

Question ID 002dba45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 $\frac{-1}{-\frac{17}{3}}$, 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	(Medium)

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 3008fcf3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 3008fcf3

x	y
k	13
$k + 7$	-15

The table gives the coordinates of two points on a line in the xy -plane. The y -intercept of the line is $(k - 5, b)$, where k and b are constants. What is the value of b ?

ID: 3008fcf3 Answer

Correct Answer: 33

Rationale

The correct answer is 33. It's given in the table that the coordinates of two points on a line in the xy -plane are $(k, 13)$ and $(k + 7, -15)$. The y -intercept is another point on the line. The slope computed using any pair of points from the line will be the same. The slope of a line, m , between any two points, (x_1, y_1) and (x_2, y_2) , on the line can be calculated using the slope formula, $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$. It follows that the slope of the line with the given points from the table, $(k, 13)$ and $(k + 7, -15)$, is $m = \frac{-15 - 13}{k + 7 - k}$, which is equivalent to $m = \frac{-28}{7}$, or $m = -4$. It's given that the y -intercept of the line is $(k - 5, b)$. Substituting -4 for m and the coordinates of the points $(k - 5, b)$ and $(k, 13)$ into the slope formula yields $-4 = \frac{13 - b}{k - (k - 5)}$, which is equivalent to $-4 = \frac{13 - b}{k - k + 5}$, or $-4 = \frac{13 - b}{5}$. Multiplying both sides of this equation by 5 yields $-20 = 13 - b$. Subtracting 13 from both sides of this equation yields $-33 = -b$. Dividing both sides of this equation by -1 yields $b = 33$. Therefore, the value of b is 33.

Question Difficulty: Hard

Question ID d1b66ae6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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	■ ■ □

ID: cb8f449f

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

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 88e13c8c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 88e13c8c

The total cost $f(x)$, in dollars, to lease a car for **36** months from a particular car dealership is given by $f(x) = 36x + 1,000$, where x is the monthly payment, in dollars. What is the total cost to lease a car when the monthly payment is **\$400**?

- A. \$13,400
- B. \$13,000
- C. \$15,400
- D. \$37,400

ID: 88e13c8c Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $f(x)$ is the total cost, in dollars, to lease a car from this dealership with a monthly payment of x dollars. Therefore, the total cost, in dollars, to lease the car when the monthly payment is \$400 is represented by the value of $f(x)$ when $x = 400$. Substituting 400 for x in the equation $f(x) = 36x + 1,000$ yields $f(400) = 36(400) + 1,000$, or $f(400) = 15,400$. Thus, when the monthly payment is \$400, the total cost to lease a car is \$15,400.

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 3cdbf026

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 3cdbf026

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: 3cdbf026 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	

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 8c5e6702

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 8c5e6702

A window repair specialist charges **\$220** for the first two hours of repair plus an hourly fee for each additional hour. The total cost for **5** hours of repair is **\$400**. Which function f gives the total cost, in dollars, for x hours of repair, where $x \geq 2$?

- A. $f(x) = 60x + 100$
- B. $f(x) = 60x + 220$
- C. $f(x) = 80x$
- D. $f(x) = 80x + 220$

ID: 8c5e6702 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the window repair specialist charges **\$220** for the first two hours of repair plus an hourly fee for each additional hour. Let n represent the hourly fee for each additional hour after the first two hours. Since it's given that x is the number of hours of repair, it follows that the charge generated by the hourly fee after the first two hours can be represented by the expression $n(x - 2)$. Therefore, the total cost, in dollars, for x hours of repair is $f(x) = 220 + n(x - 2)$. It's given that the total cost for 5 hours of repair is **\$400**. Substituting 5 for x and 400 for $f(x)$ into the equation $f(x) = 220 + n(x - 2)$ yields $400 = 220 + n(5 - 2)$, or $400 = 220 + 3n$. Subtracting 220 from both sides of this equation yields $180 = 3n$. Dividing both sides of this equation by 3 yields $n = 60$. Substituting 60 for n in the equation $f(x) = 220 + n(x - 2)$ yields $f(x) = 220 + 60(x - 2)$, which is equivalent to $f(x) = 220 + 60x - 120$, or $f(x) = 60x + 100$. Therefore, the total cost, in dollars, for x hours of repair is $f(x) = 60x + 100$.

Choice B is incorrect. This function represents the total cost, in dollars, for x hours of repair where the specialist charges **\$340**, rather than **\$220**, for the first two hours of repair.

Choice C is incorrect. This function represents the total cost, in dollars, for x hours of repair where the specialist charges **\$160**, rather than **\$220**, for the first two hours of repair, and an hourly fee of **\$80**, rather than **\$60**, after the first two hours.

Choice D is incorrect. This function represents the total cost, in dollars, for x hours of repair where the specialist charges **\$380**, rather than **\$220**, for the first two hours of repair, and an hourly fee of **\$80**, rather than **\$60**, after the first two hours.

Question Difficulty: Hard

Question ID 2937ef4f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 548a4929

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 548a4929

The function h is defined by $h(x) = 4x + 28$. The graph of $y = h(x)$ 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 $a + b$?

- A. 21
- B. 28
- C. 32
- D. 35

ID: 548a4929 Answer

Correct Answer: A

Rationale

Choice A is correct. The x -intercept of a graph in the xy -plane is the point on the graph where $y = 0$. It's given that function h is defined by $h(x) = 4x + 28$. Therefore, the equation representing the graph of $y = h(x)$ is $y = 4x + 28$. Substituting 0 for y in the equation $y = 4x + 28$ yields $0 = 4x + 28$. Subtracting 28 from both sides of this equation yields $-28 = 4x$. Dividing both sides of this equation by 4 yields $-7 = x$. Therefore, the x -intercept of the graph of $y = h(x)$ in the xy -plane is $(-7, 0)$. It's given that the x -intercept of the graph of $y = h(x)$ is $(a, 0)$. Therefore, $a = -7$. The y -intercept of a graph in the xy -plane is the point on the graph where $x = 0$. Substituting 0 for x in the equation $y = 4x + 28$ yields $y = 4(0) + 28$, or $y = 28$. Therefore, the y -intercept of the graph of $y = h(x)$ in the xy -plane is $(0, 28)$. It's given that the y -intercept of the graph of $y = h(x)$ is $(0, b)$. Therefore, $b = 28$. If $a = -7$ and $b = 28$, then the value of $a + b$ is $-7 + 28$, or 21.

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

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

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

Question Difficulty: Medium

Question ID 2b15d65f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 9bbce683

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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.

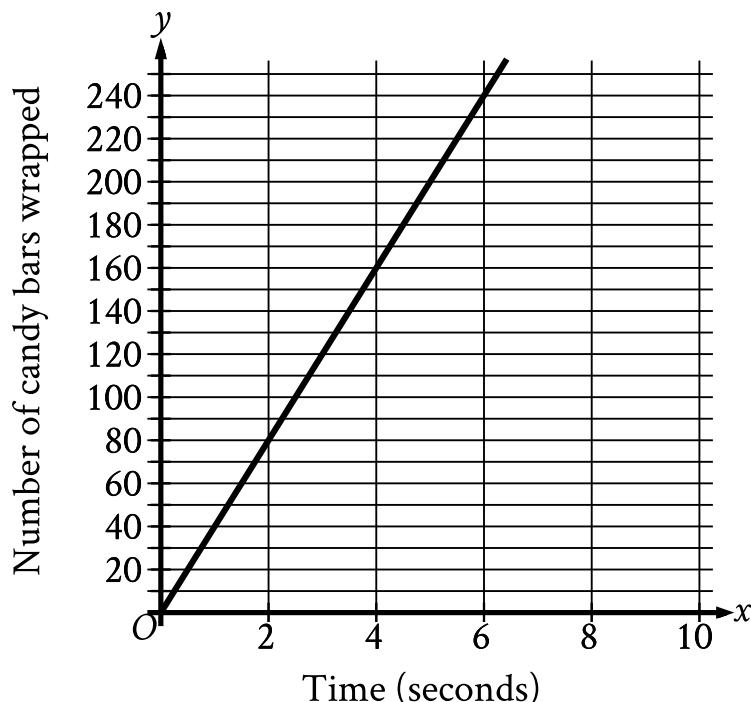
Question Difficulty: Hard

Question ID 13294295

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 13294295

The graph shown models the number of candy bars a certain machine wraps with a label in x seconds.



According to the graph, what is the estimated number of candy bars the machine wraps with a label per second?

- A. 2
- B. 40
- C. 78
- D. 80

ID: 13294295 Answer

Correct Answer: B

Rationale

Choice B is correct. For the graph shown, the x -axis represents time, in seconds, and the y -axis represents the number of candy bars wrapped. The slope of a line in the xy -plane is the change in y for each 1-unit increase in x . It follows that the slope of the graph shown represents the estimated number of candy bars the machine wraps with a label per second. The slope, m , of a line in the xy -plane can be found using any two points, (x_1, y_1) and (x_2, y_2) , on the line and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. The graph shown passes through the points $(0, 0)$ and $(2, 80)$. Substituting these points for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{80 - 0}{2 - 0}$, which is

equivalent to $m = \frac{80}{2}$, or $m = 40$. Therefore, the estimated number of candy bars the machine wraps with a label per second is 40.

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 60f71697

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 8a87c2c8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 8a87c2c8

$$\begin{aligned}x + 3 &= -2y + 5 \\x - 3 &= 2y + 7\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $2x$?

- A. **-2**
- B. **6**
- C. **12**
- D. **24**

ID: 8a87c2c8 Answer

Correct Answer: C

Rationale

Choice C is correct. Adding the second equation in the given system to the first equation in the given system yields $(x + 3) + (x - 3) = (-2y + 5) + (2y + 7)$. Adding like terms in this equation yields $2x = 12$. Thus, the value of $2x$ is 12.

Choice A is incorrect. This is the value of y , not $2x$.

Choice B is incorrect. This is the value of x , not $2x$.

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

Question Difficulty: Medium

Question ID 70feb725

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	3

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 3d04de9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 620abf36

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $4(x + 4)$ from both sides of the given equation yields $1(x + 4) = 29$, 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 5bf5136d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 5bf5136d

The triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. If a triangle has side lengths of **6** and **12**, which inequality represents the possible lengths, x , of the third side of the triangle?

- A. $x < 18$
- B. $x > 18$
- C. $6 < x < 18$
- D. $x < 6$ or $x > 18$

ID: 5bf5136d Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that a triangle has side lengths of **6** and **12**, and x represents the length of the third side of the triangle. It's also given that the triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. Therefore, the inequalities $6 + x > 12$, $6 + 12 > x$, and $12 + x > 6$ represent all possible values of x . Subtracting **6** from both sides of the inequality $6 + x > 12$ yields $x > 12 - 6$, or $x > 6$. Adding **6** and **12** in the inequality $6 + 12 > x$ yields $18 > x$, or $x < 18$. Subtracting **12** from both sides of the inequality $12 + x > 6$ yields $x > 6 - 12$, or $x > -6$. Since all x -values that satisfy the inequality $x > 6$ also satisfy the inequality $x > -6$, it follows that the inequalities $x > 6$ and $x < 18$ represent the possible values of x . Therefore, the inequality $6 < x < 18$ represents the possible lengths, x , of the third side of the triangle.

Choice A is incorrect. This inequality gives the upper bound for x but does not include its lower bound.

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 2554b413

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 bf883fde

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: bf883fde

For the function f , the graph of $y = f(x)$ in the xy -plane has a slope of 3 and passes through the point $(0, -8)$. Which equation defines f ?

- A. $f(x) = 3x$
- B. $f(x) = 3x - 8$
- C. $f(x) = 3x + 5$
- D. $f(x) = 3x + 11$

ID: bf883fde Answer

Correct Answer: B

Rationale

Choice B is correct. An equation defining a linear function can be written in the form $f(x) = mx + b$, where m and b are constants, 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 function f , the graph of $y = f(x)$ in the xy -plane has a slope of 3. Therefore, $m = 3$. It's also given that this graph passes through the point $(0, -8)$. Therefore, the y -intercept of the graph is $(0, -8)$, and it follows that $b = -8$. Substituting 3 for m and -8 for b in the equation $f(x) = mx + b$ yields $f(x) = 3x - 8$. Thus, the equation that defines f is $f(x) = 3x - 8$.

Choice A is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane passes through the point $(0, 0)$, not $(0, -8)$.

Choice C is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane passes through the point $(0, 5)$, not $(0, -8)$.

Choice D is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane passes through the point $(0, 11)$, not $(0, -8)$.

Question Difficulty: Easy

Question ID a309803e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 789975b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 771bd0ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $-2(t + 3) = 38$. 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 4fe4fd7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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

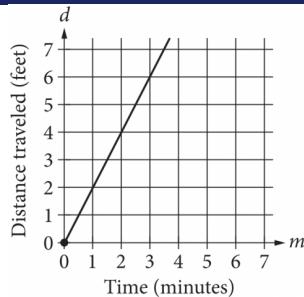
The correct answer is 3500. The given information includes a cost, \$800, to produce 100 shirts. Substituting $c(x) = 800$ and $x = 100$ into the given equation yields $800 = m \cdot 100 + 500$. Subtracting 500 from both sides of the equation yields $300 = m \cdot 100$. Dividing both sides of this equation 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 11e1ab81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	█ █ █

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 c22b5f25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 d7bf55e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 b4553284

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: b4553284

If $2x = 12$, what is the value of $9x$?

ID: b4553284 Answer

Correct Answer: 54

Rationale

The correct answer is 54. Dividing both sides of the given equation by 2 yields $x = 6$. Multiplying both sides of this equation by 9 yields $9x = 54$. Thus, the value of $9x$ is 54.

Question Difficulty: Easy

Question ID adb0c96c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: adb0c96c

$$24x + y = 48$$

$$6x + y = 72$$

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

ID: adb0c96c Answer

Correct Answer: 80

Rationale

The correct answer is 80. Subtracting the second equation in the given system from the first equation yields $(24x + y) - (6x + y) = 48 - 72$, which is equivalent to $24x - 6x + y - y = -24$, or $18x = -24$. Dividing each side of this equation by 3 yields $6x = -8$. Substituting -8 for $6x$ in the second equation yields $-8 + y = 72$. Adding 8 to both sides of this equation yields $y = 80$.

Alternate approach: Multiplying each side of the second equation in the given system by 4 yields $24x + 4y = 288$. Subtracting the first equation in the given system from this equation yields $(24x + 4y) - (24x + y) = 288 - 48$, which is equivalent to $24x - 24x + 4y - y = 240$, or $3y = 240$. Dividing each side of this equation by 3 yields $y = 80$.

Question Difficulty: Hard

Question ID c651cc56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $6 - (-2) = 8$. So the values of $f(x)$ increase by 4 for every increase by 1 in the value of x . Since $f(2) = 4$, it follows that $f(2 + 1) = 4 + 4 = 8$. Therefore, $f(3) = 8$.

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 16889ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 ca9bb527

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: ca9bb527

$$\begin{aligned}y &= 4x - 9 \\y &= 19\end{aligned}$$

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

- A. (4, 19)
- B. (7, 19)
- C. (19, 4)
- D. (19, 7)

ID: ca9bb527 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given by the second equation in the system that $y = 19$. Substituting 19 for y in the first equation yields $19 = 4x - 9$. Adding 9 to both sides of this equation yields $28 = 4x$. Dividing both sides of this equation by 4 yields $7 = x$. Therefore, since $x = 7$ and $y = 19$, the solution (x, y) to the given system of equations is $(7, 19)$.

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 87071893

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 50f4cb9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $-64 = a(1) + (-2a)$. Combining like terms yields $-64 = -a$, or $a = 64$. Since $b = -2a$, substituting 64 for a into this equation gives $b = (-2)(64)$, 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 a396ed75

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $m(x) = 5.7x$ 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 550b352c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 45a534d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 45a534d0

$$\begin{aligned}48x - 72y &= 30y + 24 \\ ry &= \frac{1}{6} - 16x\end{aligned}$$

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

ID: 45a534d0 Answer

Correct Answer: -34

Rationale

The correct answer is **-34**. 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 distinct and parallel. Two lines represented by equations in standard form $Ax + By = C$, where A , B , and C are constants, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation. The first equation in the given system can be written in standard form by subtracting $30y$ from both sides of the equation to yield $48x - 102y = 24$. The second equation in the given system can be written in standard form by adding $16x$ to both sides of the equation to yield $16x + ry = \frac{1}{6}$. The coefficient of x in this second equation, 16 , is $\frac{1}{3}$ times the coefficient of x in the first equation, 48 . For the lines to be parallel the coefficient of y in the second equation, r , must also be $\frac{1}{3}$ times the coefficient of y in the first equation, -102 . Thus, $r = \frac{1}{3}(-102)$, or $r = -34$. Therefore, if the given system has no solution, the value of r is **-34**.

Question Difficulty: Hard

Question ID dd797fe2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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.

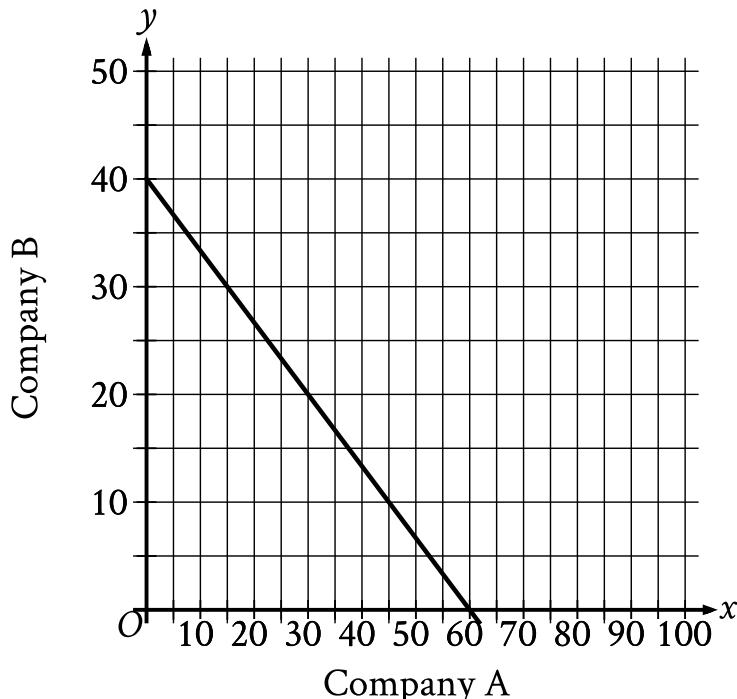
Choice A is incorrect. This is represented by the expression $4x$ in the given equation. Choice B is incorrect. This is represented by the expression $3y$ in the given equation. Choice D is incorrect. This is represented by the expression $|4x - 3y|$.

Question Difficulty: Easy

Question ID 2e0290c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	■ ■ □

ID: 2e0290c3



The graph shows the relationship between the number of shares of stock from Company A, x , and the number of shares of stock from Company B, y , that Simone can purchase. Which equation could represent this relationship?

- A. $y = 8x + 12$
- B. $8x + 12y = 480$
- C. $y = 12x + 8$
- D. $12x + 8y = 480$

ID: 2e0290c3 Answer

Correct Answer: B

Rationale

Choice B is correct. The graph shown is a line passing through the points $(0, 40)$ and $(60, 0)$. Since the relationship between x and y is linear, if two points on the graph make a linear equation true, then the equation represents the relationship. Substituting 0 for x and 40 for y in the equation in choice B, $8x + 12y = 480$, yields $8(0) + 12(40) = 480$, or $480 = 480$, which is true. Substituting 60 for x and 0 for y in the equation $8x + 12y = 480$ yields $8(60) + 12(0) = 480$, or $480 = 480$, which is true. Therefore, the equation $8x + 12y = 480$ represents the relationship between x and y .

Choice A is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $40 = 8(0) + 12$, or $40 = 12$, is not true.

Choice C is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $40 = 12(0) + 8$, or $40 = 8$, is not true.

Choice D is incorrect. The point $(0, 40)$ is not on the graph of this equation, since $12(0) + 8(40) = 480$, or $320 = 480$, is not true.

Question Difficulty: Medium

Question ID 8339793c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 8339793c

Nasir bought **9** storage bins that were each the same price. He used a coupon for **\$63** off the entire purchase. The cost for the entire purchase after using the coupon was **\$27**. What was the original price, in dollars, for **1** storage bin?

ID: 8339793c Answer

Correct Answer: 10

Rationale

The correct answer is **10**. It's given that the cost for the entire purchase was **\$27** after a coupon was used for **\$63** off the entire purchase. Adding the amount of the coupon to the purchase price yields $27 + 63 = 90$. Thus, the cost for the entire purchase before using the coupon was **\$90**. It's given that Nasir bought **9** storage bins. The original price for **1** storage bin can be found by dividing the total cost by **9**. Therefore, the original price, in dollars, for **1** storage bin is $\frac{90}{9}$, or **10**.

Question Difficulty: Easy

Question ID c5082ce3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 1035faea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 1035faea

A psychologist set up an experiment to study the tendency of a person to select the first item when presented with a series of items. In the experiment, 300 people were presented with a set of five pictures arranged in random order. Each person was asked to choose the most appealing picture. Of the first 150 participants, 36 chose the first picture in the set. Among the remaining 150 participants, p people chose the first picture in the set. If more than 20% of all participants chose the first picture in the set, which of the following inequalities best describes the possible values of p ?

- A. $p > 0.20(300 - 36)$, where $p \leq 150$
- B. $p > 0.20(300 + 36)$, where $p \leq 150$
- C. $p - 36 > 0.20(300)$, where $p \leq 150$
- D. $p + 36 > 0.20(300)$, where $p \leq 150$

ID: 1035faea Answer

Correct Answer: D

Rationale

Choice D is correct. Of the first 150 participants, 36 chose the first picture in the set, and of the 150 remaining participants, p chose the first picture in the set. Hence, the proportion of the participants who chose the first picture

in the set is $\frac{36+p}{300}$. Since more than 20% of all the participants chose the first picture, it follows that $\frac{36+p}{300} > 0.20$.

This inequality can be rewritten as $p + 36 > 0.20(300)$. Since p is a number of people among the remaining 150 participants, $p \leq 150$.

Choices A, B, and C are incorrect and may be the result of some incorrect interpretations of the given information or of computational errors.

Question Difficulty: Hard

Question ID 94b48cbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 $7x + 2(0) = -31$, 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 $7(0) + 2y = -31$, 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 $\frac{-\frac{31}{2}}{-\frac{31}{7}}$, which is equivalent to $(\frac{31}{2})(\frac{7}{31})$, 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 c17d9ba9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: c17d9ba9

A number x is at most 17 less than 5 times the value of y . If the value of y is 3, what is the greatest possible value of x ?

ID: c17d9ba9 Answer

Correct Answer: -2

Rationale

The correct answer is -2 . It's given that a number x is at most 17 less than 5 times the value of y , or $x \leq 5y - 17$. Substituting 3 for y in this inequality yields $x \leq 5(3) - 17$, or $x \leq -2$. Thus, if the value of y is 3, the greatest possible value of x is -2 .

Question Difficulty: Medium

Question ID ee7b1de1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: ee7b1de1

A small business owner budgets **\$2,200** to purchase candles. The owner must purchase a minimum of **200** candles to maintain the discounted pricing. If the owner pays **\$4.90** per candle to purchase small candles and **\$11.60** per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

ID: ee7b1de1 Answer

Correct Answer: 182

Rationale

The correct answer is **182**. Let s represent the number of small candles the owner can purchase, and let ℓ represent the number of large candles the owner can purchase. It's given that the owner pays **\$4.90** per candle to purchase small candles and **\$11.60** per candle to purchase large candles. Therefore, the owner pays $4.90s$ dollars for s small candles and 11.60ℓ dollars for ℓ large candles, which means the owner pays a total of $4.90s + 11.60\ell$ dollars to purchase candles. It's given that the owner budgets **\$2,200** to purchase candles. Therefore, $4.90s + 11.60\ell \leq 2,200$. It's also given that the owner must purchase a minimum of **200** candles. Therefore, $s + \ell \geq 200$. The inequalities $4.90s + 11.60\ell \leq 2,200$ and $s + \ell \geq 200$ can be combined into one compound inequality by rewriting the second inequality so that its left-hand side is equivalent to the left-hand side of the first inequality. Subtracting ℓ from both sides of the inequality $s + \ell \geq 200$ yields $s \geq 200 - \ell$. Multiplying both sides of this inequality by **4.90** yields $4.90s \geq 4.90(200 - \ell)$, or $4.90s \geq 980 - 4.90\ell$. Adding 11.60ℓ to both sides of this inequality yields $4.90s + 11.60\ell \geq 980 - 4.90\ell + 11.60\ell$, or $4.90s + 11.60\ell \geq 980 + 6.70\ell$. This inequality can be combined with the inequality $4.90s + 11.60\ell \leq 2,200$, which yields the compound inequality $980 + 6.70\ell \leq 4.90s + 11.60\ell \leq 2,200$. It follows that $980 + 6.70\ell \leq 2,200$. Subtracting **980** from both sides of this inequality yields $6.70\ell \leq 2,200$. Dividing both sides of this inequality by **6.70** yields approximately $\ell \leq 182.09$. Since the number of large candles the owner purchases must be a whole number, the maximum number of large candles the owner can purchase is the largest whole number less than **182.09**, which is **182**.

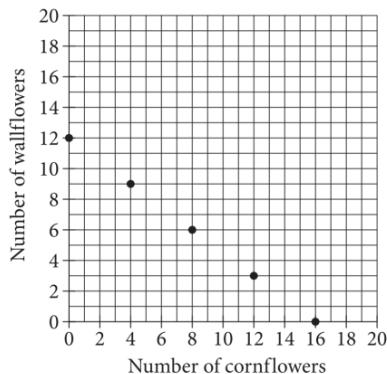
Question Difficulty: Hard

Question ID c362c210

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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 a9039591

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: a9039591

x	$f(x)$
0	29
1	32
2	35

For the linear function f , the table shows three values of x and their corresponding values of $f(x)$. Which equation defines $f(x)$?

- A. $f(x) = 3x + 29$
- B. $f(x) = 29x + 32$
- C. $f(x) = 35x + 29$
- D. $f(x) = 32x + 35$

ID: a9039591 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 and b are constants. It's given in the table that when $x = 0$, $f(x) = 29$. Substituting 0 for x and 29 for $f(x)$ in the equation $f(x) = mx + b$ yields $29 = m(0) + b$, or $29 = b$. Substituting 29 for b in the equation $f(x) = mx + b$ yields $f(x) = mx + 29$. It's also given in the table that when $x = 1$, $f(x) = 32$. Substituting 1 for x and 32 for $f(x)$ in the equation $f(x) = mx + 29$ yields $32 = m(1) + 29$, or $32 = m + 29$. Subtracting 29 from both sides of this equation yields $3 = m$. Substituting 3 for m in the equation $f(x) = mx + 29$ yields $f(x) = 3x + 29$.

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 f09097b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 e7343559

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: e7343559

$$y = -4x + 40$$

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

A.

x	y
0	0
1	-4
2	-8

B.

x	y
0	40
1	44
2	48

C.

x	y
0	40
1	36
2	32

D.

x	y
0	0
1	4
2	8

ID: e7343559 Answer

Correct Answer: C

Rationale

Choice C is correct. Each of the given choices gives three values of x : 0, 1, and 2. Substituting 0 for x in the given equation yields $y = -4(0) + 40$, or $y = 40$. Therefore, when $x = 0$, the corresponding value of y for the given equation is 40. Substituting 1 for x in the given equation yields $y = -4(1) + 40$, or $y = 36$. Therefore, when $x = 1$,

the corresponding value of y for the given equation is **36**. Substituting **2** for x in the given equation yields $y = -4(2) + 40$, or $y = 32$. Therefore, when $x = 2$, the corresponding value of y for the given equation is **32**. Choice C gives three values of x , **0**, **1**, and **2**, and their corresponding values of y , **40**, **36**, and **32**, respectively, for the given equation.

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

Choice B is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = 4x + 40$.

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

Question Difficulty: Easy

Question ID 7d5d1b32

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 7d5d1b32

$$2(kx - n) = -\frac{28}{15}x - \frac{36}{19}$$

In the given equation, k and n are constants and $n > 1$. The equation has no solution. What is the value of k ?

ID: 7d5d1b32 Answer

Correct Answer: -.9333, -14/15

Rationale

The correct answer is $-\frac{14}{15}$. A linear equation in the form $ax + b = cx + d$ has no solution only when the coefficients of x on each side of the equation are equal and the constant terms are not equal. Dividing both sides of the given equation by 2 yields $kx - n = -\frac{28}{30}x - \frac{36}{38}$, or $kx - n = -\frac{14}{15}x - \frac{18}{19}$. Since it's given that the equation has no solution, the coefficient of x on both sides of this equation must be equal, and the constant terms on both sides of this equation must not be equal. Since $\frac{18}{19} < 1$, and it's given that $n > 1$, the second condition is true. Thus, k must be equal to $-\frac{14}{15}$. Note that $-14/15$, $-.9333$, and -0.933 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID f79fffba

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: f79fffba

The function h is defined by $h(x) = 3x - 7$. What is the value of $h(-2)$?

- A. **-13**
- B. -10
- C. 10
- D. 13

ID: f79fffba Answer

Correct Answer: A

Rationale

Choice A is correct. The value of $h(-2)$ can be found by substituting -2 for x in the equation defining h . Substituting -2 for x in $h(x) = 3x - 7$ yields $h(-2) = 3(-2) - 7$, or $h(-2) = -13$. Therefore, the value of $h(-2)$ is -13 .

Choice B is incorrect. This is the value of $h(-1)$, not $h(-2)$.

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 b31c3117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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

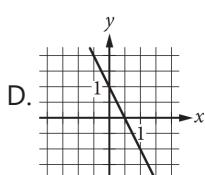
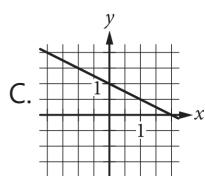
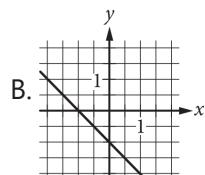
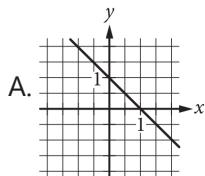
Question ID 0b46bad5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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?



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 e7b6f0d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: e7b6f0d1

$$4x + 6 = 18$$

Which equation has the same solution as the given equation?

- A. $4x = 108$
- B. $4x = 24$
- C. $4x = 12$
- D. $4x = 3$

ID: e7b6f0d1 Answer

Correct Answer: C

Rationale

Choice C is correct. Subtracting 6 from both sides of the given equation yields $4x = 12$, which is the equation given in choice C. Since this equation is equivalent to the given equation, it has the same solution as the given equation.

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 271f7e3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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	

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 9db5b5c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 9db5b5c1

$$\begin{aligned}4x &= 20 \\ -3x + y &= -7\end{aligned}$$

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

- A. -27
- B. -13
- C. 13
- D. 27

ID: 9db5b5c1 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $4x = 20$ and $-3x + y = -7$ is a system of equations with a solution (x, y) . Adding the second equation in the given system to the first equation yields $4x + (-3x + y) = 20 + (-7)$, which is equivalent to $x + y = 13$. Thus, the value of $x + y$ is 13.

Choice A is incorrect. This represents the value of $-2(x + y) - 1$.

Choice B is incorrect. This represents the value of $-(x + y)$.

Choice D is incorrect. This represents the value of $2(x + y) + 1$.

Question Difficulty: Easy

Question ID 8adf1335

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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	

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 $930 < w < 1,295$.

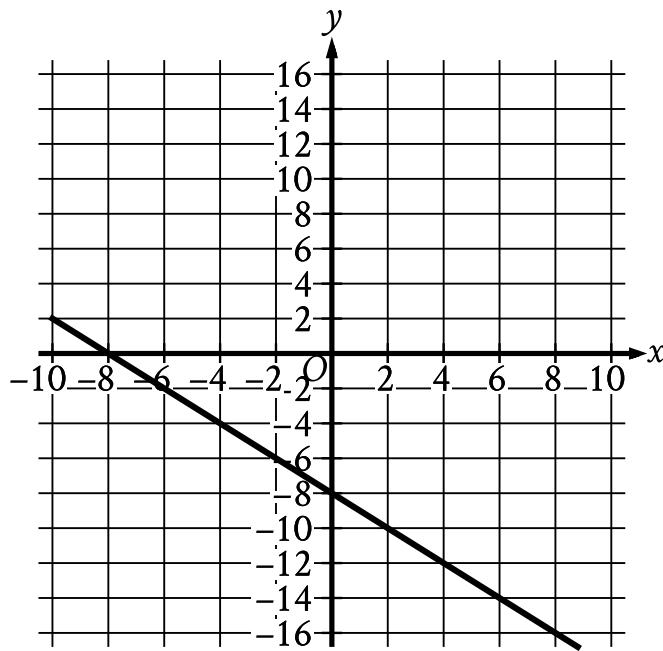
Choice A is incorrect and may result from solving the inequality $200(2) < w < 200(3)$. Choice B is incorrect and may result from solving the inequality for a weight range of more than 1 pound but less than 2 pounds: $200 + 1(365) < w < 200 + 2(365)$. Choice C is incorrect and may result from calculating 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 c307283c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	■ ■ □

ID: c307283c



What is an equation of the graph shown?

- A. $y = -2x - 8$
- B. $y = x - 8$
- C. $y = -x - 8$
- D. $y = 2x - 8$

ID: c307283c Answer

Correct Answer: C

Rationale

Choice C is correct. An equation of a line 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. The line shown passes through the point $(0, -8)$, so $b = -8$. The line shown also passes through the point $(-8, 0)$. The slope, m , of a line passing through two points (x_1, y_1) and (x_2, y_2) can be calculated using the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$. For the points $(0, -8)$ and $(-8, 0)$, this gives $m = \frac{(-8) - 0}{0 - (-8)}$, or $m = -1$. Substituting -8 for b and -1 for m in $y = mx + b$ yields $y = (-1)x + (-8)$, or $y = -x - 8$. Therefore, an equation of the graph shown is $y = -x - 8$.

Choice A is incorrect. This is an equation of a line with a slope of -2 , not -1 .

Choice B is incorrect. This is an equation of a line with a slope of 1, not -1 .

Choice D is incorrect. This is an equation of a line with a slope of 2, not -1 .

Question Difficulty: Medium

Question ID 52cb8ea4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 4de87c9a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 4de87c9a

3 more than 8 times a number x is equal to 83. Which equation represents this situation?

- A. $(3)(8)x = 83$
- B. $8x = 83 + 3$
- C. $3x + 8 = 83$
- D. $8x + 3 = 83$

ID: 4de87c9a Answer

Correct Answer: D

Rationale

Choice D is correct. The given phrase "8 times a number x " can be represented by the expression $8x$. The given phrase "3 more than" indicates an increase of 3 to a quantity. Therefore "3 more than 8 times a number x " can be represented by the expression $8x + 3$. Since it's given that 3 more than 8 times a number x is equal to 83, it follows that $8x + 3$ is equal to 83, or $8x + 3 = 83$. Therefore, the equation that represents this situation is $8x + 3 = 83$.

Choice A is incorrect. This equation represents 3 times the quantity 8 times a number x is equal to 83.

Choice B is incorrect. This equation represents 8 times a number x is equal to 3 more than 83.

Choice C is incorrect. This equation represents 8 more than 3 times a number x is equal to 83.

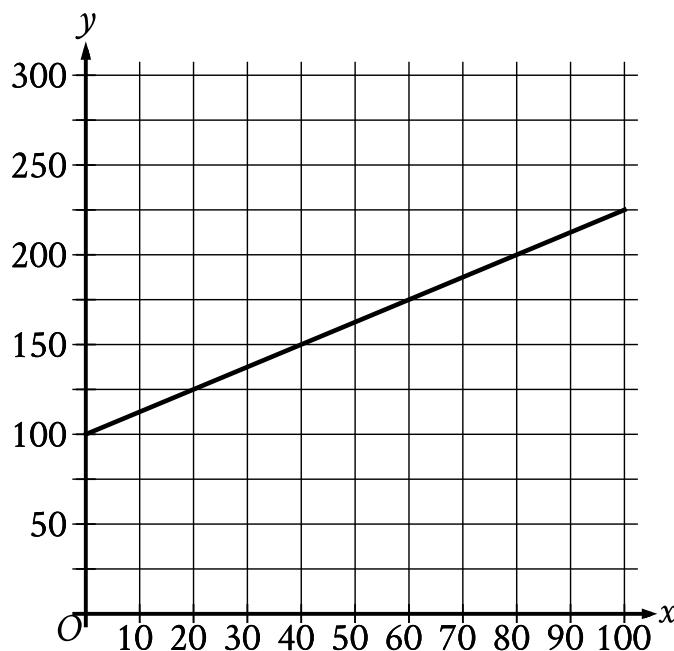
Question Difficulty: Easy

Question ID 720e51ac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 720e51ac

The cost y , in dollars, for a manufacturer to make x rings is represented by the line shown.



What is the cost, in dollars, for the manufacturer to make **60** rings?

- A. 100
- B. 125
- C. 175
- D. 225

ID: 720e51ac Answer

Correct Answer: C

Rationale

Choice C is correct. The line shown represents the cost y , in dollars, for a manufacturer to make x rings. For the line shown, the x -axis represents the number of rings made by the manufacturer and the y -axis represents the cost, in dollars. Therefore, the cost, in dollars, for the manufacturer to make **60** rings is represented by the y -coordinate of the point on the line that has an x -coordinate of **60**. The point on the line with an x -coordinate of **60** has a y -coordinate of **175**. Therefore, the cost, in dollars, for the manufacturer to make **60** rings is **175**.

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

Choice B is incorrect. This is the cost, in dollars, for the manufacturer to make **20** rings.

Choice D is incorrect. This is the cost, in dollars, for the manufacturer to make **100** rings.

Question Difficulty: Easy

Question ID 1362ccde

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 1362ccde

$$\begin{aligned}y &= 4x + 1 \\4y &= 15x - 8\end{aligned}$$

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

ID: 1362ccde Answer

Correct Answer: 35

Rationale

The correct answer is 35. The first equation in the given system of equations defines y as $4x + 1$. Substituting $4x + 1$ for y in the second equation in the given system of equations yields $4(4x + 1) = 15x - 8$. Applying the distributive property on the left-hand side of this equation yields $16x + 4 = 15x - 8$. Subtracting $15x$ from each side of this equation yields $x + 4 = -8$. Subtracting 4 from each side of this equation yields $x = -12$. Substituting -12 for x in the first equation of the given system of equations yields $y = 4(-12) + 1$, or $y = -47$. Substituting -12 for x and -47 for y into the expression $x - y$ yields $-12 - (-47)$, or 35.

Question Difficulty: Hard

Question ID 70d9516e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 70d9516e

A bus is traveling at a constant speed along a straight portion of road. The equation $d = 30t$ gives the distance d , in feet from a road marker, that the bus will be t seconds after passing the marker. How many feet from the marker will the bus be **2** seconds after passing the marker?

- A. 30
- B. 32
- C. 60
- D. 90

ID: 70d9516e Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that t represents the number of seconds after the bus passes the marker. Substituting **2** for t in the given equation $d = 30t$ yields $d = 30(2)$, or $d = 60$. Therefore, the bus will be **60** feet from the marker **2** seconds after passing it.

Choice A is incorrect. This is the distance, in feet, the bus will be from the marker **1** second, not **2** seconds, after passing it.

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

Choice D is incorrect. This is the distance, in feet, the bus will be from the marker **3** seconds, not **2** seconds, after passing it.

Question Difficulty: Easy

Question ID ae2287e2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: ae2287e2

A certain product costs a company \$65 to make. The product is sold by a salesperson who earns a commission that is equal to 20% of the sales price of the product. The profit the company makes for each unit is equal to the sales price minus the combined cost of making the product and the commission. If the sales price of the product is \$100, which of the following equations gives the number of units, u , of the product the company sold to make a profit of \$6,840?

- A. $(100(1 - 0.2) - 65)u = 6,840$
- B. $(100 - 65)(1 - 0.8)u = 6,840$
- C. $0.8(100) - 65u = 6,840$
- D. $(0.2(100) + 65)u = 6,840$

ID: ae2287e2 Answer

Correct Answer: A

Rationale

Choice A is correct. The sales price of one unit of the product is given as \$100. Because the salesperson is awarded a commission equal to 20% of the sales price, the expression $100(1 - 0.2)$ gives the sales price of one unit after the commission is deducted. It is also given that the profit is equal to the sales price minus the combined cost of making the product, or \$65, and the commission: $100(1 - 0.2) - 65$. Multiplying this expression by u gives the profit of u units: $(100(1 - 0.2) - 65)u$. Finally, it is given that the profit for u units is \$6,840; therefore $(100(1 - 0.2) - 65)u = \$6,840$.

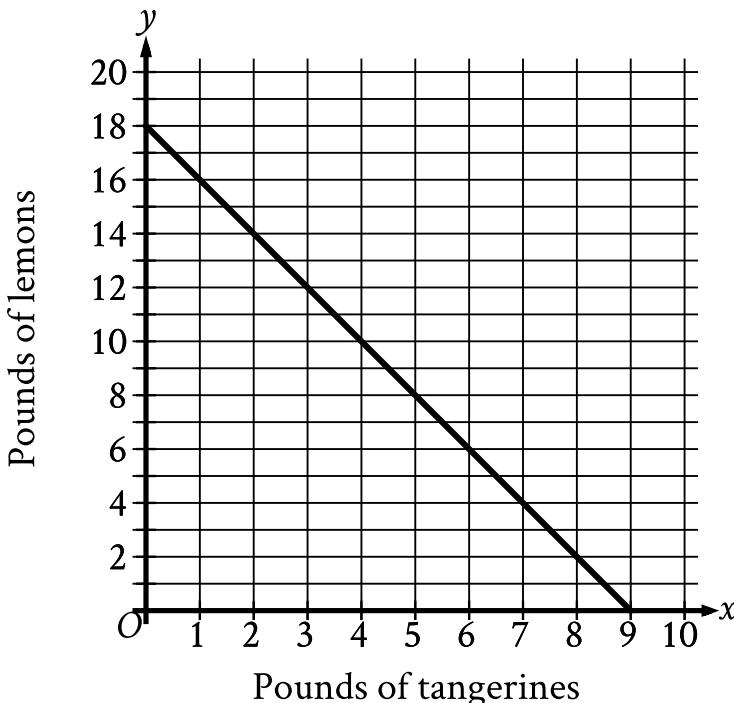
Choice B is incorrect. In this equation, cost is subtracted before commission and the equation gives the commission, not what the company retains after commission. Choice C is incorrect because the number of units is multiplied only by the cost but not by the sale price. Choice D is incorrect because the value 0.2 shows the commission, not what the company retains after commission.

Question Difficulty: Hard

Question ID 8368afd1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 8368afd1



The graph shows the possible combinations of the number of pounds of tangerines and lemons that could be purchased for \$18 at a certain store. If Melvin purchased lemons and 4 pounds of tangerines for a total of \$18, how many pounds of lemons did he purchase?

- A. 7
- B. 10
- C. 14
- D. 16

ID: 8368afd1 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the graph shows the possible combinations of the number of pounds of tangerines, x , and the number of pounds of lemons, y , that could be purchased for \$18 at a certain store. If Melvin purchased lemons and 4 pounds of tangerines for a total of \$18, the number of pounds of lemons he purchased is represented by the y -coordinate of the point on the graph where $x = 4$. For the graph shown, when $x = 4$, $y = 10$.

Therefore, if Melvin purchased lemons and **4** pounds of tangerines for a total of **\$18**, then he purchased **10** pounds of lemons.

Choice A is incorrect. This is the number of pounds of tangerines Melvin purchased if he purchased tangerines and **4** pounds of lemons for a total of **\$18**.

Choice C is incorrect. This is the number of pounds of lemons Melvin purchased if he purchased lemons and **2** pounds of tangerines for a total of **\$18**.

Choice D is incorrect. This is the number of pounds of lemons Melvin purchased if he purchased lemons and **1** pound of tangerines for a total of **\$18**.

Question Difficulty: Easy

Question ID 12983c1e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 bf5f80c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 $0 < -4(-4) + 4$, 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 cc7ffe02

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: cc7ffe02

Keenan made **32** cups of vegetable broth. Keenan then filled x small jars and y large jars with all the vegetable broth he made. The equation $3x + 5y = 32$ represents this situation. Which is the best interpretation of $5y$ in this context?

- A. The number of large jars Keenan filled
- B. The number of small jars Keenan filled
- C. The total number of cups of vegetable broth in the large jars
- D. The total number of cups of vegetable broth in the small jars

ID: cc7ffe02 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the equation $3x + 5y = 32$ represents the situation where Keenan filled x small jars and y large jars with all the vegetable broth he made, which was **32** cups. Therefore, $3x$ represents the total number of cups of vegetable broth in the small jars and $5y$ represents the total number of cups of vegetable broth in the large jars.

Choice A is incorrect. The number of large jars Keenan filled is represented by y , not $5y$.

Choice B is incorrect. The number of small jars Keenan filled is represented by x , not $5y$.

Choice D is incorrect. The total number of cups of vegetable broth in the small jars is represented by $3x$, not $5y$.

Question Difficulty: Hard

Question ID dae126d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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

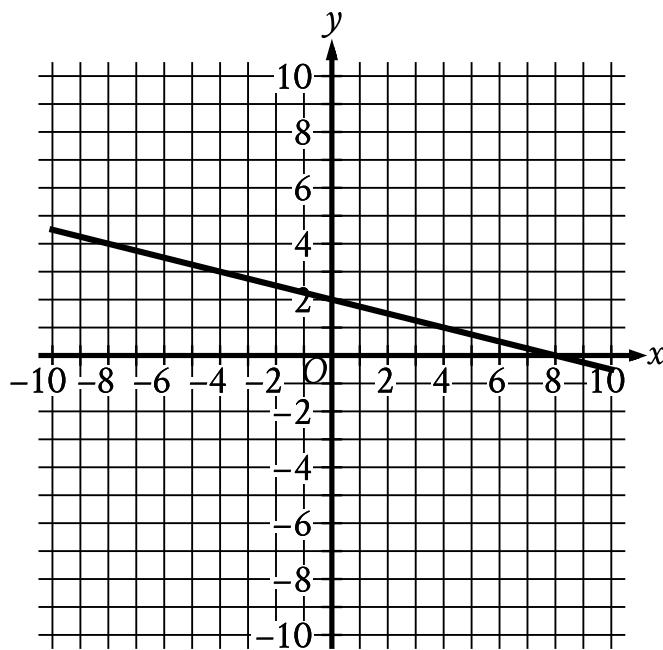
Choices A and B are incorrect and may result from using the boiling point of water at sea level as the rate of change and the rate of change as the initial boiling point of water at sea level. Choice C is incorrect and may result from representing the change in the boiling point of water as an increase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

Question Difficulty: Medium

Question ID 05bb1af9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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 $y = f(x) + 14$. Substituting $f(x) + 14$ for y in the equation $y = -\frac{1}{4}x + 2$ yields $f(x) + 14 = -\frac{1}{4}x + 2$. Subtracting 14 from both sides of this equation yields $f(x) = -\frac{1}{4}x - 12$.

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 b8cbe394

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: b8cbe394

Sean rents a tent at a cost of \$11 per day plus a onetime insurance fee of \$10. Which equation represents the total cost c , in dollars, to rent the tent with insurance for d days?

- A. $c = 11(d + 10)$
- B. $c = 10(d + 11)$
- C. $c = 11d + 10$
- D. $c = 10d + 11$

ID: b8cbe394 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the cost of renting a tent is \$11 per day for d days. Multiplying the rental cost by the number of days yields $11d$, which represents the cost of renting the tent for d days before the insurance is added. Adding the onetime insurance fee of \$10 to the rental cost of $11d$ gives the total cost c , in dollars, which can be represented by the equation $c = 11d + 10$.

Choice A is incorrect. This equation represents the total cost to rent the tent if the insurance fee was charged every day.

Choice B is incorrect. This equation represents the total cost to rent the tent if the daily fee was $(d + 11)$ for 10 days.

Choice D is incorrect. This equation represents the total cost to rent the tent if the daily fee was \$10 and the onetime fee was \$11.

Question Difficulty: Easy

Question ID e1248a5c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 df32b09c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 b9835972

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 $d = 8(3)$, or $d = 24$.

Question Difficulty: Hard

Question ID db0107df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: db0107df

The y -intercept of the graph of $12x + 2y = 18$ in the xy -plane is $(0, y)$. What is the value of y ?

ID: db0107df Answer

Correct Answer: 9

Rationale

The correct answer is 9. It's given that the y -intercept of the graph of $12x + 2y = 18$ in the xy -plane is $(0, y)$. Substituting 0 for x in the equation $12x + 2y = 18$ yields $12(0) + 2y = 18$, or $2y = 18$. Dividing both sides of this equation by 2 yields $y = 9$. Therefore, the value of y is 9.

Question Difficulty: Easy

Question ID a775af14

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $f(x) = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the graph of $y = f(x)$. It's given that the graph of the linear function f , where $y = f(x)$, 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 $f(x) = mx + b$ yields $f(x) = 4x + 2$.

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 19fdf387

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	(Three filled blue squares followed by one empty square)

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 af2ba762

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 3e9eaffc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 3e9eaffc

Caleb used juice to make popsicles. The function $f(x) = -5x + 30$ approximates the volume, in fluid ounces, of juice Caleb had remaining after making x popsicles. Which statement is the best interpretation of the y -intercept of the graph of $y = f(x)$ in the xy -plane in this context?

- A. Caleb used approximately 5 fluid ounces of juice for each popsicle.
- B. Caleb had approximately 5 fluid ounces of juice when he began to make the popsicles.
- C. Caleb had approximately 30 fluid ounces of juice when he began to make the popsicles.
- D. Caleb used approximately 30 fluid ounces of juice for each popsicle.

ID: 3e9eaffc Answer

Correct Answer: C

Rationale

Choice C is correct. An equation that defines a linear function f can be written in the form $f(x) = mx + b$, where m represents the slope and b represents the y -intercept, $(0, b)$, of the line of $y = f(x)$ in the xy -plane. The function $f(x) = -5x + 30$ is linear. Therefore, the graph of the given function $y = f(x)$ in the xy -plane has a y -intercept of $(0, 30)$. It's given that $f(x)$ gives the approximate volume, in fluid ounces, of juice Caleb had remaining after making x popsicles. It follows that the y -intercept of $(0, 30)$ means that Caleb had approximately 30 fluid ounces of juice remaining after making 0 popsicles. In other words, Caleb had approximately 30 fluid ounces of juice when he began to make the popsicles.

Choice A is incorrect. This is an interpretation of the slope, rather than the y -intercept, of the graph of $y = f(x)$ in the xy -plane.

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 1a621af4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 ed92fb68

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 b988eeec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 .

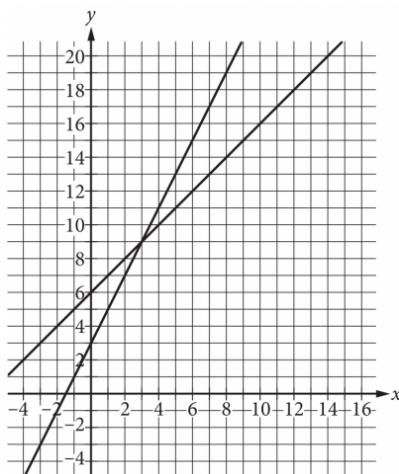
Question Difficulty: Hard

Question ID e1259a5a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 8abed0fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 8abed0fb

$$\begin{aligned}y &= 2x + 3 \\x &= 1\end{aligned}$$

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 68f2cbaf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 68f2cbaf

Ty set a goal to walk at least **24** kilometers every day to prepare for a multiday hike. On a certain day, Ty plans to walk at an average speed of **4** kilometers per hour. What is the minimum number of hours Ty must walk on that day to fulfill the daily goal?

- A. **4**
- B. **6**
- C. **20**
- D. **24**

ID: 68f2cbaf Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that Ty plans to walk at an average speed of **4** kilometers per hour. The number of kilometers Ty will walk is determined by the expression $4s$, where s is the number of hours Ty walks. The given goal of at least **24** kilometers means that the inequality $4s \geq 24$ represents the situation. Dividing both sides of this inequality by **4** gives $s \geq 6$, which corresponds to a minimum of **6** hours Ty must walk.

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 9c7741c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 74c03c21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	(Medium)

ID: 74c03c21

A bus traveled on the highway and on local roads to complete a trip of **160 miles**. The trip took **4 hours**. The bus traveled at an average speed of **55 miles per hour (mph)** on the highway and an average speed of **25 mph** on local roads. If x is the time, in hours, the bus traveled on the highway and y is the time, in hours, it traveled on local roads, which system of equations represents this situation?

A. $55x + 25y = 4$
 $x + y = 160$

B. $55x + 25y = 160$
 $x + y = 4$

C. $25x + 55y = 4$
 $x + y = 160$

D. $25x + 55y = 160$
 $x + y = 4$

ID: 74c03c21 Answer

Correct Answer: B

Rationale

Choice B is correct. If the bus traveled at an average speed of **55 miles per hour (mph)** on the highway for x hours, then the bus traveled $55x$ miles on the highway. If the bus traveled at an average speed of **25 mph** on local roads for y hours, then the bus traveled $25y$ miles on local roads. It's given that the trip was **160 miles**. This can be represented by the equation $55x + 25y = 160$. It's also given that the trip took **4 hours**. This can be represented by the equation $x + y = 4$. Therefore, the system consisting of the equations $55x + 25y = 160$ and $x + y = 4$ represents this situation.

Choice A is incorrect. This system of equations represents a situation where the trip was **4 miles** and took **160 hours**.

Choice C is incorrect. This system of equations represents a situation where the trip was **4 miles** and took **160 hours**, and the bus traveled at an average speed of **25 mph** on the highway and **55 mph** on local roads.

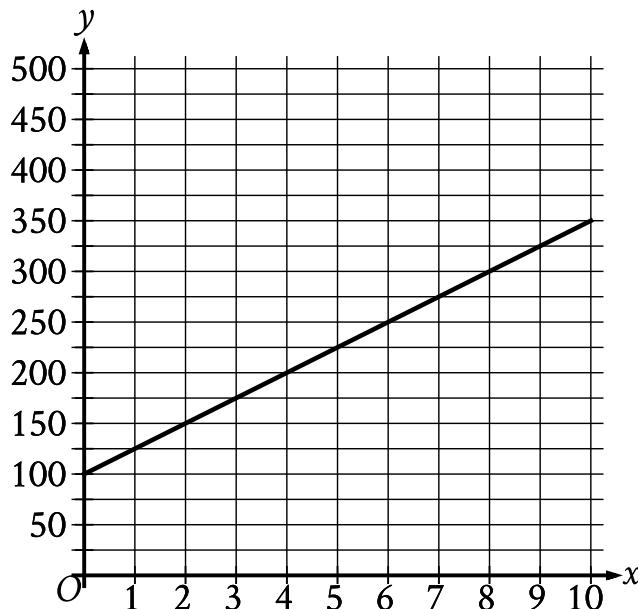
Choice D is incorrect. This system of equations represents a situation where the bus traveled at an average speed of **25 mph** on the highway and **55 mph** on local roads.

Question Difficulty: Medium

Question ID 5cf1bbc9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	█ █ █

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 93954cfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 7392dfc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 6c71f3ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 6c71f3ec

A salesperson's total earnings consist of a base salary of x dollars per year, plus commission earnings of 11% of the total sales the salesperson makes during the year. This year, the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary. Which of the following inequalities represents all possible values of total sales s , in dollars, the salesperson can make this year in order to meet that goal?

- A. $2x \leq s \leq 3x$
- B. $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$
- C. $3x \leq s \leq 4x$
- D. $\frac{3}{0.11}x \leq s \leq \frac{4}{0.11}x$

ID: 6c71f3ec Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a salesperson's total earnings consist of a base salary of x dollars per year plus commission earnings of 11% of the total sales the salesperson makes during the year. If the salesperson makes s dollars in total sales this year, the salesperson's total earnings can be represented by the expression $x + 0.11s$. It's also given that the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary, which can be represented by the expressions $3x$ and $4x$, respectively. Therefore, this situation can be represented by the inequality $3x \leq x + 0.11s \leq 4x$. Subtracting x from each part of this inequality yields $2x \leq 0.11s \leq 3x$. Dividing each part of this inequality by 0.11 yields $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$. Therefore, the inequality $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$ represents all possible values of total sales s , in dollars, the salesperson can make this year in order to meet their goal.

Choice A is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 2 times and at most 3 times, rather than at least 3 times and at most 4 times, the base salary.

Choice C is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 3 times and at most 4 times the base salary.

Choice D is incorrect. This inequality represents a situation in which the total earnings are at least 4 times and at most 5 times, rather than at least 3 times and at most 4 times, the base salary.

Question Difficulty: Hard

Question ID f5929f7a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	(representing difficulty level)

ID: f5929f7a

$$\begin{aligned}y &= -\frac{1}{9}x \\y &= \frac{1}{2}x\end{aligned}$$

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

- A. -9
- B. -7
- C. 0
- D. 2

ID: f5929f7a Answer

Correct Answer: C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = -\frac{1}{9}x$. Substituting $-\frac{1}{9}x$ for y in the second equation in the system yields $-\frac{1}{9}x = \frac{1}{2}x$. Multiplying the left-hand side of this equation by $\frac{2}{2}$ and the right-hand side by $\frac{9}{9}$ yields $-\frac{2}{18}x = \frac{9}{18}x$. Adding $\frac{2}{18}x$ to both sides of this equation yields $0 = \frac{11}{18}x$. Multiplying both sides of this equation by $\frac{18}{11}$ yields $x = 0$.

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

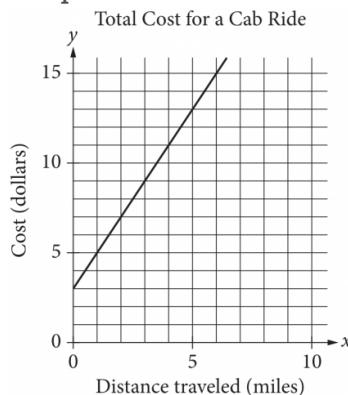
Question Difficulty: Medium

Question ID 3f5375d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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	

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 541bef2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	3

ID: 541bef2f

$$\begin{aligned}y &\leq x + 7 \\y &\geq -2x - 1\end{aligned}$$

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

- A. $(-14, 0)$
- B. $(0, -14)$
- C. $(0, 14)$
- D. $(14, 0)$

ID: 541bef2f Answer

Correct Answer: D

Rationale

Choice D is correct. A point (x, y) is a solution to a system of inequalities in the xy -plane if substituting the x -coordinate and the y -coordinate of the point for x and y , respectively, in each inequality makes both of the inequalities true. Substituting the x -coordinate and the y -coordinate of choice D, 14 and 0, for x and y , respectively, in the first inequality in the given system, $y \leq x + 7$, yields $0 \leq 14 + 7$, or $0 \leq 21$, which is true. Substituting 14 for x and 0 for y in the second inequality in the given system, $y \geq -2x - 1$, yields $0 \geq -2(14) - 1$, or $0 \geq -29$, which is true. Therefore, the point $(14, 0)$ is a solution to the given system of inequalities in the xy -plane.

Choice A is incorrect. Substituting -14 for x and 0 for y in the inequality $y \leq x + 7$ yields $0 \leq -14 + 7$, or $0 \leq -7$, which is not true.

Choice B is incorrect. Substituting 0 for x and -14 for y in the inequality $y \geq -2x - 1$ yields $-14 \geq -2(0) - 1$, or $-14 \geq -1$, which is not true.

Choice C is incorrect. Substituting 0 for x and 14 for y in the inequality $y \leq x + 7$ yields $14 \leq 0 + 7$, or $14 \leq 7$, which is not true.

Question Difficulty: Hard

Question ID 620fe971

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 6a87902f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 6a87902f

$$y = 2x + 10$$

$$y = 2x - 1$$

At how many points do the graphs of the given equations intersect in the xy -plane?

- A. Zero
- B. Exactly one
- C. Exactly two
- D. Infinitely many

ID: 6a87902f Answer

Correct Answer: A

Rationale

Choice A is correct. A system of two linear equations in two variables, x and y , has zero points of intersection if 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, $y = mx + b$, are distinct if the y -coordinates of their y -intercepts, b , are different and are parallel if their slopes, m , are the same. For the two equations in the given system, $y = 2x + 10$ and $y = 2x - 1$, the values of b are 10 and -1 , respectively, and the values of m are both 2. Since the values of b are different, the graphs of these lines have different y -coordinates of the y -intercept and are distinct. Since the values of m are the same, the graphs of these lines have the same slope and are parallel. Therefore, the graphs of the given equations are lines that intersect at zero points in the xy -plane.

Choice B is incorrect. The graphs of a system of two linear equations have exactly one point of intersection if the lines represented by the equations have different slopes. Since the given equations represent lines with the same slope, there is not exactly one intersection point.

Choice C is incorrect. The graphs of a system of two linear equations can never have exactly two intersection points.

Choice D is incorrect. The graphs of a system of two linear equations have infinitely many intersection points when the lines represented by the equations have the same slope and the same y -coordinate of the y -intercept. Since the given equations represent lines with different y -coordinates of their y -intercepts, there are not infinitely many intersection points.

Question Difficulty: Medium

Question ID aff28230

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: aff28230

$$\begin{aligned}x &= 10 \\y &= x + 21\end{aligned}$$

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

- A. 2.1
- B. 10
- C. 21
- D. 31

ID: aff28230 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given by the first equation in the given system of equations that $x = 10$. Substituting 10 for x in the second equation in the given system yields $y = 10 + 21$, or $y = 31$. Therefore, the value of y is 31.

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

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.

Question Difficulty: Easy

Question ID f7e39fe9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	■ ■ □

ID: f7e39fe9

x	10	15	20	25
$f(x)$	82	137	192	247

The table shows four values of x and their corresponding values of $f(x)$. There is a linear relationship between x and $f(x)$ that is defined by the equation $f(x) = mx - 28$, where m is a constant. What is the value of m ?

ID: f7e39fe9 Answer

Correct Answer: 11

Rationale

The correct answer is 11. It's given that $f(x)$ is defined by the equation $f(x) = mx - 28$, where m is a constant. It's also given in the table that when $x = 10$, $f(x) = 82$. Substituting 10 for x and 82 for $f(x)$ in the equation $f(x) = mx - 28$ yields $82 = m(10) - 28$. Adding 28 to both sides of this equation yields $110 = 10m$. Dividing both sides of this equation by 10 yields $11 = m$. Therefore, the value of m is 11.

Question Difficulty: Medium

Question ID e470e19d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: e470e19d

The function f is defined by $f(x) = 7x - 84$. What is the x -intercept of the graph of $y = f(x)$ in the xy -plane?

- A. $(-12, 0)$
- B. $(-7, 0)$
- C. $(7, 0)$
- D. $(12, 0)$

ID: e470e19d Answer

Correct Answer: D

Rationale

Choice D is correct. The given function f is a linear function. Therefore, the graph of $y = f(x)$ in the xy -plane has one x -intercept at the point $(k, 0)$, where k is a constant. Substituting 0 for $f(x)$ and k for x in the given function yields $0 = 7k - 84$. Adding 84 to both sides of this equation yields $84 = 7k$. Dividing both sides of this equation by 7 yields $12 = k$. Therefore, the x -intercept of the graph of $y = f(x)$ in the xy -plane is $(12, 0)$.

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 e6cb2402

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $3(kx + 13) = \frac{48}{17}x + 36$ 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 6e6a3241

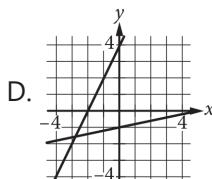
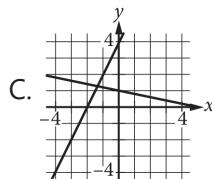
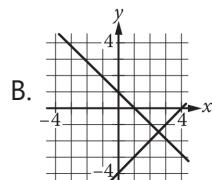
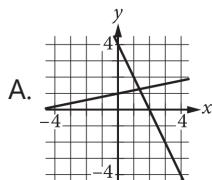
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	■ ■ □

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 6ac23de7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 b450ab03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: b450ab03

An employee at a restaurant prepares sandwiches and salads. It takes the employee **1.5** minutes to prepare a sandwich and **1.9** minutes to prepare a salad. The employee spends a total of **46.1** minutes preparing x sandwiches and y salads. Which equation represents this situation?

- A. $1.9x + 1.5y = 46.1$
- B. $1.5x + 1.9y = 46.1$
- C. $x + y = 46.1$
- D. $30.7x + 24.3y = 46.1$

ID: b450ab03 Answer

Correct Answer: B

Rationale

Choice A is correct. It's given that the employee takes **1.5** minutes to prepare a sandwich. Multiplying **1.5** by the number of sandwiches, x , yields **$1.5x$** , the amount of time the employee spends preparing x sandwiches. It's also given that the employee takes **1.9** minutes to prepare a salad. Multiplying **1.9** by the number of salads, y , yields **$1.9y$** , the amount of time the employee spends preparing y salads. It follows that the total amount of time, in minutes, the employee spends preparing x sandwiches and y salads is **$1.5x + 1.9y$** . It's given that the employee spends a total of **46.1** minutes preparing x sandwiches and y salads. Thus, the equation **$1.5x + 1.9y = 46.1$** represents this situation.

Choice C is incorrect. This equation represents a situation where it takes the employee **1.9** minutes, rather than **1.5** minutes, to prepare a sandwich and **1.5** minutes, rather than **1.9** minutes, to prepare a salad.

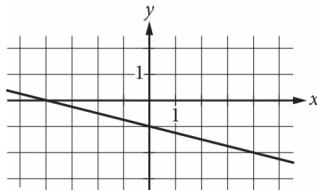
Choice D is incorrect. This equation represents a situation where it takes the employee **30.7** minutes, rather than **1.5** minutes, to prepare a sandwich and **24.3** minutes, rather than **1.9** minutes, to prepare a salad.

Question Difficulty: Easy

Question ID b2845d88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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	

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 $\frac{1/2}{2}$, 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 $(-\frac{1}{2})(-16) = (-\frac{t}{16})(-16)$, 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 b3abf40f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 ee2f611f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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	

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	

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	

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

Question ID 317e80f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 317e80f9

$$\begin{aligned}x + y &= 18 \\5y &= x\end{aligned}$$

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

- A. (15, 3)
- B. (16, 2)
- C. (17, 1)
- D. (18, 0)

ID: 317e80f9 Answer

Correct Answer: A

Rationale

Choice A is correct. The second equation in the given system defines the value of x as $5y$. Substituting $5y$ for x into the first equation yields $5y + y = 18$ or $6y = 18$. Dividing each side of this equation by 6 yields $y = 3$. Substituting 3 for y in the second equation yields $5(3) = x$ or $x = 15$. Therefore, the solution (x, y) to the given system of equations is $(15, 3)$.

Choice B is incorrect. Substituting 16 for x and 2 for y in the second equation yields $5(2) = 16$, which is not true. Therefore, $(16, 2)$ is not a solution to the given system of equations.

Choice C is incorrect. Substituting 17 for x and 1 for y in the second equation yields $5(1) = 17$, which is not true. Therefore, $(17, 1)$ is not a solution to the given system of equations.

Choice D is incorrect. Substituting 18 for x and 0 for y in the second equation yields $5(0) = 18$, which is not true. Therefore, $(18, 0)$ is not a solution to the given system of equations.

Question Difficulty: Easy

Question ID ee439cff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: ee439cff

On a car trip, Rhett and Jessica each drove for part of the trip, and the total distance they drove was under **220** miles. Rhett drove at an average speed of **35 miles per hour (mph)**, and Jessica drove at an average speed of **40 mph**. Which of the following inequalities represents this situation, where ***r*** is the number of hours Rhett drove and ***j*** is the number of hours Jessica drove?

- A. $35r + 40j > 220$
- B. $35r + 40j < 220$
- C. $40r + 35j > 220$
- D. $40r + 35j < 220$

ID: ee439cff Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that Rhett drove at an average speed of **35** miles per hour and that he drove for ***r*** hours. Multiplying **35** miles per hour by ***r*** hours yields **$35r$** miles, or the distance that Rhett drove. It's also given that Jessica drove at an average speed of **40** miles per hour and that she drove for ***j*** hours. Multiplying **40** miles per hour by ***j*** hours yields **$40j$** miles, or the distance that Jessica drove. The total distance, in miles, that Rhett and Jessica drove can be represented by the expression **$35r + 40j$** . It's given that the total distance they drove was under **220** miles. Therefore, the inequality **$35r + 40j < 220$** represents this situation.

Choice A is incorrect. This inequality represents a situation in which the total distance Rhett and Jessica drove was over, rather than under, **220** miles.

Choice C is incorrect. This inequality represents a situation in which Rhett drove at an average speed of **40**, rather than **35**, miles per hour, Jessica drove at an average speed of **35**, rather than **40**, miles per hour, and the total distance they drove was over, rather than under, **220** miles.

Choice D is incorrect. This inequality represents a situation in which Rhett drove at an average speed of **40**, rather than **35**, miles per hour, and Jessica drove at an average speed of **35**, rather than **40**, miles per hour.

Question Difficulty: Easy

Question ID 0d391910

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 0d391910

The function f is defined by $f(x) = 4x$. For what value of x does $f(x) = 8$?

ID: 0d391910 Answer

Correct Answer: 2

Rationale

The correct answer is 2. Substituting 8 for $f(x)$ in the given equation yields $8 = 4x$. Dividing the left- and right-hand sides of this equation by 4 yields $x = 2$. Therefore, the value of x is 2 when $f(x) = 8$.

Question Difficulty: Easy

Question ID c6b151d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 12ee1edc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 ebf8d2b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: ebf8d2b7

A machine makes large boxes or small boxes, one at a time, for a total of **700** minutes each day. It takes the machine **10** minutes to make a large box or **5** minutes to make a small box. Which equation represents the possible number of large boxes, x , and small boxes, y , the machine can make each day?

- A. $5x + 10y = 700$
- B. $10x + 5y = 700$
- C. $(x + y)(10 + 5) = 700$
- D. $(10 + x)(5 + y) = 700$

ID: ebf8d2b7 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that it takes the machine **10** minutes to make a large box. It's also given that x represents the possible number of large boxes the machine can make each day. Multiplying **10** by x gives $10x$, which represents the amount of time spent making large boxes. It's given that it takes the machine **5** minutes to make a small box. It's also given that y represents the possible number of small boxes the machine can make each day. Multiplying **5** by y gives $5y$, which represents the amount of time spent making small boxes. Combining the amount of time spent making x large boxes and y small boxes yields $10x + 5y$. It's given that the machine makes boxes for a total of **700** minutes each day. Therefore $10x + 5y = 700$ represents the possible number of large boxes, x , and small boxes, y , the machine can make each day.

Choice A is incorrect and may result from associating the time of **10** minutes with small, rather than large, boxes and the time of **5** minutes with large, rather than small, boxes.

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 997bec28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 997bec28

The perimeter of an isosceles triangle is **83** inches. Each of the two congruent sides of the triangle has a length of **24** inches. What is the length, in inches, of the third side?

ID: 997bec28 Answer

Correct Answer: 35

Rationale

The correct answer is **35**. It's given that the perimeter of an isosceles triangle is **83** inches and that each of the two congruent sides has a length of **24** inches. The perimeter of a triangle is the sum of the lengths of its three sides. The equation $24 + 24 + x = 83$ can be used to represent this situation, where x is the length, in inches, of the third side. Combining like terms on the left-hand side of this equation yields $48 + x = 83$. Subtracting **48** from both sides of this equation yields $x = 35$. Therefore, the length, in inches, of the third side is **35**.

Question Difficulty: Easy

Question ID 2f0a43b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 2f0a43b2

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

ID: 2f0a43b2 Answer

Correct Answer: .2, 1/5

Rationale

The correct answer is $\frac{1}{5}$. Since the number 5 can also be written as $\frac{5}{1}$, the given equation can also be written as $\frac{x}{8} = \frac{5}{1}$. This equation is equivalent to $\frac{8}{x} = \frac{1}{5}$. Therefore, the value of $\frac{8}{x}$ is $\frac{1}{5}$. Note that 1/5 and .2 are examples of ways to enter a correct answer.

Alternate approach: Multiplying both sides of the equation $\frac{x}{8} = 5$ by 8 yields $x = 40$. Substituting 40 for x into the expression $\frac{8}{x}$ yields $\frac{8}{40}$, or $\frac{1}{5}$.

Question Difficulty: Easy

Question ID 15daa8d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $2x + 16 = a(x + 8)$, where a is a constant. This equation can be rewritten as $2(x + 8) = a(x + 8)$. 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, $2x + 16 = a(x + 8)$, 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 $2x + 16 = a(x + 8)$ yields $2(0) + 16 = a(0 + 8)$, or $16 = 8a$. Dividing both sides of this equation by 8 yields $2 = a$.

Question Difficulty: Medium

Question ID aa85b138

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 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 9f3cb472

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 9f3cb472

Line t in the xy -plane has a slope of $-\frac{1}{3}$ and passes through the point $(9, 10)$. Which equation defines line t ?

- A. $y = 13x - \frac{1}{3}$
- B. $y = 9x + 10$
- C. $y = -\frac{x}{3} + 10$
- D. $y = -\frac{x}{3} + 13$

ID: 9f3cb472 Answer

Correct Answer: D

Rationale

Choice D is correct. The equation that defines line t in the xy -plane can be written in slope-intercept form $y = mx + b$, where m is the slope of line t and $(0, b)$ is its y -intercept. It's given that line t has a slope of $-\frac{1}{3}$. Therefore, $m = -\frac{1}{3}$. Substituting $-\frac{1}{3}$ for m in the equation $y = mx + b$ yields $y = -\frac{1}{3}x + b$, or $y = -\frac{x}{3} + b$. It's also given that line t passes through the point $(9, 10)$. Substituting 9 for x and 10 for y in the equation $y = -\frac{x}{3} + b$ yields $10 = -\frac{9}{3} + b$, or $10 = -3 + b$. Adding 3 to both sides of this equation yields $13 = b$. Substituting 13 for b in the equation $y = -\frac{x}{3} + b$ yields $y = -\frac{x}{3} + 13$.

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

Choice B is incorrect. This equation defines a line that has a slope of 9, not $-\frac{1}{3}$, and passes through the point $(0, 10)$, not $(9, 10)$.

Choice C is incorrect. This equation defines a line that passes through the point $(0, 10)$, not $(9, 10)$.

Question Difficulty: Medium

Question ID 968e9e51

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ □

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 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 686b7244

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 686b7244

A certain apprentice has enrolled in **85** hours of training courses. The equation $10x + 15y = 85$ represents this situation, where x is the number of on-site training courses and y is the number of online training courses this apprentice has enrolled in. How many more hours does each online training course take than each on-site training course?

ID: 686b7244 Answer

Correct Answer: 5

Rationale

The correct answer is **5**. It's given that the equation $10x + 15y = 85$ represents the situation, where x is the number of on-site training courses, y is the number of online training courses, and **85** is the total number of hours of training courses the apprentice has enrolled in. Therefore, $10x$ represents the number of hours the apprentice has enrolled in on-site training courses, and $15y$ represents the number of hours the apprentice has enrolled in online training courses. Since x is the number of on-site training courses and y is the number of online training courses the apprentice has enrolled in, **10** is the number of hours each on-site course takes and **15** is the number of hours each online course takes. Subtracting these numbers gives $15 - 10$, or **5** more hours each online training course takes than each on-site training course.

Question Difficulty: Hard

Question ID b86123af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 ee846db7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: ee846db7

A store sells two different-sized containers of a certain Greek yogurt. The store's sales of this Greek yogurt totaled **1,277.94** dollars last month. The equation $5.48x + 7.30y = 1,277.94$ represents this situation, where x is the number of smaller containers sold and y is the number of larger containers sold. According to the equation, which of the following represents the price, in dollars, of each smaller container?

- A. **5.48**
- B. **$7.30y$**
- C. **7.30**
- D. **$5.48x$**

ID: ee846db7 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the store's sales of a certain Greek yogurt totaled **1,277.94** dollars last month. It's also given that the equation $5.48x + 7.30y = 1,277.94$ represents this situation, where x is the number of smaller containers sold and y is the number of larger containers sold. Since x represents the number of smaller containers of yogurt sold, the expression $5.48x$ represents the total sales, in dollars, from smaller containers of yogurt. This means that x smaller containers of yogurt were sold at a price of **5.48** dollars each. Therefore, according to the equation, **5.48** represents the price, in dollars, of each smaller container.

Choice B is incorrect. This expression represents the total sales, in dollars, from selling y larger containers of yogurt.

Choice C is incorrect. This value represents the price, in dollars, of each larger container of yogurt.

Choice D is incorrect. This expression represents the total sales, in dollars, from selling x smaller containers of yogurt.

Question Difficulty: Easy

Question ID 5b8a8475

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 5b8a8475

Line k is defined by $y = 3x + 15$. Line j is perpendicular to line k in the xy -plane. What is the slope of line j ?

- A. $-\frac{1}{3}$
- B. $-\frac{1}{12}$
- C. $-\frac{1}{18}$
- D. $-\frac{1}{45}$

ID: 5b8a8475 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that line j is perpendicular to line k in the xy -plane. It follows that the slope of line j is the opposite reciprocal of the slope of line k . The equation for line k 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 3. The opposite reciprocal of a number is -1 divided by the number. Thus, the opposite reciprocal of 3 is $-\frac{1}{3}$. Therefore, the slope of line j is $-\frac{1}{3}$.

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 cfe67646

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: cfe67646

The point $(8, 2)$ in the xy -plane is a solution to which of the following systems of inequalities?

- A. $x > 0$
 $y > 0$
- B. $x > 0$
 $y < 0$
- C. $x < 0$
 $y > 0$
- D. $x < 0$
 $y < 0$

ID: cfe67646 Answer

Correct Answer: A

Rationale

Choice A is correct. The given point, $(8, 2)$, is located in the first quadrant in the xy -plane. The system of inequalities in choice A represents all the points in the first quadrant in the xy -plane. Therefore, $(8, 2)$ is a solution to the system of inequalities in choice A.

Alternate approach: Substituting 8 for x in the first inequality in choice A, $x > 0$, yields $8 > 0$, which is true. Substituting 2 for y in the second inequality in choice A, $y > 0$, yields $2 > 0$, which is true. Since the coordinates of the point $(8, 2)$ make the inequalities $x > 0$ and $y > 0$ true, the point $(8, 2)$ is a solution to the system of inequalities consisting of $x > 0$ and $y > 0$.

Choice B is incorrect. This system of inequalities represents all the points in the fourth quadrant, not the first quadrant, in the xy -plane.

Choice C is incorrect. This system of inequalities represents all the points in the second quadrant, not the first quadrant, in the xy -plane.

Choice D is incorrect. This system of inequalities represents all the points in the third quadrant, not the first quadrant, in the xy -plane.

Question Difficulty: Easy

Question ID 608eeb6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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	

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 097e10f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 097e10f5

What value of p satisfies the equation $5p + 180 = 250$?

- A. 14
- B. 65
- C. 86
- D. 250

ID: 097e10f5 Answer

Correct Answer: A

Rationale

Choice A is correct. Subtracting 180 from both sides of the given equation yields $5p = 70$. Dividing both sides of this equation by 5 yields $p = 14$. Therefore, the value of p that satisfies the equation $5p + 180 = 250$ is 14.

Choice B is incorrect. This value of p satisfies the equation $5p + 180 = 505$.

Choice C is incorrect. This value of p satisfies the equation $5p + 180 = 610$.

Choice D is incorrect. This value of p satisfies the equation $5p + 180 = 1,430$.

Question Difficulty: Easy

Question ID 84664a7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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	

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

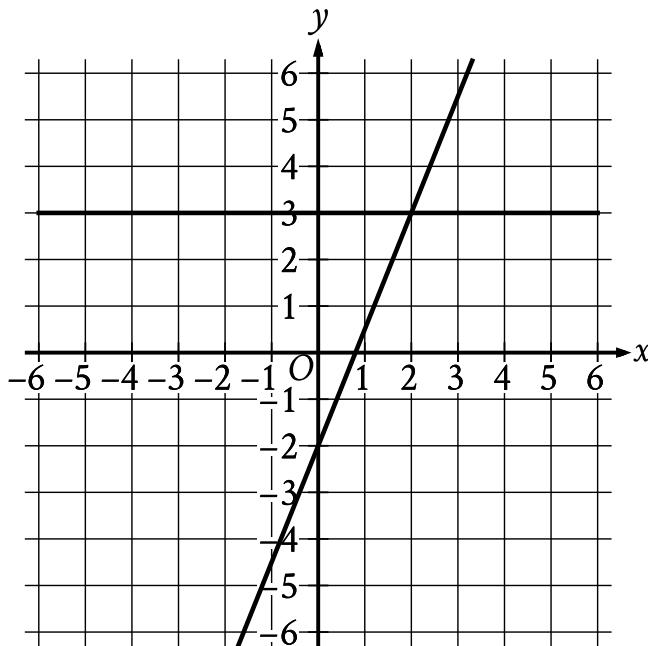
The correct answer is 2.6. According to the model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to 4 times the body weight, in grams, of the bee. Let x represent the body weight, in grams, of a worker bumblebee and let y represent the head width, in millimeters. 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 $13/5$ 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	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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 db422e7f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 01682aa5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 01682aa5

Line p is defined by $2y + 18x = 9$. Line r is perpendicular to line p in the xy -plane. What is the slope of line r ?

- A. -9
- B. $-\frac{1}{9}$
- C. $\frac{1}{9}$
- D. 9

ID: 01682aa5 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that line r is perpendicular to line p in the xy -plane. This means that the slope of line r is the negative reciprocal of the slope of line p . If the equation for line p is rewritten in slope-intercept form $y = mx + b$, where m and b are constants, then m is the slope of the line and $(0, b)$ is its y -intercept. Subtracting $18x$ from both sides of the equation $2y + 18x = 9$ yields $2y = -18x + 9$. Dividing both sides of this equation by 2 yields $y = -9x + \frac{9}{2}$. It follows that the slope of line p is -9 . The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of -9 is $-\frac{1}{9}$, or $\frac{1}{9}$. Thus, the slope of line r is $\frac{1}{9}$.

Choice A is incorrect. This is the slope of line p , not line r .

Choice B is incorrect. This is the reciprocal, not the negative reciprocal, of the slope of line p .

Choice D is incorrect. This is the negative, not the negative reciprocal, of the slope of line p .

Question Difficulty: Medium

Question ID 45cfb9de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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	

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 6863c7ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 6863c7ce

$$d = 16t$$

The given equation represents the distance d , in inches, where t represents the number of seconds since an object started moving. Which of the following is the best interpretation of 16 in this context?

- A. The object moved a total of 16 inches.
- B. The object moved a total of $16t$ inches.
- C. The object is moving at a rate of 16 inches per second.
- D. The object is moving at a rate of $\frac{1}{16}$ inches per second.

ID: 6863c7ce Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that in the equation $d = 16t$, d represents the distance, in inches, and t represents the number of seconds since an object started moving. In this equation, t is being multiplied by 16 . This means that the object's distance increases by 16 inches each second. Therefore, the best interpretation of 16 in this context is that the object is moving at a rate of 16 inches per second.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect. This is the best interpretation of $16t$, rather than 16 , in this context.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID a5834ea4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: a5834ea4

$$f(x) = 39$$

For the given linear function f , which table gives three values of x and their corresponding values of $f(x)$?

A.

x	$f(x)$
0	0
1	0
2	0

B.

x	$f(x)$
0	39
1	39
2	39

C.

x	$f(x)$
0	0
1	39
2	78

D.

x	$f(x)$
0	39
1	0
2	-39

ID: a5834ea4 Answer

Correct Answer: B

Rationale

Choice B is correct. For the given linear function f , $f(x)$ must equal 39 for all values of x . Of the given choices, only choice B gives three values of x and their corresponding values of $f(x)$ for the given linear function f .

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 bf36c815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 95cad55f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 95cad55f

A laundry service is buying detergent and fabric softener from its supplier. The supplier will deliver no more than 300 pounds in a shipment. Each container of detergent weighs 7.35 pounds, and each container of fabric softener weighs 6.2 pounds. The service wants to buy at least twice as many containers of detergent as containers of fabric softener. Let d represent the number of containers of detergent, and let s represent the number of containers of fabric softener, where d and s are nonnegative integers. Which of the following systems of inequalities best represents this situation?

A. $7.35d + 6.2s \leq 300$
 $d \geq 2s$

B. $7.35d + 6.2s \leq 300$
 $2d \geq s$

C. $14.7d + 6.2s \leq 300$
 $d \geq 2s$

D. $14.7d + 6.2s \leq 300$
 $2d \geq s$

ID: 95cad55f Answer

Correct Answer: A

Rationale

Choice A is correct. The number of containers in a shipment must have a weight less than or equal to 300 pounds. The total weight, in pounds, of detergent and fabric softener that the supplier delivers can be expressed as the weight of each container multiplied by the number of each type of container, which is $7.35d$ for detergent and $6.2s$ for fabric softener. Since this total cannot exceed 300 pounds, it follows that $7.35d + 6.2s \leq 300$. Also, since the laundry service wants to buy at least twice as many containers of detergent as containers of fabric softener, the number of containers of detergent should be greater than or equal to two times the number of containers of fabric softener. This can be expressed by the inequality $d \geq 2s$.

Choice B is incorrect because it misrepresents the relationship between the numbers of each container that the laundry service wants to buy. Choice C is incorrect because the first inequality of the system incorrectly doubles the weight per container of detergent. The weight of each container of detergent is 7.35, not 14.7 pounds. Choice D is

incorrect because it doubles the weight per container of detergent and transposes the relationship between the numbers of containers.

Question Difficulty: Hard

Question ID b7e6394d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 7a5a74a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 87322577

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 5c94e6fa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 5c94e6fa

$$3x + 21 = 3x + k$$

In the given equation, k is a constant. The equation has infinitely many solutions. What is the value of k ?

ID: 5c94e6fa Answer

Correct Answer: 21

Rationale

The correct answer is 21. It's given that the equation $3x + 21 = 3x + k$ has infinitely many solutions. If an equation in one variable has infinitely many solutions, then the equation is true for any value of the variable. Subtracting $3x$ from both sides of the given equation yields $k = 21$. Since this equation must be true for any value of x , the value of k is 21.

Question Difficulty: Easy

Question ID 64c85440

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 dba8d38a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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?

- A. $s + p = 250$
 $5s + 12p = 2,300$
- B. $s + p = 250$
 $12s + 5p = 2,300$
- C. $5s + 12p = 250$
 $s + p = 2,300$
- D. $12s + 5p = 250$
 $s + p = 2,300$

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 71189542

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	(representing difficulty level)

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 0b332f00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 0b332f00

The function g is defined by $g(x) = 6x$. For what value of x is $g(x) = 54$?

ID: 0b332f00 Answer

Correct Answer: 9

Rationale

The correct answer is 9. It's given that $g(x) = 6x$. Substituting 54 for $g(x)$ in the given function yields $54 = 6x$. Dividing both sides of this equation by 6 yields $x = 9$. Therefore, the value of x when $g(x) = 54$ is 9.

Question Difficulty: Easy

Question ID 349a5bc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 349a5bc1

$$4x + 5 = 165$$

What is the solution to the given equation?

ID: 349a5bc1 Answer

Correct Answer: 40

Rationale

The correct answer is 40. Subtracting 5 from both sides of the given equation yields $4x = 160$. Dividing both sides of this equation by 4 yields $x = 40$. Therefore, the solution to the given equation is 40.

Question Difficulty: Easy

Question ID bf4a8b6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: bf4a8b6a

A company that provides whale-watching tours takes groups of **21** people at a time. The company's revenue is **80** dollars per adult and **60** dollars per child. If the company's revenue for one group consisting of adults and children was **1,440** dollars, how many people in the group were children?

- A. **3**
- B. **9**
- C. **12**
- D. **18**

ID: bf4a8b6a Answer

Correct Answer: C

Rationale

Choice C is correct. Let x represent the number of children in a whale-watching tour group. Let y represent the number of adults in this group. Because it's given that **21** people are in a group and the group consists of adults and children, it must be true that $x + y = 21$. Since the company's revenue is **60** dollars per child, the total revenue from x children in this group was $60x$ dollars. Since the company's revenue is **80** dollars per adult, the total revenue from y adults in this group was $80y$ dollars. Because it's given that the total revenue for this group was **1,440** dollars, it must be true that $60x + 80y = 1,440$. The equations $x + y = 21$ and $60x + 80y = 1,440$ form a linear system of equations that can be solved to find the value of x , which represents the number of children in the group, using the elimination method. Multiplying both sides of the equation $x + y = 21$ by **80** yields $80x + 80y = 1,680$. Subtracting $60x + 80y = 1,440$ from $80x + 80y = 1,680$ yields $(80x + 80y) - (60x + 80y) = 1,680 - 1,440$, which is equivalent to $80x - 60x + 80y - 80y = 240$, or $20x = 240$. Dividing both sides of this equation by **20** yields $x = 12$. Therefore, **12** people in the group were children.

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

Choice B is incorrect. This is the number of adults in the group, not the number of children in the group.

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

Question Difficulty: Medium

Question ID 7e3f8363

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $f(x) = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the graph of $y = f(x)$. It's given that the graph of the linear function f , where $y = f(x)$, 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 $f(x) = mx + b$ yields $f(x) = 4x + 3$.

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	

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 447fa970

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 447fa970

The function f is defined by the equation $f(x) = 7x + 2$. What is the value of $f(x)$ when $x = 4$?

ID: 447fa970 Answer

Correct Answer: 30

Rationale

The correct answer is 30. The value of $f(x)$ when $x = 4$ can be found by substituting 4 for x in the given equation $f(x) = 7x + 2$. This yields $f(4) = 7(4) + 2$, or $f(4) = 30$. Therefore, when $x = 4$, the value of $f(x)$ is 30.

Question Difficulty: Easy

Question ID 0dd6227f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 0dd6227f

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: 0dd6227f 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 b1228811

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: b1228811

Marisa needs to hire at least 10 staff members for an upcoming project. The staff members will be made up of junior directors, who will be paid \$640 per week, and senior directors, who will be paid \$880 per week. Her budget for paying the staff members is no more than \$9,700 per week. She must hire at least 3 junior directors and at least 1 senior director. Which of the following systems of inequalities represents the conditions described if x is the number of junior directors and y is the number of senior directors?

$$640x + 880y \geq 9,700$$

$$x + y \leq 10$$

$$x \geq 3$$

- A. $y \geq 1$

$$640x + 880y \leq 9,700$$

$$x + y \geq 10$$

$$x \geq 3$$

- B. $y \geq 1$

$$640x + 880y \geq 9,700$$

$$x + y \geq 10$$

$$x \leq 3$$

- C. $y \leq 1$

$$640x + 880y \leq 9,700$$

$$x + y \leq 10$$

$$x \leq 3$$

- D. $y \leq 1$

ID: b1228811 Answer

Correct Answer: B

Rationale

Choice B is correct. Marisa will hire x junior directors and y senior directors. Since she needs to hire at least 10 staff members, $x + y \geq 10$. Each junior director will be paid \$640 per week, and each senior director will be paid \$880 per week. Marisa's budget for paying the new staff is no more than \$9,700 per week; in terms of x and y , this condition is $640x + 880y \leq 9,700$. Since Marisa must hire at least 3 junior directors and at least 1 senior director, it follows that $x \geq 3$ and $y \geq 1$. All four of these conditions are represented correctly in choice B.

Choices A and C are incorrect. For example, the first condition, $640x + 880y \geq 9,700$, in each of these options implies that Marisa can pay the new staff members more than her budget of \$9,700. Choice D is incorrect because Marisa needs to hire at least 10 staff members, not at most 10 staff members, as the inequality $x + y \leq 10$ implies.

Question Difficulty: Medium

Question ID 6105234d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 6105234d

John paid a total of \$165 for a microscope by making a down payment of \$37 plus p monthly payments of \$16 each. Which of the following equations represents this situation?

- A. $16p - 37 = 165$
- B. $37p - 16 = 165$
- C. $16p + 37 = 165$
- D. $37p + 16 = 165$

ID: 6105234d Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that John made a \$16 payment each month for p months. The total amount of these payments can be represented by the expression $16p$. The down payment can be added to that amount to find the total amount John paid, yielding the expression $16p + 37$. It's given that John paid a total of \$165. Therefore, the expression for the total amount John paid can be set equal to that amount, yielding the equation $16p + 37 = 165$.

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 7efe5495

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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	

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 83f2c3bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 83f2c3bf

$$y = x + 4$$

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

A.

x	y
0	4
1	5
2	6

B.

x	y
0	6
1	5
2	4

C.

x	y
0	2
1	1
2	0

D.

x	y
0	0
1	1
2	2

ID: 83f2c3bf Answer

Correct Answer: A

Rationale

Choice A is correct. Substituting 0 for x into the given equation yields $y = 0 + 4$, or $y = 4$. Therefore, when $x = 0$, the corresponding value of y for the given equation is 4. Substituting 1 for x into the given equation yields $y = 1 + 4$, or $y = 5$. Therefore, when $x = 1$, the corresponding value of y for the given equation is 5. Substituting 2

for x into the given equation yields $y = 2 + 4$, or $y = 6$. Therefore, when $x = 2$, the corresponding value of y for the given equation is **6**. Of the choices given, only the table in choice A gives these three values of x and their corresponding values of y for the given equation.

Choice B is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = -x + 6$.

Choice C is incorrect. This table gives three values of x and their corresponding values of y for the equation $y = -x + 2$.

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

Question Difficulty: Easy

Question ID c50ede6d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: c50ede6d

The total cost, in dollars, to rent a surfboard consists of a \$25 service fee and a \$10 per hour rental fee. A person rents a surfboard for t hours and intends to spend a maximum of \$75 to rent the surfboard. Which inequality represents this situation?

- A. $10t \leq 75$
- B. $10 + 25t \leq 75$
- C. $25t \leq 75$
- D. $25 + 10t \leq 75$

ID: c50ede6d Answer

Correct Answer: D

Rationale

Choice D is correct. The cost of the rental fee depends on the number of hours the surfboard is rented. Multiplying t hours by 10 dollars per hour yields a rental fee of $10t$ dollars. The total cost of the rental consists of the rental fee plus the 25 dollar service fee, which yields a total cost of $25 + 10t$ dollars. Since the person intends to spend a maximum of 75 dollars to rent the surfboard, the total cost must be at most 75 dollars. Therefore, the inequality $25 + 10t \leq 75$ represents this situation.

Choice A is incorrect. This represents a situation where the rental fee, not the total cost, is at most 75 dollars.

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 c1bd5301

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: c1bd5301

A model predicts that a certain animal weighed **241** pounds when it was born and that the animal gained **3** pounds per day in its first year of life. This model is defined by an equation in the form $f(x) = a + bx$, where $f(x)$ is the predicted weight, in pounds, of the animal x days after it was born, and a and b are constants. What is the value of a ?

ID: c1bd5301 Answer

Correct Answer: 241

Rationale

The correct answer is **241**. For a certain animal, it's given that a model predicts the animal weighed **241** pounds when it was born and gained **3** pounds per day in its first year of life. It's also given that this model is defined by an equation in the form $f(x) = a + bx$, where $f(x)$ is the predicted weight, in pounds, of the animal x days after it was born, and a and b are constants. It follows that a represents the predicted weight, in pounds, of the animal when it was born and b represents the predicted rate of weight gain, in pounds per day, in its first year of life. Thus, the value of a is **241**.

Question Difficulty: Medium

Question ID b23bba4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 24854644

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 24854644

What is the equation of the line that passes through the point $(0, 5)$ and is parallel to the graph of $y = 7x + 4$ in the xy -plane?

- A. $y = 5x$
- B. $y = 7x + 5$
- C. $y = 7x$
- D. $y = 5x + 7$

ID: 24854644 Answer

Correct Answer: B

Rationale

Choice B is correct. The equation of a line in the xy -plane can be written in slope-intercept form $y = mx + b$, where m is the slope of the line and $(0, b)$ is its y -intercept. It's given that the line passes through the point $(0, 5)$. Therefore, $b = 5$. It's also given that the line is parallel to the graph of $y = 7x + 4$, which means the line has the same slope as the graph of $y = 7x + 4$. The slope of the graph of $y = 7x + 4$ is 7. Therefore, $m = 7$. Substituting 7 for m and 5 for b in the equation $y = mx + b$ yields $y = 7x + 5$.

Choice A is incorrect. The graph of this equation passes through the point $(0, 0)$, not $(0, 5)$, and has a slope of 5, not 7.

Choice C is incorrect. The graph of this equation passes through the point $(0, 0)$, not $(0, 5)$.

Choice D is incorrect. The graph of this equation passes through the point $(0, 7)$, not $(0, 5)$, and has a slope of 5, not 7.

Question Difficulty: Easy

Question ID d62ad380

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	 [Three solid blue squares followed by one empty square]

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	

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 52a8ef85

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 52a8ef85

The equation $40x + 20y = 160$ represents the number of sweaters, x , and number of shirts, y , that Yesenia purchased for \$160. If Yesenia purchased 2 sweaters, how many shirts did she purchase?

- A. 3
- B. 4
- C. 8
- D. 40

ID: 52a8ef85 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the equation $40x + 20y = 160$ represents the number of sweaters, x , and the number of shirts, y , that Yesenia purchased for \$160. If Yesenia purchased 2 sweaters, the number of shirts she purchased can be calculated by substituting 2 for x in the given equation, which yields $40(2) + 20y = 160$, or $80 + 20y = 160$. Subtracting 80 from both sides of this equation yields $20y = 80$. Dividing both sides of this equation by 20 yields $y = 4$. Therefore, if Yesenia purchased 2 sweaters, she purchased 4 shirts.

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

Choice C is incorrect. This is the number of shirts Yesenia purchased if she purchased 0 sweaters.

Choice D is incorrect. This is the price, in dollars, for each sweater, not the number of shirts Yesenia purchased.

Question Difficulty: Easy

Question ID 3462d850

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 0d685865

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 0d685865

If $x = 7$, what is the value of $x + 20$?

- A. 13
- B. 20
- C. 27
- D. 34

ID: 0d685865 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $x = 7$. Substituting 7 for x into the given expression $x + 20$ yields $7 + 20$, which is equivalent to 27.

Choice A is incorrect. This is the value of $x + 6$.

Choice B is incorrect. This is the value of $x + 13$.

Choice D is incorrect. This is the value of $x + 27$.

Question Difficulty: Easy

Question ID 948087f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ □

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 a8e6bd75

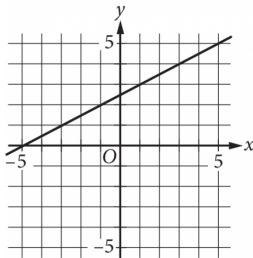
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: a8e6bd75

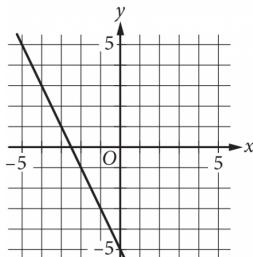
Which of the following is the graph of the equation

$$y = 2x - 5$$
 in the xy -plane?

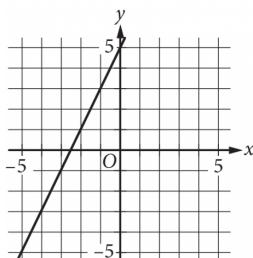
A.



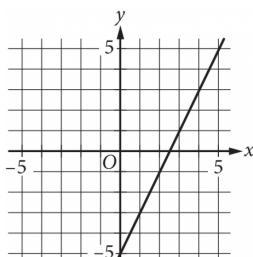
B.



C.



D.



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 5ad6bc97

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 5ad6bc97

$$f(x) = 7x + 1$$

The function gives the total number of people on a company retreat with x managers. What is the total number of people on a company retreat with 7 managers?

ID: 5ad6bc97 Answer

Correct Answer: 50

Rationale

The correct answer is 50. It's given that the function f gives the total number of people on a company retreat with x managers. It's also given that 7 managers are on the company retreat. Substituting 7 for x in the given function yields $f(7) = 7(7) + 1$, or $f(7) = 50$. Therefore, there are a total of 50 people on a company retreat with 7 managers.

Question Difficulty: Easy

Question ID 7d6928bd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 7d6928bd

A cleaning service that cleans both offices and homes can clean at most 14 places per day. Which inequality represents this situation, where f is the number of offices and h is the number of homes?

- A. $f + h \leq 14$
- B. $f + h \geq 14$
- C. $f - h \leq 14$
- D. $f - h \geq 14$

ID: 7d6928bd Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the cleaning service cleans both offices and homes, where f is the number of offices and h is the number of homes the cleaning service can clean per day. Therefore, the expression $f + h$ represents the number of places the cleaning service can clean per day. It's also given that the cleaning service can clean at most 14 places per day. Since $f + h$ represents the number of places the cleaning service can clean per day and the service can clean at most 14 places per day, it follows that the inequality $f + h \leq 14$ represents this situation.

Choice B is incorrect. This inequality represents a cleaning service that cleans at least 14 places per day.

Choice C is incorrect. This inequality represents a cleaning service that cleans at most 14 more offices than homes per day.

Choice D is incorrect. This inequality represents a cleaning service that cleans at least 14 more offices than homes per day.

Question Difficulty: Easy

Question ID b64e2c7f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: b64e2c7f

Monarch butterflies can fly only with a body temperature of at least **55.0 degrees Fahrenheit (°F)**. If a monarch butterfly's body temperature is **51.3°F**, what is the minimum increase needed in its body temperature, in °F, so that it can fly?

- A. 1.3
- B. 3.7
- C. 5.0
- D. 6.3

ID: b64e2c7f Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that monarch butterflies can fly only with a body temperature of at least **55.0 degrees Fahrenheit (°F)**. Let x represent the minimum increase needed in the monarch butterfly's body temperature to fly. If the monarch butterfly's body temperature is **51.3°F**, the inequality $51.3 + x \geq 55.0$ represents this situation. Subtracting **51.3** from both sides of this inequality yields $x \geq 3.7$. Therefore, if the monarch butterfly's body temperature is **51.3°F**, the minimum increase needed in its body temperature, in °F, so that it can fly is **3.7**.

Choice A is incorrect. This is the minimum increase needed in body temperature if the monarch butterfly's body temperature is **53.7°F**, not **51.3°F**.

Choice C is incorrect. This is the minimum increase needed in body temperature if the monarch butterfly's body temperature is **50.0°F**, not **51.3°F**.

Choice D is incorrect. This is the minimum increase needed in body temperature if the monarch butterfly's body temperature is **48.7°F**, not **51.3°F**.

Question Difficulty: Easy

Question ID 4b76c7f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 8c515062

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 6fa593f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 6fa593f1

If $x = 40$, what is the value of $x + 6$?

- A. 34
- B. 40
- C. 46
- D. 64

ID: 6fa593f1 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $x = 40$. Adding 6 to both sides of this equation yields $x + 6 = 40 + 6$, or $x + 6 = 46$. Therefore, the value of $x + 6$ is 46.

Choice A is incorrect. This is the value of $x - 6$, not $x + 6$.

Choice B is incorrect. This is the value of x , not $x + 6$.

Choice D is incorrect. This is the value of $x + 24$, not $x + 6$.

Question Difficulty: Easy

Question ID a73a5c22

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $g(x)$ when $x = 8$ can be found by substituting 8 for x in the given equation $g(x) = 10x + 8$. This yields $g(8) = 10(8) + 8$, or $g(8) = 88$. Therefore, when $x = 8$, the value of $g(x)$ is 88.

Choice A is incorrect. This is the value of x when $g(x) = 8$, rather than the value of $g(x)$ 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 535fa6e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 535fa6e6

Davio bought some potatoes and celery. The potatoes cost **\$0.69** per pound, and the celery cost **\$0.99** per pound. If Davio spent **\$5.34** in total and bought twice as many pounds of celery as pounds of potatoes, how many pounds of celery did Davio buy?

- A. 2
- B. 2.5
- C. 2.67
- D. 4

ID: 535fa6e6 Answer

Correct Answer: D

Rationale

Choice D is correct. Let p represent the number of pounds of potatoes and let c represent the number of pounds of celery that Davio bought. It's given that potatoes cost **\$0.69** per pound and celery costs **\$0.99** per pound. If Davio spent **\$5.34** in total, then the equation $0.69p + 0.99c = 5.34$ represents this situation. It's also given that Davio bought twice as many pounds of celery as pounds of potatoes; therefore, $c = 2p$. Substituting $2p$ for c in the equation $0.69p + 0.99c = 5.34$ yields $0.69p + 0.99(2p) = 5.34$, which is equivalent to $0.69p + 1.98p = 5.34$, or $2.67p = 5.34$. Dividing both sides of this equation by 2.67 yields $p = 2$. Substituting 2 for p in the equation $c = 2p$ yields $c = 2(2)$, or $c = 4$. Therefore, Davio bought 4 pounds of celery.

Choice A is incorrect. This is the number of pounds of potatoes, not the number of pounds of celery, Davio bought.

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

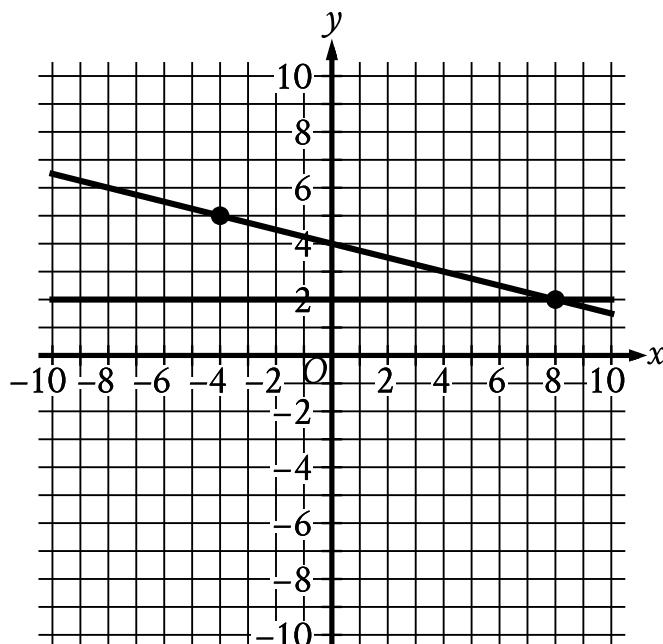
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 27f5fff3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	3

ID: 27f5fff3



If a new graph of three linear equations is created using the system of equations shown and the equation $x + 4y = -16$, how many solutions (x, y) will the resulting system of three equations have?

- A. Zero
- B. Exactly one
- C. Exactly two
- D. Infinitely many

ID: 27f5fff3 Answer

Correct Answer: A

Rationale

Choice A is correct. A solution to a system of equations must satisfy each equation in the system. It follows that if an ordered pair (x, y) is a solution to the system, the point (x, y) lies on the graph in the xy -plane of each equation in the system. The only point that lies on each graph of the system of two linear equations shown is their intersection point $(8, 2)$. It follows that if a new graph of three linear equations is created using the system of equations shown and the graph of $x + 4y = -16$, this system has either zero solutions or one solution, the point $(8, 2)$. Substituting 8 for x and 2 for y in the equation $x + 4y = -16$ yields $8 + 4(2) = -16$, or $16 = -16$. Since this equation is not true,

the point $(8, 2)$ does not lie on the graph of $x + 4y = -16$. Therefore, $(8, 2)$ is not a solution to the system of three equations. It follows that there are zero solutions to this system.

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 a9c04a21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $x = 2$.

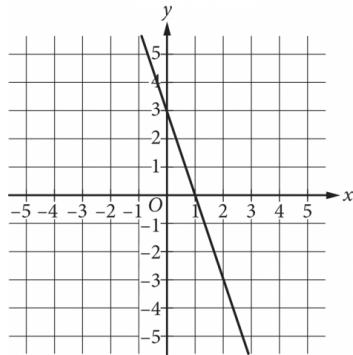
Choices A and B are incorrect and may result from computational errors. Choice D is incorrect. This is the value of $2x$.

Question Difficulty: Easy

Question ID 8a1544f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

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 70774aa4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 70774aa4

If $5x = 20$, what is the value of $15x$?

- A. 7
- B. 12
- C. 23
- D. 60

ID: 70774aa4 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that $5x = 20$. Multiplying both sides of this equation by 3 yields $15x = 60$. Therefore, the value of $15x$ is 60.

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 8b2a2a63

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 44d65912

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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	

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 e53688cb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: e53688cb

$$x + 3y = 29$$

$$3y = 11$$

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

ID: e53688cb Answer

Correct Answer: 18

Rationale

The correct answer is 18. It's given by the second equation in the system that $3y = 11$. Substituting 11 for $3y$ in the first equation in the system, $x + 3y = 29$, yields $x + 11 = 29$. Subtracting 11 from both sides of this equation yields $x = 18$.

Question Difficulty: Medium

Question ID 768b2425

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 768b2425

Last week, an interior designer earned a total of **\$1,258** from consulting for x hours and drawing up plans for y hours. The equation $68x + 85y = 1,258$ represents this situation. Which of the following is the best interpretation of **68** in this context?

- A. The interior designer earned **\$68** per hour consulting last week.
- B. The interior designer worked **68** hours drawing up plans last week.
- C. The interior designer earned **\$68** per hour drawing up plans last week.
- D. The interior designer worked **68** hours consulting last week.

ID: 768b2425 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that $68x + 85y = 1,258$ represents the situation where an interior designer earned a total of **\$1,258** last week from consulting for x hours and drawing up plans for y hours. Thus, $68x$ represents the amount earned, in dollars, from consulting for x hours, and $85y$ represents the amount earned, in dollars, from drawing up plans for y hours. Since $68x$ represents the amount earned, in dollars, from consulting for x hours, it follows that the interior designer earned **\$68** per hour consulting last week.

Choice B is incorrect. The interior designer worked y hours, not **68** hours, drawing up plans last week.

Choice C is incorrect. The interior designer earned **\$85** per hour, not **\$68** per hour, drawing up plans last week.

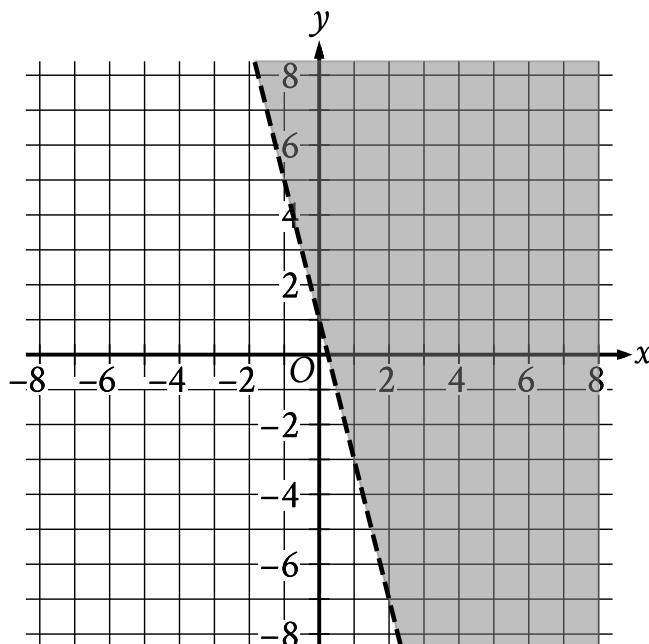
Choice D is incorrect. The interior designer worked x hours, not **68** hours, consulting last week.

Question Difficulty: Easy

Question ID d02193fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ □

ID: d02193fb



The shaded region shown represents the solutions to which inequality?

- A. $y < 1 + 4x$
- B. $y < 1 - 4x$
- C. $y > 1 + 4x$
- D. $y > 1 - 4x$

ID: d02193fb Answer

Correct Answer: D

Rationale

Choice D is correct. The equation for the line representing the boundary of the shaded region can be written in slope-intercept form $y = b + mx$, where m is the slope and $(0, b)$ is the y -intercept of the line. For the graph shown, the boundary line passes through the points $(0, 1)$ and $(1, -3)$. Given two points on a line, (x_1, y_1) and (x_2, y_2) , the slope of the line can be calculated using the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(0, 1)$ and $(1, -3)$ for (x_1, y_1) and (x_2, y_2) in this equation yields $m = \frac{-3 - 1}{1 - 0}$, which is equivalent to $m = \frac{-4}{1}$, or $m = -4$. Since the point $(0, 1)$ represents the y -intercept, it follows that $b = 1$. Substituting -4 for m and 1 for b in the equation $y = b + mx$ yields $y = 1 - 4x$ as the equation of the boundary line. Since the shaded region represents all the

points above this boundary line, it follows that the shaded region shown represents the solutions to the inequality $y > 1 - 4x$.

Choice A is incorrect. This inequality represents a region below, not above, a boundary line with a slope of 4, not -4 .

Choice B is incorrect. This inequality represents a region below, not above, the boundary line shown.

Choice C is incorrect. This inequality represents a region whose boundary line has a slope of 4, not -4 .

Question Difficulty: Medium

Question ID a4d6fbec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $y = 5(8) + 10$, or $y = 50$. Therefore, the value of y is 50 when $x = 8$.

Question Difficulty: Easy

Question ID bbf9e5ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 8643d906

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 8a6de407

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 17f176ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 12ae3452

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 12ae3452

The equation $46 = 2a + 2b$ gives the relationship between the side lengths a and b of a certain parallelogram. If $a = 9$, what is the value of b ?

ID: 12ae3452 Answer

Correct Answer: 14

Rationale

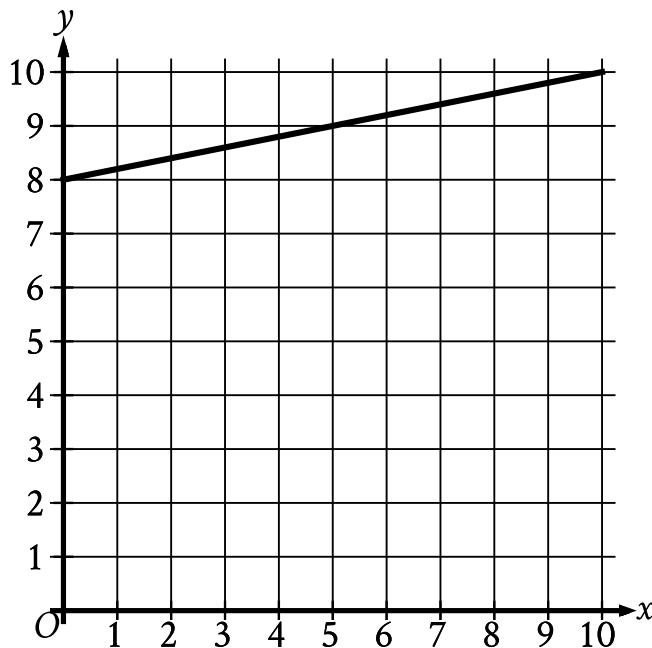
The correct answer is 14. It's given that the equation $46 = 2a + 2b$ gives the relationship between the side lengths a and b of a certain parallelogram. Substituting 9 for a in the given equation yields $46 = 2(9) + 2b$, or $46 = 18 + 2b$. Subtracting 18 from both sides of this equation yields $28 = 2b$. Dividing both sides of this equation by 2 yields $14 = b$. Therefore, if $a = 9$, the value of b is 14.

Question Difficