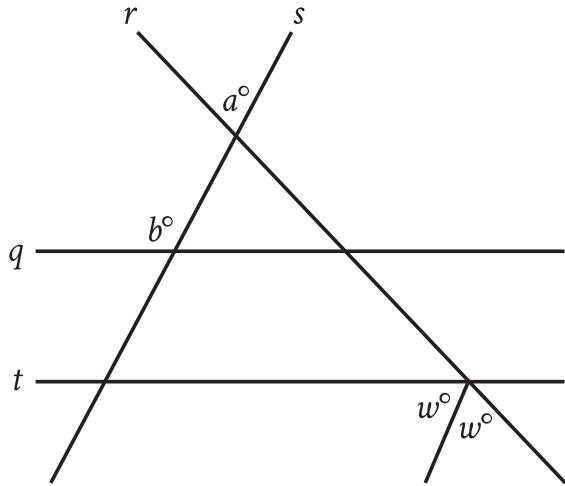
Question Difficulty:

Medium

Question ID 17912810

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 17912810



Note: Figure not drawn to scale.

In the figure, parallel lines q and t are intersected by lines r and s . If $a = 43$ and $b = 122$, what is the value of w ?

ID: 17912810 Answer

Correct Answer:

101/2, 50.5

Rationale

The correct answer is $\frac{101}{2}$. In the figure, lines q , r , and s form a triangle. One interior angle of this triangle is vertical to the angle marked a° ; therefore, the interior angle also has measure a° . It's given that $a = 43$. Therefore, the interior angle of the triangle has measure 43° . A second interior angle of the triangle forms a straight line, q , with the angle marked b° . Therefore, the sum of the measures of these two angles is 180° . It's given that $b = 122$. Therefore, the angle marked b° has measure 122° and the second interior angle of the triangle has measure $180 - 122^\circ$, or 58° . The sum of the interior angles of a triangle is 180° . Therefore, the measure of the third interior angle of the triangle is $180 - 43 - 58^\circ$, or 79° . It's given that parallel lines q and t are intersected by line r . It follows that the triangle's interior angle with measure 79° is congruent to the same side interior angle between lines q and t formed by lines t and r . Since this angle is supplementary to the two angles marked w° , the sum of 79° , w° , and w° is 180° . It follows that $79 + w + w = 180$, or $79 + 2w = 180$. Subtracting 79 from both sides of this equation yields $2w = 101$. Dividing both sides of this equation by 2 yields $w = \frac{101}{2}$. Note that $101/2$ and 50.5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 4420e500

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4420e500

What is the area of a rectangle with a length of **4 centimeters (cm)** and a width of **2 cm**?

- A. **6 cm²**
- B. **8 cm²**
- C. **12 cm²**
- D. **36 cm²**

ID: 4420e500 Answer

Correct Answer:

B

Rationale

Choice B is correct. The area of a rectangle with length l and width w can be found using the formula $A = lw$. It's given that the rectangle has a length of 4 cm and a width of 2 cm. Therefore, the area of this rectangle is $4 \text{ cm} \times 2 \text{ cm}$, or 8 cm^2 .

Choice A is incorrect. This is the sum, in cm, of the length and width of the rectangle, not the area, in cm².

Choice C is incorrect. This is the perimeter, in cm, of the rectangle, not the area, in cm².

Choice D is incorrect. This is the sum of the length and width of the rectangle squared, not the area.

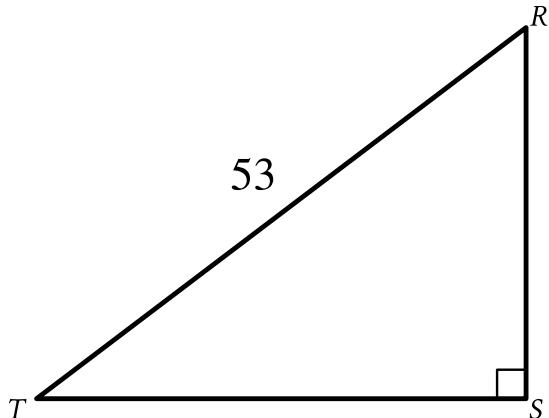
Question Difficulty:

Easy

Question ID a67b9f88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 30%; height: 10px; background-color: #0056b3;"></div> <div style="width: 30%; height: 10px; background-color: #0056b3;"></div> <div style="width: 30%; height: 10px; background-color: #0056b3;"></div>

ID: a67b9f88



Note: Figure not drawn to scale.

In the triangle shown, $RS = \sqrt{105}$. What is the value of $\sin R$?

ID: a67b9f88 Answer

Correct Answer:

.9811, 52/53

Rationale

The correct answer is $\frac{52}{53}$. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs. The length of the hypotenuse of the right triangle shown is 53. It's given that $RS = \sqrt{105}$. Therefore, the length of one of the legs of the triangle shown is $\sqrt{105}$. Let x represent TS , the length of the other leg of the triangle shown.

Therefore, $53^2 = (\sqrt{105})^2 + x^2$, or $2,809 = 105 + x^2$. Subtracting 105 from both sides of this equation yields $2,704 = x^2$. Taking the positive square root of both sides of this equation yields $52 = x$. Therefore, TS , the length of the other leg of the triangle shown, is 52. The sine of an acute angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the hypotenuse. The length of the leg opposite angle R is 52, and the length of the hypotenuse is 53. Therefore, the value of $\sin R$ is $\frac{52}{53}$. Note that 52/53 or .9811 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID f7e626b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: f7e626b2

The dimensions of a right rectangular prism are 4 inches by 5 inches by 6 inches. What is the surface area, in square inches, of the prism?

- A. 30
- B. 74
- C. 120
- D. 148

ID: f7e626b2 Answer

Rationale

Choice D is correct. The surface area is found by summing the area of each face. A right rectangular prism consists of three pairs of congruent rectangles, so the surface area is found by multiplying the areas of three adjacent rectangles by 2 and adding these products. For this prism, the surface area is equal to $2(4 \cdot 5) + 2(5 \cdot 6) + 2(4 \cdot 6)$, or $2(20) + 2(30) + 2(24)$, which is equal to 148.

Choice A is incorrect. This is the area of one of the faces of the prism. Choice B is incorrect and may result from adding the areas of three adjacent rectangles without multiplying by 2. Choice C is incorrect. This is the volume, in cubic inches, of the prism.

Question Difficulty:

Hard

Question ID 2be01bd9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 2be01bd9

Triangle ABC is similar to triangle DEF , where angle A corresponds to angle D and angle C corresponds to angle F . Angles C and F are right angles. If $\tan(A) = \frac{50}{7}$, what is the value of $\tan(E)$?

ID: 2be01bd9 Answer

Correct Answer:

.14, 7/50

Rationale

The correct answer is $\frac{7}{50}$. It's given that triangle ABC is similar to triangle DEF , where angle A corresponds to angle D and angle C corresponds to angle F . In similar triangles, the tangents of corresponding angles are equal. Since angle A and angle D are corresponding angles, if $\tan A = \frac{50}{7}$, then $\tan D = \frac{50}{7}$. It's also given that angles C and F are right angles. It follows that triangle DEF is a right triangle with acute angles D and E . The tangent of one acute angle in a right triangle is the inverse of the tangent of the other acute angle in the triangle. Therefore, $\tan E = \frac{1}{\tan D}$. Substituting $\frac{50}{7}$ for $\tan D$ in this equation yields $\tan E = \frac{1}{50}$, or $\tan E = \frac{7}{50}$.

Thus, if $\tan A = \frac{50}{7}$, the value of $\tan E$ is $\frac{7}{50}$. Note that $7/50$ and $.14$ are examples of ways to enter a correct answer.

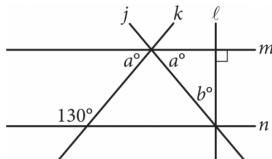
Question Difficulty:

Hard

Question ID 3828f53d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3828f53d



Note: Figure not drawn to scale.

In the figure above, lines m and n are parallel.

What is the value of b ?

- A. 40
- B. 50
- C. 65
- D. 80

ID: 3828f53d Answer

Correct Answer:

A

Rationale

Choice A is correct. Given that lines m and n are parallel, the angle marked 130° must be supplementary to the leftmost angle marked a° because they are same-side interior angles. Therefore, $130^\circ + a^\circ = 180^\circ$, which yields $a = 50^\circ$. Lines j and m intersect at a right angle, so lines j , m , and n form a right triangle where the two acute angles are a° and b° . The acute angles of a right triangle are complementary, so $a^\circ + b^\circ = 90^\circ$, which yields $50^\circ + b^\circ = 90^\circ$, and $b = 40$.

Choice B is incorrect. This is the value of a , not b . Choice C is incorrect and may be the result of dividing 130° by 2. Choice D is incorrect and may be the result of multiplying b by 2.

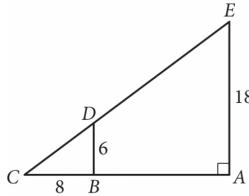
Question Difficulty:

Easy

Question ID dba6a25a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: dba6a25a



In the figure above, \overline{BD} is parallel to \overline{AE} .

What is the length of \overline{CE} ?

ID: dba6a25a Answer

Rationale

The correct answer is 30. In the figure given, since \overline{BD} is parallel to \overline{AE} and both segments are intersected by \overline{CE} , then angle BDC and angle AEC are corresponding angles and therefore congruent. Angle BCD and angle ACE are also congruent because they are the same angle. Triangle BCD and triangle ACE are similar because if two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. Since triangle BCD and triangle ACE are similar, their corresponding sides are

proportional. So in triangle BCD and triangle ACE, \overline{BD} corresponds to \overline{AE} and \overline{CD} corresponds to \overline{CE} . Therefore, $\frac{BD}{CD} = \frac{AE}{CE}$. Since triangle BCD is a right triangle, the Pythagorean theorem can be used to give the value of CD: $6^2 + 8^2 = CD^2$. Taking the

square root of each side gives $CD = 10$. Substituting the values in the proportion $\frac{BD}{CD} = \frac{AE}{CE}$ yields $\frac{6}{10} = \frac{18}{CE}$. Multiplying each side by CE, and then multiplying by $\frac{10}{6}$ yields $CE = 30$. Therefore, the length of \overline{CE} is 30.

Question Difficulty:

Hard

Question ID c984f1a5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: c984f1a5

A hemisphere is half of a sphere. If a hemisphere has a radius of 27 inches, which of the following is closest to the volume, in cubic inches, of this hemisphere?

- A. 1,500
- B. 6,100
- C. 30,900
- D. 41,200

ID: c984f1a5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a sphere is given by $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. Since a hemisphere is half of a sphere, it follows that the volume, V , of a hemisphere is given by $V = \frac{1}{2} \cdot \frac{4}{3}\pi r^3$, or $V = \frac{2}{3}\pi r^3$. Substituting 27 for r in this formula yields $V = \frac{2}{3}\pi 27^3$, which gives $V = 13,122\pi$, or V is approximately equal to 41,223.98. Therefore, the choice that is closest to the volume, in cubic inches, of this hemisphere is 41,200.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID acd30391

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: acd30391

A circle in the xy -plane has equation $(x + 3)^2 + (y - 1)^2 = 25$. Which of the following points does NOT lie in the interior of the circle?

- A. $(-7, 3)$
- B. $(-3, 1)$
- C. $(0, 0)$
- D. $(3, 2)$

ID: acd30391 Answer

Correct Answer:

D

Rationale

Choice D is correct. The circle with equation $(x + 3)^2 + (y - 1)^2 = 25$ has center $(-3, 1)$ and radius 5. For a point to be inside of the circle, the distance from that point to the center must be less than the radius, 5. The distance between $(3, 2)$ and $(-3, 1)$ is $\sqrt{(-3 - 3)^2 + (1 - 2)^2} = \sqrt{(-6)^2 + (-1)^2} = \sqrt{37}$, which is greater than 5. Therefore, $(3, 2)$ does NOT lie in the interior of the circle.

Choice A is incorrect. The distance between $(-7, 3)$ and $(-3, 1)$ is $\sqrt{(-7 + 3)^2 + (3 - 1)^2} = \sqrt{(-4)^2 + (2)^2} = \sqrt{20}$, which is less than 5, and therefore $(-7, 3)$ lies in the interior of the circle. Choice B is incorrect because it is the center of the circle. Choice C is incorrect because the distance between $(0, 0)$ and $(-3, 1)$ is $\sqrt{(0 + 3)^2 + (0 - 1)^2} = \sqrt{(3)^2 + (1)^2} = \sqrt{8}$, which is less than 5, and therefore $(0, 0)$ in the interior of the circle.

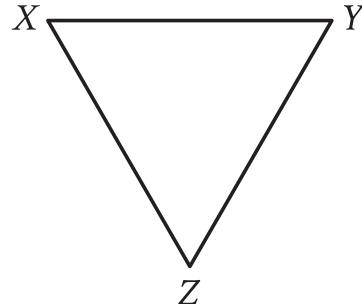
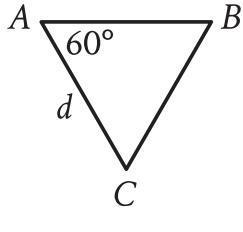
Question Difficulty:

Hard

Question ID e0d2e21a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e0d2e21a



Note: Figures not drawn to scale.

For the triangles shown, triangle ABC is dilated by a scale factor of 3 to obtain triangle XYZ , where $d = 16$. What is the measure, in degrees, of angle X ?

- A. 20
- B. 57
- C. 60
- D. 63

ID: e0d2e21a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that triangle XYZ is obtained by a dilation of triangle ABC . It follows that triangle ABC is similar to triangle XYZ , where A corresponds to X . Since corresponding angles in similar triangles have the same measure and the measure of angle A is 60 degrees, it follows that the measure of angle X is also 60 degrees.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

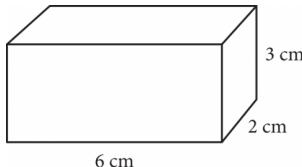
Question Difficulty:

Easy

Question ID d683a9cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: d683a9cc



The figure shows the lengths, in centimeters (cm), of the edges of a right rectangular prism. The volume V of a right rectangular prism is ℓwh , where ℓ is the length of the prism, w is the width of the prism, and h is the height of the prism. What is the volume, in cubic centimeters, of the prism?

- A. 36
- B. 24
- C. 12
- D. 11

ID: d683a9cc Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the volume of a right rectangular prism is ℓwh . The prism shown has a length of 6 cm, a width of 2 cm, and a height of 3 cm. Thus, $\ell wh = (6)(2)(3)$, or 36 cubic centimeters.

Choice B is incorrect. This is the volume of a rectangular prism with edge lengths of 6, 2, and 2. Choice C is incorrect and may result from only finding the product of the length and width of the base of the prism. Choice D is incorrect and may result from finding the sum, not the product, of the edge lengths of the prism.

Question Difficulty:

Easy

Question ID 14e7c1f4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 14e7c1f4

For two acute angles, $\angle Q$ and $\angle R$, $\cos(Q) = \sin(R)$. The measures, in degrees, of $\angle Q$ and $\angle R$ are $x + 61$ and $4x + 4$, respectively. What is the value of x ?

- A. 5
- B. 19
- C. 23
- D. 29

ID: 14e7c1f4 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that for two acute angles, $\angle Q$ and $\angle R$, $\cos(Q) = \sin(R)$. For two acute angles, if the sine of one angle is equal to the cosine of the other angle, the angles are complementary. It follows that $\angle Q$ and $\angle R$ are complementary. That is, the sum of the measures of the angles is 90 degrees. It's given that the measure of $\angle Q$ is $x + 61$ degrees and the measure of $\angle R$ is $4x + 4$ degrees. It follows that $(x + 61) + (4x + 4) = 90$. By combining like terms, this equation can be rewritten as $5x + 65 = 90$. Subtracting 65 from each side of this equation yields $5x = 25$. Dividing each side of this equation by 5 yields $x = 5$.

Choice B is incorrect. This would be the value of x if $\cos(Q) = \cos(R)$ rather than $\cos(Q) = \sin(R)$.

Choice C is incorrect. This would be the value of x if $\cos(Q) = -\cos(R)$ rather than $\cos(Q) = \sin(R)$ and if $\angle R$ were obtuse rather than acute.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID a2e76b60

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: a2e76b60

A cylindrical can containing pieces of fruit is filled to the top with syrup before being sealed. The base of the can has an area of 75 cm^2 , and the height of the can is 10 cm.

If 110 cm^3 of syrup is needed to fill the can to the top, which of the following is closest to the total volume of the pieces of fruit in the can?

- A. 7.5 cm^3
- B. 185 cm^3
- C. 640 cm^3
- D. 750 cm^3

ID: a2e76b60 Answer

Correct Answer:

C

Rationale

Choice C is correct. The total volume of the cylindrical can is found by multiplying the area of the base of the can, 75 cm^2 , by the height of the can, 10 cm, which yields 750 cm^3 . If the syrup needed to fill the can has a volume of 110 cm^3 , then the remaining volume for the pieces of fruit is $750 - 110 = 640 \text{ cm}^3$.

Choice A is incorrect because if the fruit had a volume of 7.5 cm^3 , there would be $750 - 7.5 = 742.5 \text{ cm}^3$ of syrup needed to fill the can to the top. Choice B is incorrect because if the fruit had a volume of 185 cm^3 , there would be $750 - 185 = 565 \text{ cm}^3$ of syrup needed to fill the can to the top. Choice D is incorrect because it is the total volume of the can, not just of the pieces of fruit.

Question Difficulty:

Medium

Question ID 468613c0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 468613c0

A triangle has a base length of **56** centimeters and a height of **112** centimeters. What is the area, in square centimeters, of the triangle?

- A. **168**
- B. **1,568**
- C. **3,136**
- D. **6,272**

ID: 468613c0 Answer

Correct Answer:

C

Rationale

Choice C is correct. The area, A , of a triangle is given by the formula $A = \frac{1}{2}bh$, where b is the base length and h is the height of the triangle. It's given that a triangle has a base length of 56 centimeters and a height of 112 centimeters. Substituting 56 for b and 112 for h in the formula $A = \frac{1}{2}bh$ yields $A = \left(\frac{1}{2}\right)(56)(112)$, or $A = 3,136$. Therefore, the area, in square centimeters, of the triangle is 3,136.

Choice A is incorrect. This is the value of $56 + 112$, not $\left(\frac{1}{2}\right)(56)(112)$.

Choice B is incorrect. This is the value of $\left(\frac{1}{4}\right)(56)(112)$, not $\left(\frac{1}{2}\right)(56)(112)$.

Choice D is incorrect. This is the value of $(56)(112)$, not $\left(\frac{1}{2}\right)(56)(112)$.

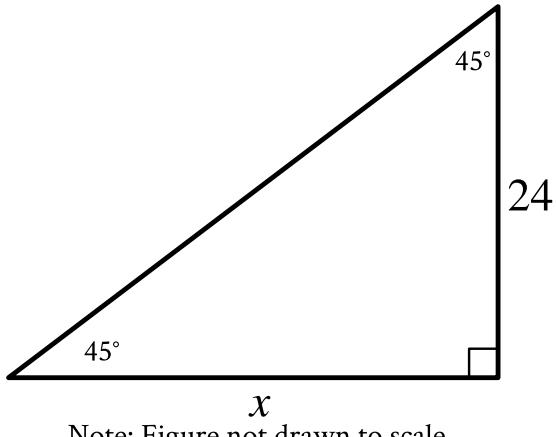
Question Difficulty:

Medium

Question ID 145337bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 145337bc



Note: Figure not drawn to scale.

In the triangle shown, what is the value of x ?

- A. 24
- B. 45
- C. 48
- D. 69

ID: 145337bc Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the two acute angles have the same measure and the third angle is a right angle, the triangle shown is an isosceles right triangle. In an isosceles right triangle, the two legs have the same length. The figure shows that the length of one leg of the triangle is 24 and the length of the other leg of the triangle is x . It follows that the value of x is 24.

Choice B is incorrect. This is the measure, in degrees, of one of the angles shown.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

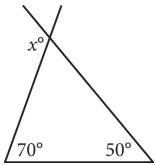
Question Difficulty:

Easy

Question ID 36200a38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 36200a38



In the figure above, two sides of a triangle are extended. What is the value of x?

- A. 110
- B. 120
- C. 130
- D. 140

ID: 36200a38 Answer

Correct Answer:

B

Rationale

Choice B is correct. The sum of the interior angles of a triangle is 180°. The measures of the two interior angles of the given triangle are shown. Therefore, the measure of the third interior angle is $180^\circ - 70^\circ - 50^\circ = 60^\circ$. The angles of measures x° and 60° are supplementary, so their sum is 180°. Therefore, $x = 180 - 60 = 120$.

Choice A is incorrect and may be the result of misinterpreting x° as supplementary to 70° . Choice C is incorrect and may be the result of misinterpreting x° as supplementary to 50° . Choice D is incorrect and may be the result of a calculation error.

Question Difficulty:

Easy

Question ID a490003a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a490003a

The width of a rectangle is 7 centimeters. The length of the rectangle is 40 centimeters longer than the width. What is the area, in square centimeters, of this rectangle?

- A. 7
- B. 14
- C. 54
- D. 329

ID: a490003a Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the width of this rectangle is 7 centimeters and that the length of this rectangle is 40 centimeters longer than the width. Therefore, the length of this rectangle is $7 + 40$, or 47, centimeters. The area of a rectangle can be found by multiplying its length and its width. Therefore the area, in square centimeters, of this rectangle is 7×47 , or 329.

Choice A is incorrect. This is the width, in centimeters, not the area, in square centimeters, of this rectangle.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

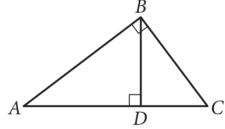
Question Difficulty:

Easy

Question ID 6a3fbec3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6a3fbec3



Note: Figure not drawn to scale.

In the figure above, $BD = 6$ and $AD = 8$.

What is the length of \overline{DC} ?

ID: 6a3fbec3 Answer

Rationale

The correct answer is 4.5. According to the properties of right triangles, BD divides triangle ABC into two similar triangles, ABD and BCD. The corresponding sides of ABD and BCD are proportional, so the ratio of BD to AD is the same as the ratio of DC to BD.

Expressing this information as a proportion gives $\frac{6}{8} = \frac{DC}{6}$. Solving the proportion for DC results in $DC = 4.5$. Note that 4.5 and 9/2 are examples of ways to enter a correct answer.

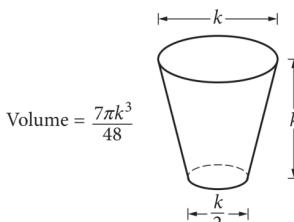
Question Difficulty:

Hard

Question ID 37dde49f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 37dde49f



The glass pictured above can hold a maximum volume of 473 cubic centimeters, which is approximately 16 fluid ounces. What is the value of k , in centimeters?

- A. 2.52
- B. 7.67
- C. 7.79
- D. 10.11

ID: 37dde49f Answer

Correct Answer:

D

Rationale

$$V = \frac{7\pi k^3}{48}$$

Choice D is correct. Using the volume formula $V = \frac{7\pi k^3}{48}$ and the given information that the volume of the glass is 473 cubic centimeters, the value of k can be found as follows:

$$473 = \frac{7\pi k^3}{48}$$

$$k^3 = \frac{473(48)}{7\pi}$$

$$k = \sqrt[3]{\frac{473(48)}{7\pi}} \approx 10.10690$$

Therefore, the value of k is approximately 10.11 centimeters.

Choices A, B, and C are incorrect. Substituting the values of k from these choices in the formula results in volumes of approximately 7 cubic centimeters, 207 cubic centimeters, and 217 cubic centimeters, respectively, all of which contradict the given information that the volume of the glass is 473 cubic centimeters.

Question Difficulty:

Medium

Question ID 82c8325f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 82c8325f

A circle in the xy -plane has its center at $(-4, 5)$ and the point $(-8, 8)$ lies on the circle. Which equation represents this circle?

- A. $(x - 4)^2 + (y + 5)^2 = 5$
- B. $(x + 4)^2 + (y - 5)^2 = 5$
- C. $(x - 4)^2 + (y + 5)^2 = 25$
- D. $(x + 4)^2 + (y - 5)^2 = 25$

ID: 82c8325f Answer

Correct Answer:

D

Rationale

Choice D is correct. A circle in the xy -plane can be represented by an equation of the form $x - h^2 + y - k^2 = r^2$, where h, k is the center of the circle and r is the length of a radius of the circle. It's given that the circle has its center at $-4, 5$. Therefore, $h = -4$ and $k = 5$. Substituting -4 for h and 5 for k in the equation $x - h^2 + y - k^2 = r^2$ yields $x - (-4)^2 + y - 5^2 = r^2$, or $x + 4^2 + y - 5^2 = r^2$. It's also given that the point $-8, 8$ lies on the circle. Substituting -8 for x and 8 for y in the equation $x + 4^2 + y - 5^2 = r^2$ yields $-8 + 4^2 + 8 - 5^2 = r^2$, or $-4^2 + 3^2 = r^2$, which is equivalent to $16 + 9 = r^2$, or $25 = r^2$. Substituting 25 for r^2 in the equation $x + 4^2 + y - 5^2 = r^2$ yields $x + 4^2 + y - 5^2 = 25$. Thus, the equation $x + 4^2 + y - 5^2 = 25$ represents the circle.

Choice A is incorrect. The circle represented by this equation has its center at $4, -5$, not $-4, 5$, and the point $-8, 8$ doesn't lie on the circle.

Choice B is incorrect. The point $-8, 8$ doesn't lie on the circle represented by this equation.

Choice C is incorrect. The circle represented by this equation has its center at $4, -5$, not $-4, 5$, and the point $-8, 8$ doesn't lie on the circle.

Question Difficulty:

Medium

Question ID 459dd6c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: 459dd6c5

Triangles ABC and DEF are similar. Each side length of triangle ABC is 4 times the corresponding side length of triangle DEF . The area of triangle ABC is 270 square inches. What is the area, in square inches, of triangle DEF ?

ID: 459dd6c5 Answer

Correct Answer:

135/8, 16.87, 16.88

Rationale

The correct answer is $\frac{135}{8}$. It's given that triangles ABC and DEF are similar and each side length of triangle ABC is 4 times the corresponding side length of triangle DEF. For two similar triangles, if each side length of the first triangle is k times the corresponding side length of the second triangle, then the area of the first triangle is k^2 times the area of the second triangle. Therefore, the area of triangle ABC is 4^2 , or 16, times the area of triangle DEF. It's given that the area of triangle ABC is 270 square inches. Let a represent the area, in square inches, of triangle DEF. It follows that 270 is 16 times a , or $270 = 16a$. Dividing both sides of this equation by 16 yields $\frac{270}{16} = a$, which is equivalent to $\frac{135}{8} = a$. Thus, the area, in square inches, of triangle DEF is $\frac{135}{8}$. Note that 135/8, 16.87, and 16.88 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 25da87f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 25da87f8

A triangle with angle measures 30° , 60° , and 90° has a perimeter of $18 + 6\sqrt{3}$. What is the length of the longest side of the triangle?

ID: 25da87f8 Answer

Rationale

The correct answer is 12. It is given that the triangle has angle measures of 30° , 60° , and 90° , and so the triangle is a special right triangle. The side measures of this type of special triangle are in the ratio $2:1:\sqrt{3}$. If x is the measure of the shortest leg, then the measure of the other leg is $\sqrt{3}x$ and the measure of the hypotenuse is $2x$. The perimeter of the triangle is given to be $18 + 6\sqrt{3}$, and so the equation for the perimeter can be written as $2x + x + \sqrt{3}x = 18 + 6\sqrt{3}$. Combining like terms and factoring out a common factor of x on the left-hand side of the equation gives $(3 + \sqrt{3})x = 18 + 6\sqrt{3}$. Rewriting the right-hand side of the equation by factoring out 6 gives $(3 + \sqrt{3})x = 6(3 + \sqrt{3})$. Dividing both sides of the equation by the common factor $(3 + \sqrt{3})$ gives $x = 6$. The longest side of the right triangle, the hypotenuse, has a length of $2x$, or $2(6)$, which is 12.

Question Difficulty:

Hard

Question ID 310c87fe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 310c87fe

A cube has a surface area of 54 square meters. What is the volume, in cubic meters, of the cube?

- A. 18
- B. 27
- C. 36
- D. 81

ID: 310c87fe Answer

Correct Answer:

B

Rationale

Choice B is correct. The surface area of a cube with side length s is equal to $6s^2$. Since the surface area is given as 54 square meters, the equation $54 = 6s^2$ can be used to solve for s . Dividing both sides of the equation by 6 yields $9 = s^2$. Taking the square root of both sides of this equation yields $3 = s$ and $-3 = s$. Since the side length of a cube must be a positive value, $s = -3$ can be discarded as a possible solution, leaving $s = 3$. The volume of a cube with side length s is equal to s^3 . Therefore, the volume of this cube, in cubic meters, is 3^3 , or 27.

Choices A, C, and D are incorrect and may result from calculation errors.

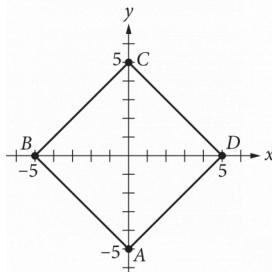
Question Difficulty:

Hard

Question ID cf53cb56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: cf53cb56



In the xy -plane shown, square $ABCD$ has its diagonals on the x - and y -axes. What is the area, in square units, of the square?

- A. 20
- B. 25
- C. 50
- D. 100

ID: cf53cb56 Answer

Correct Answer:

C

Rationale

Choice C is correct. The two diagonals of square $ABCD$ divide the square into 4 congruent right triangles, where each triangle has a vertex at the origin of the graph shown. The formula for the area of a triangle is $A = \frac{1}{2}bh$, where b is the base length of the triangle and h is the height of the triangle. Each of the 4 congruent right triangles has a height of 5 units and a base length of 5 units. Therefore, the area of each triangle is $A = \frac{1}{2}(5)(5)$, or 12.5 square units. Since the 4 right triangles are congruent, the area of each is $\frac{1}{4}$ of the area of square $ABCD$. It follows that the area of the square $ABCD$ is equal to 4×12.5 , or 50 square units.

Choices A and D are incorrect and may result from using 5 or 25, respectively, as the area of one of the 4 congruent right triangles formed by diagonals of square $ABCD$. However, the area of these triangles is 12.5. Choice B is incorrect and may result from using 5 as the length of one side of square $ABCD$. However, the length of a side of square $ABCD$ is $5\sqrt{2}$.

Question Difficulty:

Medium

Question ID b96ff36e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b96ff36e

In the xy -plane, the graph of the equation $(x - 3)^2 + (y - 5)^2 = 9$ is a circle. The point $(6, c)$, where c is a constant, lies on this circle. What is the value of c ?

ID: b96ff36e Answer

Correct Answer:

5

Rationale

The correct answer is 5. It's given that in the xy -plane, the graph of the equation $(x - 3)^2 + (y - 5)^2 = 9$ is a circle. It's also given that the point $(6, c)$, where c is a constant, lies on this circle. It follows that the ordered pair $(6, c)$ makes the equation $(x - 3)^2 + (y - 5)^2 = 9$ true. Substituting 6 for x and c for y in this equation yields $(6 - 3)^2 + (c - 5)^2 = 9$, or $9 + (c - 5)^2 = 9$. Subtracting 9 from each side of this equation yields $(c - 5)^2 = 0$. It follows that the value of c is 5.

Question Difficulty:

Medium

Question ID ac472881

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: ac472881

$$\frac{12x+28}{4} - \frac{s}{13} = r(x-8)$$

In the given equation, s and r are constants, and $s > 0$. If the equation has infinitely many solutions, what is the value of s ?

ID: ac472881 Answer

Correct Answer:

403

Rationale

The correct answer is 403. For a linear equation in one variable to have infinitely many solutions, the coefficients of the variable must be equal on both sides of the equation and the constant terms must also be equal on both sides of the equation. The given equation can be rewritten as $\frac{43x + 7}{4} - \frac{s}{13} = rx - 8$, or $3x + 7 - \frac{s}{13} = rx - 8$. Applying the distributive property to the right-hand side of this equation yields $3x + 7 - \frac{s}{13} = rx - 8r$. For this equation to have infinitely many solutions, the coefficients of x must be equal, so it follows that $3 = r$. Additionally, the constant terms must be equal, which means $7 - \frac{s}{13} = -8r$. Substituting 3 for r in this equation yields $7 - \frac{s}{13} = -83$, or $7 - \frac{s}{13} = -24$. Adding $\frac{s}{13}$ to both sides of this equation yields $7 = -24 + \frac{s}{13}$. Adding 24 to both sides of this equation yields $31 = \frac{s}{13}$. Multiplying both sides of this equation by 13 yields $403 = s$. Therefore, if the equation has infinitely many solutions, the value of s is 403.

Question Difficulty:

Hard

Question ID 002dba45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 002dba45

Line k is defined by $y = -\frac{17}{3}x + 5$. Line j is perpendicular to line k in the xy -plane. What is the slope of line j ?

ID: 002dba45 Answer

Correct Answer:

.1764, .1765, 3/17

Rationale

The correct answer is $\frac{3}{17}$. It's given that line j is perpendicular to line k in the xy -plane. This means that the slope of line j is the negative reciprocal of the slope of line k . The equation of line k , $y = -\frac{17}{3}x + 5$, is written in slope-intercept form $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It follows that the slope of line k is $-\frac{17}{3}$. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of $-\frac{17}{3}$ is $-\frac{1}{17}$, or $\frac{3}{17}$. Thus, the slope of line j is $\frac{3}{17}$. Note that $3/17$, $.1764$, $.1765$, and 0.176 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID f224df07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f224df07

A cargo helicopter delivers only 100-pound packages and 120-pound packages. For each delivery trip, the helicopter must carry at least 10 packages, and the total weight of the packages can be at most 1,100 pounds. What is the maximum number of 120-pound packages that the helicopter can carry per trip?

- A. 2
- B. 4
- C. 5
- D. 6

ID: f224df07 Answer

Correct Answer:

C

Rationale

Choice C is correct. Let a equal the number of 120-pound packages, and let b equal the number of 100-pound packages. It's given that the total weight of the packages can be at most 1,100 pounds: the inequality $120a + 100b \leq 1,100$ represents this situation. It's also given that the helicopter must carry at least 10 packages: the inequality $a + b \geq 10$ represents this situation. Values of a and b that satisfy these two inequalities represent the allowable numbers of 120-pound packages and 100-pound packages the helicopter can transport. To maximize the number of 120-pound packages, a , in the helicopter, the number of 100-pound packages, b , in the helicopter needs to be minimized. Expressing b in terms of a in the second inequality yields $b \geq 10 - a$, so the minimum value of b is equal to $10 - a$. Substituting $10 - a$ for b in the first inequality results in $120a + 100(10 - a) \leq 1,100$. Using the distributive property to rewrite this inequality yields $120a + 1,000 - 100a \leq 1,100$, or $20a + 1,000 \leq 1,100$. Subtracting 1,000 from both sides of this inequality yields $20a \leq 100$. Dividing both sides of this inequality by 20 results in $a \leq 5$. This means that the maximum number of 120-pound packages that the helicopter can carry per trip is 5.

Choices A, B, and D are incorrect and may result from incorrectly creating or solving the system of inequalities.

Question Difficulty:

Medium

Question ID d1b66ae6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d1b66ae6

$$-x + y = -3.5$$

$$x + 3y = 9.5$$

If (x, y) satisfies the system of equations

above, what is the value of y ?

ID: d1b66ae6 Answer

Rationale

$$\frac{3}{2}$$

The correct answer is $\frac{3}{2}$. One method for solving the system of equations for y is to add corresponding sides of the two equations. Adding the left-hand sides gives $(-x + y) + (x + 3y)$, or $4y$. Adding the right-hand sides yields $-3.5 + 9.5 = 6$. It

follows that $4y = 6$. Finally, dividing both sides of $4y = 6$ by 4 yields $y = \frac{6}{4}$ or $\frac{3}{2}$. Note that $3/2$ and 1.5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID cb8f449f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #006699; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: cb8f449f

$$\begin{array}{l} \frac{1}{2}y = 4 \\ x - \frac{1}{2}y = 2 \end{array}$$

The system of equations above has solution (x, y) . What is the value of x ?

A. 3

B. $\frac{7}{2}$

C. 4

D. 6

ID: cb8f449f Answer

Correct Answer:

D

Rationale

Choice D is correct. Adding the corresponding sides of the two equations eliminates y and yields $x = 6$, as shown.

$$\begin{array}{r} \frac{1}{2}y = 4 \\ x - \frac{1}{2}y = 2 \\ \hline x + 0 = 6 \end{array}$$

If (x, y) is a solution to the system, then (x, y) satisfies both equations in the system and any equation derived from them. Therefore, $x = 6$.

Choices A, B, and C are incorrect and may be the result of errors when solving the system.

Question Difficulty:

Medium

Question ID 3cdbc026

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3cdbc026

The graph of the equation $ax + ky = 6$ is a line in the xy -plane, where a and k are constants. If the line contains the points $(-2, -6)$ and $(0, -3)$, what is the value of k ?

- A. -2
- B. -1
- C. 2
- D. 3

ID: 3cdbc026 Answer

Correct Answer:

A

Rationale

Choice A is correct. The value of k can be found using the slope-intercept form of a linear equation, $y = mx + b$, where m is the slope and b is the y -coordinate of the y -intercept. The equation $ax + ky = 6$ can be rewritten in the form $y = -\frac{ax}{k} + \frac{6}{k}$. One of the given points, $(0, -3)$, is the y -intercept. Thus, the y -coordinate of the y -intercept -3 must be equal to $\frac{6}{k}$. Multiplying both sides by k gives $-3k = 6$. Dividing both sides by -3 gives $k = -2$.

Choices B, C, and D are incorrect and may result from errors made rewriting the given equation.

Question Difficulty:

Hard

Question ID ff501705

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: ff501705

$$\begin{aligned}\frac{3}{2}y - \frac{1}{4}x &= \frac{2}{3} - \frac{3}{2}y \\ \frac{1}{2}x + \frac{3}{2} &= py + \frac{9}{2}\end{aligned}$$

In the given system of equations, p is a constant. If the system has no solution, what is the value of p ?

ID: ff501705 Answer

Correct Answer:

6

Rationale

The correct answer is 6. A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in standard form, $Ax + By = C$ and $Dx + Ey = F$, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation, meaning $\frac{D}{A} = \frac{E}{B}$; and the lines are distinct if the constants are not proportional, meaning $\frac{F}{C}$ is not equal to $\frac{D}{A}$ or $\frac{E}{B}$. The first equation in the given system is $\frac{3}{2}y - \frac{1}{4}x = \frac{2}{3} - \frac{3}{2}y$. Multiplying each side of this equation by 12 yields $18y - 3x = 8 - 18y$. Adding $18y$ to each side of this equation yields $36y - 3x = 8$, or $-3x + 36y = 8$. The second equation in the given system is $\frac{1}{2}x + \frac{3}{2} = py + \frac{9}{2}$. Multiplying each side of this equation by 2 yields $x + 3 = 2py + 9$. Subtracting $2py$ from each side of this equation yields $x + 3 - 2py = 9$. Subtracting 3 from each side of this equation yields $x - 2py = 6$. Therefore, the two equations in the given system, written in standard form, are $-3x + 36y = 8$ and $x - 2py = 6$. As previously stated, if this system has no solution, the lines represented by the equations in the xy -plane are parallel and distinct, meaning the proportion $\frac{1}{-3} = \frac{-2p}{36}$, or $\frac{1}{3} = \frac{p}{18}$, is true and the proportion $\frac{6}{8} = \frac{1}{-3}$ is not true. The proportion $\frac{6}{8} = \frac{1}{-3}$ is not true. Multiplying each side of the true proportion, $\frac{1}{3} = \frac{p}{18}$, by -18 yields $6 = p$. Therefore, if the system has no solution, then the value of p is 6.

Question Difficulty:

Hard

Question ID 2937ef4f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div>

ID: 2937ef4f

Hector used a tool called an auger to remove corn from a storage bin at a constant rate. The bin contained 24,000 bushels of corn when Hector began to use the auger. After 5 hours of using the auger, 19,350 bushels of corn remained in the bin. If the auger continues to remove corn at this rate, what is the total number of hours Hector will have been using the auger when 12,840 bushels of corn remain in the bin?

- A. 3
- B. 7
- C. 8
- D. 12

ID: 2937ef4f Answer

Correct Answer:

D

Rationale

Choice D is correct. After using the auger for 5 hours, Hector had removed $24,000 - 19,350 = 4,650$ bushels of corn from the storage bin. During the 5-hour period, the auger removed corn from the bin at a constant rate of $\frac{4,650}{5} = 930$ bushels per hour.

Assuming the auger continues to remove corn at this rate, after x hours it will have removed $930x$ bushels of corn. Because the bin contained 24,000 bushels of corn when Hector started using the auger, the equation $24,000 - 930x = 12,840$ can be used to find the number of hours, x , Hector will have been using the auger when 12,840 bushels of corn remain in the bin. Subtracting 12,840 from both sides of this equation and adding $930x$ to both sides of the equation yields $11,160 = 930x$. Dividing both sides of this equation by 930 yields $x = 12$. Therefore, Hector will have been using the auger for 12 hours when 12,840 bushels of corn remain in the storage bin.

Choice A is incorrect. Three hours after Hector began using the auger, $24,000 - 3(930) = 21,210$ bushels of corn remained, not 12,840. Choice B is incorrect. Seven hours after Hector began using the auger, $24,000 - 7(930) = 17,490$ bushels of corn will remain, not 12,840. Choice C is incorrect. Eight hours after Hector began using the auger, $24,000 - 8(930) = 16,560$ bushels of corn will remain, not 12,840.

Question Difficulty:

Hard

Question ID 9bbce683

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 9bbce683

x	y
18	130
23	160
26	178

For line h , the table shows three values of x and their corresponding values of y . Line k is the result of translating line h down 5 units in the xy -plane. What is the x -intercept of line k ?

- A. $(-\frac{26}{3}, 0)$
- B. $(-\frac{9}{2}, 0)$
- C. $(-\frac{11}{3}, 0)$
- D. $(-\frac{17}{6}, 0)$

ID: 9bbce683 Answer

Correct Answer:

D

Rationale

Choice D is correct. The equation of line h can be written in slope-intercept form $y = mx + b$, where m is the slope of the line and $0, b$ is the y -intercept of the line. It's given that line h contains the points 18, 130, 23, 160, and 26, 178. Therefore, its slope m can be found as $\frac{160 - 130}{23 - 18}$, or 6. Substituting 6 for m in the equation $y = mx + b$ yields $y = 6x + b$. Substituting 130 for y and 18 for x in this equation yields $130 = 6(18) + b$, or $130 = 108 + b$. Subtracting 108 from both sides of this equation yields $22 = b$. Substituting 22 for b in $y = 6x + b$ yields $y = 6x + 22$. Since line k is the result of translating line h down 5 units, an equation of line k is $y = 6x + 22 - 5$, or $y = 6x + 17$. Substituting 0 for y in this equation yields $0 = 6x + 17$. Solving this equation for x yields $x = -\frac{17}{6}$. Therefore, the x -intercept of line k is $-\frac{17}{6}, 0$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 2b15d65f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2b15d65f

An economist modeled the demand Q for a certain product as a linear function of the selling price P . The demand was 20,000 units when the selling price was \$40 per unit, and the demand was 15,000 units when the selling price was \$60 per unit. Based on the model, what is the demand, in units, when the selling price is \$55 per unit?

- A. 16,250
- B. 16,500
- C. 16,750
- D. 17,500

ID: 2b15d65f Answer

Correct Answer:

A

Rationale

Choice A is correct. Let the economist's model be the linear function $Q = mP + b$, where Q is the demand, P is the selling price, m is the slope of the line, and b is the y -coordinate of the y -intercept of the line in the xy -plane, where $y = Q$. Two pairs of the selling price P and the demand Q are given. Using the coordinate pairs (P, Q) , two points that satisfy the function are $(40, 20,000)$ and

$(60, 15,000)$. The slope m of the function can be found using the formula $m = \frac{Q_2 - Q_1}{P_2 - P_1}$. Substituting the given values into this

formula yields $m = \frac{15,000 - 20,000}{60 - 40}$, or $m = -250$. Therefore, $Q = -250P + b$. The value of b can be found by substituting one of the points into the function. Substituting the values of P and Q from the point $(40, 20,000)$ yields $20,000 = -250(40) + b$, or $20,000 = -10,000 + b$. Adding 10,000 to both sides of this equation yields $b = 30,000$. Therefore, the linear function the economist used as the model is $Q = -250P + 30,000$. Substituting 55 for P yields $Q = -250(55) + 30,000 = 16,250$. It follows that when the selling price is \$55 per unit, the demand is 16,250 units.

Choices B, C, and D are incorrect and may result from calculation or conceptual errors.

Question Difficulty:

Hard

Question ID e25f0807

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e25f0807

x	y
-12	-45
6	45

The table shows two values of x and their corresponding values of y . The graph of the linear equation representing this relationship passes through the point $(\frac{1}{4}, a)$. What is the value of a ?

ID: e25f0807 Answer

Correct Answer:

16.25, 65/4

Rationale

The correct answer is $\frac{65}{4}$. The linear relationship between x and y can be represented by the equation $y = mx + b$, where m and b are constants. It's given in the table that when $x = -12$, $y = -45$. Substituting -12 for x and -45 for y in the equation $y = mx + b$ yields $-45 = -12m + b$, which can be rewritten as $-45 + 12m = b$. It's also given in the table that when $x = 6$, $y = 45$. Substituting 6 for x and 45 for y in the equation $y = mx + b$ yields $45 = 6m + b$, which can be rewritten as $45 - 6m = b$. Substituting $-45 + 12m$ for b in this equation yields $45 - 6m = -45 + 12m$. Adding $6m$ to both sides of this equation yields $45 = -45 + 18m$. Adding 45 to both sides of this equation yields $90 = 18m$. Dividing both sides of this equation by 18 yields $5 = m$, or $m = 5$. Substituting 5 for m , -12 for x , and -45 for y in the equation $y = mx + b$ yields $-45 = 5(-12) + b$, or $-45 = -60 + b$. Adding 60 to both sides of this equation yields $15 = b$. Therefore, $m = 5$ and $b = 15$. Substituting 5 for m and 15 for b in the equation $y = mx + b$ yields $y = 5x + 15$. Thus, the equation $y = 5x + 15$ represents the linear relationship between x and y . It's also given that the graph of the linear equation representing this relationship passes through the point $(\frac{1}{4}, a)$. Substituting $\frac{1}{4}$ for x and a for y in the equation $y = 5x + 15$ yields $a = 5\frac{1}{4} + 15$, which is equivalent to $a = \frac{5}{4} + 15$, or $a = \frac{65}{4}$. Note that $65/4$ and 16.25 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID b86123af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b86123af

Hiro and Sofia purchased shirts and pants from a store. The price of each shirt purchased was the same and the price of each pair of pants purchased was the same. Hiro purchased 4 shirts and 2 pairs of pants for \$86, and Sofia purchased 3 shirts and 5 pairs of pants for \$166. Which of the following systems of linear equations represents the situation, if x represents the price, in dollars, of each shirt and y represents the price, in dollars, of each pair of pants?

- A. $4x + 2y = 86$
 $3x + 5y = 166$
- B. $4x + 3y = 86$
 $2x + 5y = 166$
- C. $4x + 2y = 166$
 $3x + 5y = 86$
- D. $4x + 3y = 166$
 $2x + 5y = 86$

ID: b86123af Answer

Correct Answer:

A

Rationale

Choice A is correct. Hiro purchased 4 shirts and each shirt cost x dollars, so he spent a total of $4x$ dollars on shirts. Likewise, Hiro purchased 2 pairs of pants, and each pair of pants cost y dollars, so he spent a total of $2y$ dollars on pants. Therefore, the total amount that Hiro spent was $4x + 2y$. Since Hiro spent \$86 in total, this can be modeled by the equation $4x + 2y = 86$. Using the same reasoning, Sofia bought 3 shirts at x dollars each and 5 pairs of pants at y dollars each, so she spent a total of $3x + 5y$ dollars on shirts and pants. Since Sofia spent \$166 in total, this can be modeled by the equation $3x + 5y = 166$.

Choice B is incorrect and may be the result of switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased. Choice C is incorrect and may be the result of switching the total price each person paid. Choice D is incorrect and may be the result of switching the total price each person paid as well as switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased.

Question Difficulty:

Easy

Question ID 608eeb6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 608eeb6e

$$\begin{aligned}5x &= 15 \\ -4x + y &= -2\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $x + y$?

- A. **-17**
- B. **-13**
- C. **13**
- D. **17**

ID: 608eeb6e Answer

Correct Answer:

C

Rationale

Choice C is correct. Adding the second equation of the given system to the first equation yields $5x + -4x + y = 15 + -2$, which is equivalent to $x + y = 13$. So the value of $x + y$ is 13.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of $-(x + y)$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID be9cb6a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: be9cb6a2

The cost of renting a backhoe for up to 10 days is \$270 for the first day and \$135 for each additional day. Which of the following equations gives the cost y , in dollars, of renting the backhoe for x days, where x is a positive integer and $x \leq 10$?

- A. $y = 270x - 135$
- B. $y = 270x + 135$
- C. $y = 135x + 270$
- D. $y = 135x + 135$

ID: be9cb6a2 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the cost of renting a backhoe for up to 10 days is \$270 for the first day and \$135 for each additional day. Therefore, the cost y , in dollars, for x days, where $x \leq 10$, is the sum of the cost for the first day, \$270, and the cost for the additional $x - 1$ days, \$135($x - 1$). It follows that $y = 270 + 135(x - 1)$, which is equivalent to $y = 270 + 135x - 135$, or $y = 135x + 135$.

Choice A is incorrect. This equation represents a situation where the cost of renting a backhoe is \$135 for the first day and \$270 for each additional day.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 84664a7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 84664a7c

The front of a roller-coaster car is at the bottom of a hill and is 15 feet above the ground. If the front of the roller-coaster car rises at a constant rate of 8 feet per second, which of the following equations gives the height h , in feet, of the front of the roller-coaster car s seconds after it starts up the hill?

A. $h = 8s + 15$

B. $h = 15s + \frac{335}{8}$

C. $h = 8s + \frac{335}{15}$

D. $h = 15s + 8$

ID: 84664a7c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the front of the roller-coaster car starts rising when it's 15 feet above the ground. This initial height of 15 feet can be represented by a constant term, 15, in an equation. Each second, the front of the roller-coaster car rises 8 feet, which can be represented by $8s$. Thus, the equation $h = 8s + 15$ gives the height, in feet, of the front of the roller-coaster car s seconds after it starts up the hill.

Choices B and C are incorrect and may result from conceptual errors in creating a linear equation. Choice D is incorrect and may result from switching the rate at which the roller-coaster car rises with its initial height.

Question Difficulty:

Easy

Question ID e62cfe5f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e62cfe5f

According to a model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to four times the body weight of the bee, in grams. According to the model, what would be the head width, in millimeters, of a worker bumblebee that has a body weight of 0.5 grams?

ID: e62cfe5f Answer

Rationale

The correct answer is 2.6. According to the model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to 4 times the body weight, in grams, of the bee. Let x represent the body weight, in grams, of a worker bumblebee and let y represent the head width, in millimeters. Translating the verbal description of the model into an equation yields $y = 0.6 + 4x$. Substituting 0.5 grams for x in this equation yields $y = 0.6 + 4(0.5)$, or $y = 2.6$. Therefore, a worker bumblebee with a body weight of 0.5 grams has an estimated head width of 2.6 millimeters. Note that 2.6 and $\frac{13}{5}$ are examples of ways to enter a correct answer.

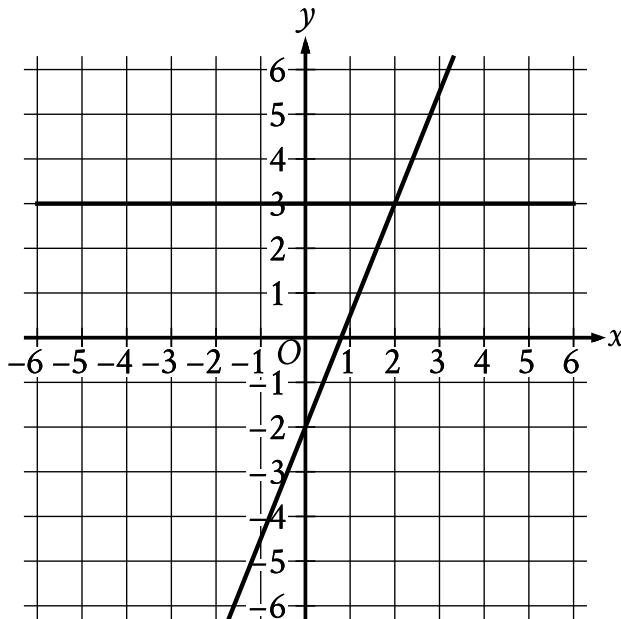
Question Difficulty:

Medium

Question ID b0fc3166

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: b0fc3166



The graph of a system of linear equations is shown. What is the solution (x, y) to the system?

- A. $(0, 3)$
- B. $(1, 3)$
- C. $(2, 3)$
- D. $(3, 3)$

ID: b0fc3166 Answer

Correct Answer:

C

Rationale

Choice C is correct. The solution to this system of linear equations is represented by the point that lies on both lines shown, or the point of intersection of the two lines. According to the graph, the point of intersection occurs when $x = 2$ and $y = 3$, or at the point 2, 3. Therefore, the solution x, y to the system is 2, 3.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 9b886541

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9b886541

If $3x - 8 = 7$, what is the value of $3x + 8$?

- A. -1
- B. 5
- C. 13
- D. 23

ID: 9b886541 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that $3x - 8 = 7$. Adding 8 to both sides of this equation yields $3x = 15$. Adding 8 to both sides of this equation yields $3x + 8 = 23$. Therefore, the value of $3x + 8$ is 23.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of x , not $3x + 8$.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID db422e7f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: db422e7f

Line p is defined by $4y + 8x = 6$. Line r is perpendicular to line p in the xy -plane. What is the slope of line r ?

ID: db422e7f Answer

Correct Answer:

.5, 1/2

Rationale

The correct answer is $\frac{1}{2}$. For an equation in slope-intercept form $y = mx + b$, m represents the slope of the line in the xy -plane defined by this equation. It's given that line p is defined by $4y + 8x = 6$. Subtracting $8x$ from both sides of this equation yields $4y = -8x + 6$. Dividing both sides of this equation by 4 yields $y = -\frac{8}{4}x + \frac{6}{4}$, or $y = -2x + \frac{3}{2}$. Thus, the slope of line p is -2 . If line r is perpendicular to line p , then the slope of line r is the negative reciprocal of the slope of line p . The negative reciprocal of -2 is $-\frac{1}{2} = \frac{1}{2}$. Note that $1/2$ and $.5$ are examples of ways to enter a correct answer.

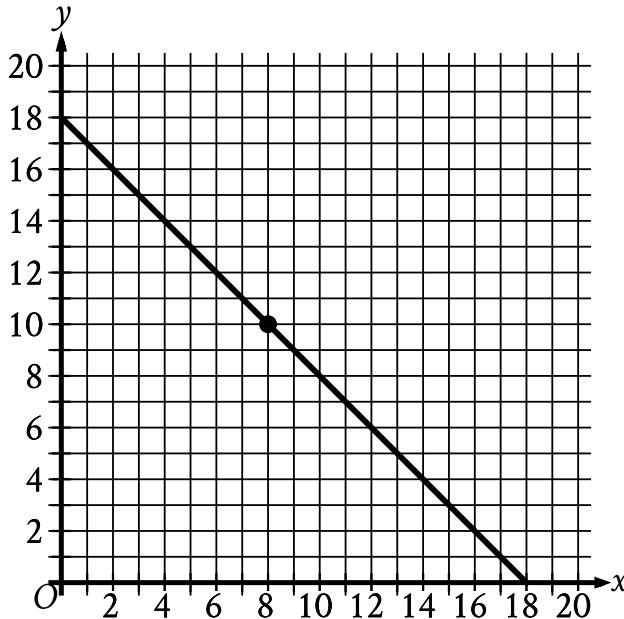
Question Difficulty:

Hard

Question ID 9b0a4eae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9b0a4eae



The graph in the xy -plane models the possible combinations of length x , in meters (m), and width y , in meters, for a rectangle with a perimeter of 36 m. Which statement is the best interpretation of the point $(8, 10)$ in this context?

- A. The length is 10 m less than the perimeter, and the width is 8 m less than the perimeter.
- B. The length is 10 m, and the width is 8 m.
- C. The length is 8 m, and the width is 10 m.
- D. The length is 8 m less than the perimeter, and the width is 10 m less than the perimeter.

ID: 9b0a4eae Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the graph in the xy -plane models the possible combinations of length x , in meters (m), and width y , in meters, for a rectangle with a perimeter of 36 m. Since x represents the length, in meters, and y represents the width, in meters, the point $(8, 10)$ in the xy -plane represents a rectangle whose length is 8 m and whose width is 10 m.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect. This is an interpretation of the point $(10, 8)$, not $(8, 10)$.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 7fac16fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 7fac16fb

The function f is defined by $f(x) = \frac{7}{10}x + 55$. What is the value of $f(20)$?

ID: 7fac16fb Answer

Correct Answer:

69

Rationale

The correct answer is 69. The value of $f(20)$ can be found by evaluating the function $f(x) = \frac{7}{10}x + 55$ for $x = 20$. Substituting 20 for x in this function yields $f(20) = \frac{7}{10}(20) + 55$, or $f(20) = 69$. Therefore, the value of $f(20)$ is 69.

Question Difficulty:

Easy

Question ID 45cfb9de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 45cfb9de

Adam's school is a 20-minute walk or a 5-minute bus ride away from his house. The bus runs once every 30 minutes, and the number of minutes, w , that Adam waits for the bus varies between 0 and 30. Which of the following inequalities gives the values of w for which it would be faster for Adam to walk to school?

- A. $w - 5 < 20$
- B. $w - 5 > 20$
- C. $w + 5 < 20$
- D. $w + 5 > 20$

ID: 45cfb9de Answer

Correct Answer:

D

Rationale

Choice D is correct. It is given that w is the number of minutes that Adam waits for the bus. The total time it takes Adam to get to school on a day he takes the bus is the sum of the minutes, w , he waits for the bus and the 5 minutes the bus ride takes; thus, this time, in minutes, is $w + 5$. It is also given that the total amount of time it takes Adam to get to school on a day that he walks is 20 minutes. Therefore, $w + 5 > 20$ gives the values of w for which it would be faster for Adam to walk to school.

Choices A and B are incorrect because $w - 5$ is not the total length of time for Adam to wait for and then take the bus to school. Choice C is incorrect because the inequality should be true when walking 20 minutes is faster than the time it takes Adam to wait for and ride the bus, not less.

Question Difficulty:

Hard

Question ID 06fc1726

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 06fc1726

If f is the function defined by $f(x) = \frac{2x-1}{3}$,
what is the value of $f(5)$?

A. $\frac{4}{3}$

B. $\frac{7}{3}$

C. 3

D. 9

ID: 06fc1726 Answer

Correct Answer:

C

Rationale

Choice C is correct. If $f(x) = \frac{2x-1}{3}$, then $f(5) = \frac{2(5)-1}{3} = \frac{10-1}{3} = \frac{9}{3} = 3$.

Choice A is incorrect and may result from not multiplying x by 2 in the numerator. Choice B is incorrect and may result from dividing $2x$ by 3 and then subtracting 1. Choice D is incorrect and may result from evaluating only the numerator $2x - 1$.

Question Difficulty:

Easy

Question ID f14484a5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: f14484a5

A manufacturing plant makes **10**-inch, **9**-inch, and **7**-inch frying pans. During a certain day, the number of **10**-inch frying pans that the manufacturing plant makes is **4** times the number **n** of **9**-inch frying pans it makes, and the number of **7**-inch frying pans it makes is **10**. During this day, the manufacturing plant makes **100** frying pans total. Which equation represents this situation?

- A. $10(4n) + 9n + 7(10) = 100$
- B. $10n + 9n + 7n = 100$
- C. $4n + 10 = 100$
- D. $5n + 10 = 100$

ID: f14484a5 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that during a certain day, the number of 9-inch frying pans the manufacturing plant makes is n and the number of 7-inch frying pans it makes is 10. It's also given that during this day the number of 10-inch frying pans that the manufacturing plant makes is 4 times the number of 9-inch frying pans, or $4n$. Therefore, the total number of 7-inch, 9-inch, and 10-inch frying pans the manufacturing plant makes is $n + 10 + 4n$, or $5n + 10$. It's given that during this day the manufacturing plant makes 100 frying pans total. Thus, the equation $5n + 10 = 100$ represents this situation.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 7e3f8363

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7e3f8363

In the xy -plane, the graph of the linear function f contains the points $(0, 3)$ and $(7, 31)$. Which equation defines f , where $y = f(x)$?

- A. $f(x) = 28x + 34$
- B. $f(x) = 3x + 38$
- C. $f(x) = 4x + 3$
- D. $f(x) = 7x + 3$

ID: 7e3f8363 Answer

Correct Answer:

C

Rationale

Choice C is correct. In the xy -plane, an equation of the graph of a linear function can be written in the form $fx = mx + b$, where m represents the slope and $0, b$ represents the y -intercept of the graph of $y = fx$. It's given that the graph of the linear function f , where $y = fx$, in the xy -plane contains the point $0, 3$. Thus, $b = 3$. The slope of the graph of a line containing any two points x_1, y_1 and x_2, y_2 can be found using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Since it's given that the graph of the linear function f contains the points $0, 3$ and $7, 31$, it follows that the slope of the graph of the line containing these points is $m = \frac{31 - 3}{7 - 0}$, or $m = 4$. Substituting 4 for m and 3 for b in $fx = mx + b$ yields $fx = 4x + 3$.

Choice A is incorrect. This function represents a graph with a slope of 28 and a y -intercept of 0, 34.

Choice B is incorrect. This function represents a graph with a slope of 3 and a y -intercept of 0, 38.

Choice D is incorrect. This function represents a graph with a slope of 7 and a y -intercept of 0, 3.

Question Difficulty:

Medium

Question ID 0eae6be1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0eae6be1

The number y is 84 less than the number x . Which equation represents the relationship between x and y ?

- A. $y = x + 84$
- B. $y = \frac{1}{84}x$
- C. $y = 84x$
- D. $y = x - 84$

ID: 0eae6be1 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the number y is 84 less than the number x . A number that's 84 less than the number x is equivalent to 84 subtracted from the number x , or $x - 84$. Therefore, the equation $y = x - 84$ represents the relationship between x and y .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID Odd6227f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: Odd6227f

At how many points do the graphs of the equations $y = x + 20$ and $y = 8x$ intersect in the xy -plane?

- A. 0
- B. 1
- C. 2
- D. 8

ID: Odd6227f Answer

Correct Answer:

B

Rationale

Choice B is correct. Each given equation is written in slope-intercept form, $y = mx + b$, where m is the slope and $0, b$ is the y -intercept of the graph of the equation in the xy -plane. The graphs of two lines that have different slopes will intersect at exactly one point. The graph of the first equation is a line with slope 1. The graph of the second equation is a line with slope 8. Since the graphs are lines with different slopes, they will intersect at exactly one point.

Choice A is incorrect because two graphs of linear equations have 0 intersection points only if they are parallel and therefore have the same slope.

Choice C is incorrect because two graphs of linear equations in the xy -plane can have only 0, 1, or infinitely many points of intersection.

Choice D is incorrect because two graphs of linear equations in the xy -plane can have only 0, 1, or infinitely many points of intersection.

Question Difficulty:

Medium

Question ID 7efe5495

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7efe5495

$$\begin{aligned}y &= 3x \\2x + y &= 12\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $5x$?

- A. 24
- B. 15
- C. 12
- D. 5

ID: 7efe5495 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = 3x$. Substituting $3x$ for y in the equation $2x + y = 12$ yields $2x + 3x = 12$, or $5x = 12$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 2c121b25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2c121b25

Valentina bought two containers of beads. In the first container 30% of the beads are red, and in the second container 70% of the beads are red. Together, the containers have at least 400 red beads. Which inequality shows this relationship, where x is the total number of beads in the first container and y is the total number of beads in the second container?

A. $0.3x + 0.7y \geq 400$

B. $0.7x + 0.3y \leq 400$

C. $\frac{x}{3} + \frac{y}{7} \leq 400$

D. $30x + 70y \geq 400$

ID: 2c121b25 Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that x is the total number of beads in the first container and that 30% of those beads are red; therefore, the expression $0.3x$ represents the number of red beads in the first container. It is given that y is the total number of beads in the second container and that 70% of those beads are red; therefore, the expression $0.7y$ represents the number of red beads in the second container. It is also given that, together, the containers have at least 400 red beads, so the inequality that shows this relationship is $0.3x + 0.7y \geq 400$.

Choice B is incorrect because it represents the containers having a total of at most, rather than at least, 400 red beads. Choice C is incorrect and may be the result of misunderstanding how to represent a percentage of beads in each container. Also, the inequality shows the containers having a combined total of at most, rather than at least, 400 red beads. Choice D is incorrect because the percentages were not converted to decimals.

Question Difficulty:

Easy

Question ID 1087f6c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1087f6c4

$$24.5x + 24.75y = 641$$

Isabel ordered topsoil and crushed stone, which cost a total of \$641, for her garden. The given equation represents the relationship between the number of cubic yards of topsoil, x , and the number of tons of crushed stone, y , Isabel ordered. How much more, in dollars, did a ton of crushed stone cost Isabel than a cubic yard of topsoil?

ID: 1087f6c4 Answer

Correct Answer:

0.25, 1/4

Rationale

The correct answer is .25. It's given that the topsoil and crushed stone Isabel ordered for her garden cost a total of \$ 641. It's also given that the equation $24.5x + 24.75y = 641$ represents the relationship between the number of cubic yards of topsoil, x , and the number of tons of crushed stone, y , that Isabel ordered. Since x represents the number of cubic yards of topsoil ordered, $24.5x$ represents the total cost, in dollars, of the topsoil, and the cost per cubic yard of topsoil is \$ 24.50. Similarly, since y represents the number of tons of crushed stone ordered, $24.75y$ represents the total cost, in dollars, of crushed stone ordered, and the cost per ton of crushed stone is \$ 24.75. Therefore, a ton of crushed stone cost Isabel $24.75 - 24.50$, or 0.25, more dollars than a cubic yard of topsoil. Note that .25 and 1/4 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 4d8ccb96

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4d8ccb96

A chemist studying the impact of salt on a process mixes x kilograms of a low-salt mixture, which is 2% salt by weight, with y kilograms of a high-salt mixture, which is 96% salt by weight, to create 24 kilograms of a mixture that is 4% salt by weight. Which equation represents this situation?

- A. $0.96x + 0.02y = (0.04)(24)$
- B. $0.02x + 0.96y = (0.04)(24)$
- C. $0.96x + 0.02y = 24$
- D. $0.02x + 0.96y = 24$

ID: 4d8ccb96 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a chemist mixes x kilograms of a low-salt mixture, which is 2% salt by weight. Multiplying 0.02 by the amount of the low-salt mixture, x kilograms, yields $0.02x$ kilograms of salt in the low-salt mixture. It's also given that the chemist mixes y kilograms of a high-salt mixture, which is 96% salt by weight. Multiplying 0.96 by the amount of the high-salt mixture, y kilograms, yields $0.96y$ kilograms of salt in the high-salt mixture. Therefore, the total amount of salt in the combined mixture is $0.02x + 0.96y$ kilograms. It's given that the low-salt mixture and the high-salt mixture together create 24 kilograms of a combined mixture that is 4% salt by weight. Thus, the amount of salt in the combined mixture is $0.04(24)$ kilograms. Since the total amount of salt in the combined mixture equals the amount of salt in the low-salt mixture and the amount of salt in the high-salt mixture, the equation $0.02x + 0.96y = (0.04)(24)$ represents this situation.

Choice A is incorrect. This equation represents a situation where the low-salt mixture is 96%, not 2%, salt by weight and the high-salt mixture is 2%, not 96%, salt by weight.

Choice C is incorrect. This equation represents a situation where the low-salt mixture is 96%, not 2%, salt by weight and the high-salt mixture is 2%, not 96%, salt by weight, and where the combined mixture contains 24 kilograms of salt, not 24 kilograms of a mixture that is 4% salt by weight.

Choice D is incorrect. This equation represents a situation where the combined mixture contains 24 kilograms of salt, not 24 kilograms of a mixture that is 4% salt by weight.

Question Difficulty:

Easy

Question ID b23bba4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b23bba4c

$$3a + 4b = 25$$

A shipping company charged a customer \$25 to ship some small boxes and some large boxes. The equation above represents the relationship between a , the number of small boxes, and b , the number of large boxes, the customer had shipped. If the customer had 3 small boxes shipped, how many large boxes were shipped?

- A. 3
- B. 4
- C. 5
- D. 6

ID: b23bba4c Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a represents the number of small boxes and b represents the number of large boxes the customer had shipped. If the customer had 3 small boxes shipped, then $a = 3$. Substituting 3 for a in the equation $3a + 4b = 25$ yields $3(3) + 4b = 25$ or $9 + 4b = 25$. Subtracting 9 from both sides of the equation yields $4b = 16$. Dividing both sides of this equation by 4 yields $b = 4$. Therefore, the customer had 4 large boxes shipped.

Choices A, C, and D are incorrect. If the number of large boxes shipped is 3, then $b = 3$. Substituting 3 for b in the given equation yields $3a + 4(3) = 25$ or $3a + 12 = 25$. Subtracting 12 from both sides of the equation and then dividing by 3 yields $a = \frac{13}{3}$.

However, it's given that the number of small boxes shipped, a , is 3, not $\frac{13}{3}$, so b cannot equal 3. Similarly, if $b = 5$ or $b = 6$, then $a = \frac{5}{3}$ or $a = \frac{1}{3}$, respectively, which is also not true.

Question Difficulty:

Easy

Question ID 71189542

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 71189542

A group of 202 people went on an overnight camping trip, taking 60 tents with them. Some of the tents held 2 people each, and the rest held 4 people each. Assuming all the tents were filled to capacity and every person got to sleep in a tent, exactly how many of the tents were 2-person tents?

- A. 30
- B. 20
- C. 19
- D. 18

ID: 71189542 Answer

Correct Answer:

C

Rationale

Choice C is correct. Let x represent the number of 2-person tents and let y represent the number of 4-person tents. It is given that the total number of tents was 60 and the total number of people in the group was 202. This situation can be expressed as a system of two equations, $x + y = 60$ and $2x + 4y = 202$. The first equation can be rewritten as $y = -x + 60$. Substituting $-x + 60$ for y in the equation $2x + 4y = 202$ yields $2x + 4(-x + 60) = 202$. Distributing and combining like terms gives $-2x + 240 = 202$. Subtracting 240 from both sides of $-2x + 240 = 202$ and then dividing both sides by -2 gives $x = 19$. Therefore, the number of 2-person tents is 19.

Alternate approach: If each of the 60 tents held 4 people, the total number of people that could be accommodated in tents would be 240. However, the actual number of people who slept in tents was 202. The difference of 38 accounts for the 2-person tents.

Since each of these tents holds 2 people fewer than a 4-person tent, $\frac{38}{2} = 19$ gives the number of 2-person tents.

Choice A is incorrect. This choice may result from assuming exactly half of the tents hold 2 people. If that were true, then the total number of people who slept in tents would be $2(30) + 4(30) = 180$; however, the total number of people who slept in tents was 202, not 180. Choice B is incorrect. If 20 tents were 2-person tents, then the remaining 40 tents would be 4-person tents. Since all the tents were filled to capacity, the total number of people who slept in tents would be $2(20) + 4(40) = 40 + 160 = 200$; however, the total number of people who slept in tents was 202, not 200. Choice D is incorrect. If 18 tents were 2-person tents, then the remaining 42 tents would be 4-person tents. Since all the tents were filled to capacity, the total number of people who slept in tents would be $2(18) + 4(42) = 36 + 168 = 204$; however, the total number of people who slept in tents was 202, not 204.

Question Difficulty:

Medium

Question ID 9d4270fe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9d4270fe

A company that creates and sells tape dispensers calculates its monthly profit, in dollars, by subtracting its fixed monthly costs, in dollars, from its monthly sales revenue, in dollars. The equation $15,000 = 2.00x - 4,500$ represents this situation for a month where x tape dispensers are created and sold. Which statement is the best interpretation of $2.00x$ in this context?

- A. The monthly sales revenue, in dollars, from selling x tape dispensers
- B. The monthly sales revenue, in dollars, from each tape dispenser sold
- C. The monthly cost, in dollars, of creating each tape dispenser
- D. The monthly cost, in dollars, of creating x tape dispensers

ID: 9d4270fe Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the equation $15,000 = 2.00x - 4,500$ represents this situation for a month where x tape dispensers are created and sold. It's also given that the company calculates its monthly profit, in dollars, by subtracting its fixed monthly costs, in dollars, from its monthly sales revenue, in dollars. It follows that $2.00x$ represents the monthly sales revenue, in dollars. Therefore, the best interpretation of $2.00x$ in this context is the monthly sales revenue from selling x tape dispensers.

Choice B is incorrect. This is the best interpretation of 2.00, not $2.00x$.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect. This is the best interpretation of 4,500, not $2.00x$.

Question Difficulty:

Medium

Question ID dba8d38a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dba8d38a

A petting zoo sells two types of tickets. The standard ticket, for admission only, costs \$5. The premium ticket, which includes admission and food to give to the animals, costs \$12. One Saturday, the petting zoo sold a total of 250 tickets and collected a total of \$2,300 from ticket sales. Which of the following systems of equations can be used to find the number of standard tickets, s , and premium tickets, p , sold on that Saturday?

$$s + p = 250$$

A. $5s + 12p = 2,300$

$$s + p = 250$$

B. $12s + 5p = 2,300$

$$5s + 12p = 250$$

C. $s + p = 2,300$

$$12s + 5p = 250$$

D. $s + p = 2,300$

ID: dba8d38a Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the petting zoo sells two types of tickets, standard and premium, and that s represents the number of standard tickets sold and p represents the number of premium tickets sold. It's also given that the petting zoo sold 250 tickets on one Saturday; thus, $s + p = 250$. It's also given that each standard ticket costs \$5 and each premium ticket costs \$12. Thus, the amount collected in ticket sales can be represented by $5s$ for standard tickets and $12p$ for premium tickets. On that Saturday the petting zoo collected a total of \$2,300 from ticket sales; thus, $5s + 12p = 2,300$. These two equations are correctly represented in choice A.

Choice B is incorrect. The second equation in the system represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12. Choices C and D are incorrect. The equations represent the total collected from standard and premium ticket sales as \$250, not \$2,300, and the total number of standard and premium tickets sold as \$2,300, not \$250. Additionally, the first equation in choice D represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12.

Question Difficulty:

Easy

Question ID 64c85440

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 64c85440

In North America, the standard width of a parking space is at least 7.5 feet and no more than 9.0 feet. A restaurant owner recently resurfaced the restaurant's parking lot and wants to determine the number of parking spaces, n , in the parking lot that could be placed perpendicular to a curb that is 135 feet long, based on the standard width of a parking space. Which of the following describes all the possible values of n ?

- A. $18 \leq n \leq 135$
- B. $7.5 \leq n \leq 9$
- C. $15 \leq n \leq 135$
- D. $15 \leq n \leq 18$

ID: 64c85440 Answer

Correct Answer:

D

Rationale

Choice D is correct. Placing the parking spaces with the minimum width of 7.5 feet gives the maximum possible number of parking spaces. Thus, the maximum number that can be placed perpendicular to a 135-foot-long curb is $\frac{135}{7.5} = 18$. Placing the parking spaces with the maximum width of 9 feet gives the minimum number of parking spaces. Thus, the minimum number that can be placed perpendicular to a 135-foot-long curb is $\frac{135}{9} = 15$. Therefore, if n is the number of parking spaces in the lot, the range of possible values for n is $15 \leq n \leq 18$.

Choices A and C are incorrect. These choices equate the length of the curb with the maximum possible number of parking spaces. Choice B is incorrect. This is the range of possible values for the width of a parking space instead of the range of possible values for the number of parking spaces.

Question Difficulty:

Medium

Question ID 87322577

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 87322577

$$x + y = 75$$

The equation above relates the number of minutes, x , Maria spends running each day and the number of minutes, y , she spends biking each day. In the equation, what does the number 75 represent?

- A. The number of minutes spent running each day
- B. The number of minutes spent biking each day
- C. The total number of minutes spent running and biking each day
- D. The number of minutes spent biking for each minute spent running

ID: 87322577 Answer

Correct Answer:

C

Rationale

Choice C is correct. Maria spends x minutes running each day and y minutes biking each day. Therefore, $x + y$ represents the total number of minutes Maria spent running and biking each day. Because $x + y = 75$, it follows that 75 is the total number of minutes that Maria spent running and biking each day.

Choices A and B are incorrect. The number of minutes Maria spent running each day is represented by x and need not be 75. Similarly, the number of minutes that Maria spends biking each day is represented by y and need not be 75. The number of minutes Maria spends running each day and biking each day may vary; however, the total number of minutes she spends each day on these activities is constant and equal to 75. Choice D is incorrect. The number of minutes Maria spent biking for each minute spent running cannot be determined from the information provided.

Question Difficulty:

Easy

Question ID 7a5a74a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7a5a74a6

$$3(2x - 6) - 11 = 4(x - 3) + 6$$

If x is the solution to the equation above, what is the value of $x - 3$?

A. $\frac{23}{2}$

B. $\frac{17}{2}$

C. $\frac{15}{2}$

D. $-\frac{15}{2}$

ID: 7a5a74a6 Answer

Correct Answer:

B

Rationale

Choice B is correct. Because 2 is a factor of both $2x$ and 6, the expression $2x - 6$ can be rewritten as $2(x - 3)$. Substituting $2(x - 3)$ for $(2x - 6)$ on the left-hand side of the given equation yields $3(2)(x - 3) - 11 = 4(x - 3) + 6$, or $6(x - 3) - 11 = 4(x - 3) + 6$. Subtracting $4(x - 3)$ from both sides of this equation yields $2(x - 3) - 11 = 6$. Adding 11 to both sides of this equation yields $2(x - 3) = 17$. Dividing both sides of this equation by 2 yields $x - 3 = \frac{17}{2}$.

Alternate approach: Distributing 3 to the quantity $(2x - 6)$ on the left-hand side of the given equation and distributing 4 to the quantity $(x - 3)$ on the right-hand side yields $6x - 18 - 11 = 4x - 12 + 6$, or $6x - 29 = 4x - 6$. Subtracting $4x$ from both sides of this equation yields $2x - 29 = -6$. Adding 29 to both sides of this equation yields $2x = 23$. Dividing both sides of this equation by 2 yields $x = \frac{23}{2}$. Therefore, the value of $x - 3$ is $\frac{23}{2} - 3$, or $\frac{17}{2}$.

Choice A is incorrect. This is the value of x , not $x - 3$. Choices C and D are incorrect. If the value of $x - 3$ is $\frac{15}{2}$ or $-\frac{15}{2}$, it follows that the value of x is $\frac{21}{2}$ or $-\frac{9}{2}$, respectively. However, solving the given equation for x yields $x = \frac{23}{2}$. Therefore, the

value of $x - 3$ can't be $\frac{15}{2}$ or $-\frac{15}{2}$.

Question Difficulty:

Medium

Question ID b7e6394d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b7e6394d

Alan drives an average of 100 miles each week. His car can travel an average of 25 miles per gallon of gasoline. Alan would like to reduce his weekly expenditure on gasoline by \$5. Assuming gasoline costs \$4 per gallon, which equation can Alan use to determine how many fewer average miles, m , he should drive each week?

A. $\frac{25}{4}m = 95$

B. $\frac{25}{4}m = 5$

C. $\frac{4}{25}m = 95$

D. $\frac{4}{25}m = 5$

ID: b7e6394d Answer

Correct Answer:

D

Rationale

Choice D is correct. Since gasoline costs \$4 per gallon, and since Alan's car travels an average of 25 miles per gallon, the expression $\frac{4}{25}$ gives the cost, in dollars per mile, to drive the car. Multiplying $\frac{4}{25}$ by m gives the cost for Alan to drive m miles in his car. Alan wants to reduce his weekly spending by \$5, so setting $\frac{4}{25}m$ equal to 5 gives the number of miles, m , by which he must reduce his driving.

Choices A, B, and C are incorrect. Choices A and B transpose the numerator and the denominator in the fraction. The fraction $\frac{25}{4}$ would result in the unit miles per dollar, but the question requires a unit of dollars per mile. Choices A and C set the expression equal to 95 instead of 5, a mistake that may result from a misconception that Alan wants to reduce his driving by 5 miles each week; instead, the question says he wants to reduce his weekly expenditure by \$5.

Question Difficulty:

Hard

Question ID 7625073d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7625073d

The equation $7g + 7b = 840$ represents the number of blue tiles, b , and the number of green tiles, g , an artist needs for an 840-square-inch tile project. The artist needs 71 blue tiles for the project. How many green tiles does he need?

ID: 7625073d Answer

Correct Answer:

49

Rationale

The correct answer is 49. It's given that the equation $7g + 7b = 840$ represents the number of blue tiles, b , and the number of green tiles, g , an artist needs for an 840-square-inch tile project. It's also given that the artist needs 71 blue tiles for the project. Substituting 71 for b in the equation $7g + 7b = 840$ yields $7g + 7(71) = 840$, or $7g + 497 = 840$. Subtracting 497 from both sides of this equation yields $7g = 343$. Dividing both sides of this equation by 7 yields $g = 49$. Therefore, the artist needs 49 green tiles for the project.

Question Difficulty:

Medium

Question ID bf36c815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bf36c815

The function g is defined by $g(x) = -x + 8$.

What is the value of $g(0)$?

- A. -8
- B. 0
- C. 4
- D. 8

ID: bf36c815 Answer

Correct Answer:

D

Rationale

Choice D is correct. The value of $g(0)$ is found by substituting 0 for x in the function g . This yields $g(0) = -0 + 8$, which can be rewritten as $g(0) = 8$.

Choice A is incorrect and may result from misinterpreting the equation as $g(x) = x + (-8)$ instead of $g(x) = -x + 8$. Choice B is incorrect. This is the value of x , not $g(x)$. Choice C is incorrect and may result from calculation errors.

Question Difficulty:

Easy

Question ID 968e9e51

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 968e9e51

$$y \leq x$$

$$y \leq -x$$

Which of the following ordered pairs (x, y) is a solution to the system of inequalities above?

- A. $(1, 0)$
- B. $(-1, 0)$
- C. $(0, 1)$
- D. $(0, -1)$

ID: 968e9e51 Answer

Correct Answer:

D

Rationale

Choice D is correct. The solutions to the given system of inequalities is the set of all ordered pairs (x, y) that satisfy both inequalities in the system. For an ordered pair to satisfy the inequality $y \leq x$, the value of the ordered pair's y-coordinate must be less than or equal to the value of the ordered pair's x-coordinate. This is true of the ordered pair $(0, -1)$, because $-1 \leq 0$. To satisfy the inequality $y \leq -x$, the value of the ordered pair's y-coordinate must be less than or equal to the value of the additive inverse of the ordered pair's x-coordinate. This is also true of the ordered pair $(0, -1)$. Because 0 is its own additive inverse, $-1 \leq -(0)$ is the same as $-1 \leq 0$. Therefore, the ordered pair $(0, -1)$ is a solution to the given system of inequalities.

Choice A is incorrect. This ordered pair satisfies only the inequality $y \leq x$ in the given system, not both inequalities. Choice B is incorrect. This ordered pair satisfies only the inequality $y \leq -x$ in the system, but not both inequalities. Choice C is incorrect. This ordered pair satisfies neither inequality.

Question Difficulty:

Medium

Question ID aa85b138

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: aa85b138

$$2n + 6 = 14$$

A tree had a height of 6 feet when it was planted. The equation above can be used to find how many years n it took the tree to reach a height of 14 feet. Which of the following is the best interpretation of the number 2 in this context?

- A. The number of years it took the tree to double its height
- B. The average number of feet that the tree grew per year
- C. The height, in feet, of the tree when the tree was 1 year old
- D. The average number of years it takes similar trees to grow 14 feet

ID: aa85b138 Answer

Correct Answer:

B

Rationale

Choice B is correct. The height of the tree at a given time is equal to its height when it was planted plus the number of feet that the tree grew. In the given equation, 14 represents the height of the tree at the given time, and 6 represents the height of the tree when it was planted. It follows that $2n$ represents the number of feet the tree grew from the time it was planted until the time it reached a height of 14 feet. Since n represents the number of years between the given time and the time the tree was planted, 2 must represent the average number of feet the tree grew each year.

Choice A is incorrect and may result from interpreting the coefficient 2 as doubling instead of as increasing by 2 each year. Choice C is incorrect. The height of the tree when it was 1 year old was $2(1) + 6 = 8$ feet, not 2 feet. Choice D is incorrect. No information is given to connect the growth of one particular tree to the growth of similar trees.

Question Difficulty:

Medium

Question ID 15daa8d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 15daa8d6

$$2x + 16 = a(x + 8)$$

In the given equation, a is a constant. If the equation has infinitely many solutions, what is the value of a ?

ID: 15daa8d6 Answer

Correct Answer:

2

Rationale

The correct answer is 2. An equation with one variable, x , has infinitely many solutions only when both sides of the equation are equal for any defined value of x . It's given that $2x + 16 = ax + 8$, where a is a constant. This equation can be rewritten as $2x + 8 = ax + 8$. If this equation has infinitely many solutions, then both sides of this equation are equal for any defined value of x . Both sides of this equation are equal for any defined value of x when $2 = a$. Therefore, if the equation has infinitely many solutions, the value of a is 2.

Alternate approach: If the given equation, $2x + 16 = ax + 8$, has infinitely many solutions, then both sides of this equation are equal for any value of x . If $x = 0$, then substituting 0 for x in $2x + 16 = ax + 8$ yields $20 + 16 = a0 + 8$, or $16 = 8a$. Dividing both sides of this equation by 8 yields $2 = a$.

Question Difficulty:

Medium

Question ID 12ee1edc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 12ee1edc

$$(b - 2)x = 8$$

In the given equation, b is a constant. If the equation has no solution, what is the value of b ?

- A. 2
- B. 4
- C. 6
- D. 10

ID: 12ee1edc Answer

Correct Answer:

A

Rationale

Choice A is correct. This equation has no solution when there is no value of x that produces a true statement. Solving the given equation for x by dividing both sides by $(b - 2)$ gives $x = \frac{8}{(b - 2)}$. When $(b - 2) = 0$, the right-hand side of this equation will be undefined, and the equation will have no solution. Therefore, when $b = 2$, there is no value of x that satisfies the given equation.

Choices B, C, and D are incorrect. Substituting 4, 6, and 10 for b in the given equation yields exactly one solution, rather than no solution, for x . For example, substituting 4 for b in the given equation yields $(4 - 2)x = 8$, or $2x = 8$. Dividing both sides of $2x = 8$ by 2 yields $x = 4$. Similarly, if $b = 6$ or $b = 10$, $x = 2$ and $x = 1$, respectively.

Question Difficulty:

Medium

Question ID c6b151d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c6b151d4

A total of **364** paper straws of equal length were used to construct two types of polygons: triangles and rectangles. The triangles and rectangles were constructed so that no two polygons had a common side. The equation $3x + 4y = 364$ represents this situation, where x is the number of triangles constructed and y is the number of rectangles constructed. What is the best interpretation of $(x, y) = (24, 73)$ in this context?

- A. If **24** triangles were constructed, then **73** rectangles were constructed.
- B. If **24** triangles were constructed, then **73** paper straws were used.
- C. If **73** triangles were constructed, then **24** rectangles were constructed.
- D. If **73** triangles were constructed, then **24** paper straws were used.

ID: c6b151d4 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that 364 paper straws of equal length were used to construct triangles and rectangles, where no two polygons had a common side. It's also given that the equation $3x + 4y = 364$ represents this situation, where x is the number of triangles constructed and y is the number of rectangles constructed. The equation $x, y = 24, 73$ means that if $x = 24$, then $y = 73$. Substituting 24 for x and 73 for y in $3x + 4y = 364$ yields $3(24) + 4(73) = 364$, or $364 = 364$, which is true. Therefore, in this context, the equation $x, y = 24, 73$ means that if 24 triangles were constructed, then 73 rectangles were constructed.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID ee2f611f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: ee2f611f

A local transit company sells a monthly pass for \$95 that allows an unlimited number of trips of any length. Tickets for individual trips cost \$1.50, \$2.50, or \$3.50, depending on the length of the trip. What is the minimum number of trips per month for which a monthly pass could cost less than purchasing individual tickets for trips?

ID: ee2f611f Answer

Rationale

The correct answer is 28. The minimum number of individual trips for which the cost of the monthly pass is less than the cost of individual tickets can be found by assuming the maximum cost of the individual tickets, \$3.50. If n tickets costing \$3.50 each are purchased in one month, the inequality $95 < 3.50n$ represents this situation. Dividing both sides of the inequality by 3.50 yields $27.14 < n$, which is equivalent to $n > 27.14$. Since only a whole number of tickets can be purchased, it follows that 28 is the minimum number of trips.

Question Difficulty:

Hard

Question ID 8c98c834

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8c98c834

The equation $y = 0.1x$ models the relationship between the number of different pieces of music a certain pianist practices, y , during an x -minute practice session. How many pieces did the pianist practice if the session lasted 30 minutes?

- A. 1
- B. 3
- C. 10
- D. 30

ID: 8c98c834 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the equation $y = 0.1x$ models the relationship between the number of different pieces of music a certain pianist practices, y , and the number of minutes in a practice session, x . Since it's given that the session lasted 30 minutes, the number of pieces the pianist practiced can be found by substituting 30 for x in the given equation, which yields $y = 0.1(30)$, or $y = 3$.

Choices A and C are incorrect and may result from misinterpreting the values in the equation. Choice D is incorrect. This is the given value of x , not the value of y .

Question Difficulty:

Easy

Question ID 563407e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 563407e5

A bakery sells trays of cookies. Each tray contains at least 50 cookies but no more than 60. Which of the following could be the total number of cookies on 4 trays of cookies?

- A. 165
- B. 205
- C. 245
- D. 285

ID: 563407e5 Answer

Correct Answer:

B

Rationale

Choice B is correct. If each tray contains the least number of cookies possible, 50 cookies, then the least number of cookies possible on 4 trays is $50 \times 4 = 200$ cookies. If each tray contains the greatest number of cookies possible, 60 cookies, then the greatest number of cookies possible on 4 trays is $60 \times 4 = 240$ cookies. If the least number of cookies on 4 trays is 200 and the greatest number of cookies is 240, then 205 could be the total number of cookies on these 4 trays of cookies because $200 \leq 205 \leq 240$.

Choices A, C, and D are incorrect. The least number of cookies on 4 trays is 200 cookies, and the greatest number of cookies on 4 trays is 240 cookies. The choices 165, 245, and 285 are each either less than 200 or greater than 240; therefore, they cannot represent the total number of cookies on 4 trays.

Question Difficulty:

Easy

Question ID 25e1cfed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 25e1cfed

How many solutions does the equation $10(15x - 9) = -15(6 - 10x)$ have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 25e1cfed Answer

Correct Answer:

C

Rationale

Choice C is correct. Applying the distributive property to each side of the given equation yields $150x - 90 = -90 + 150x$. Applying the commutative property of addition to the right-hand side of this equation yields $150x - 90 = 150x - 90$. Since the two sides of the equation are equivalent, this equation is true for any value of x . Therefore, the given equation has infinitely many solutions.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard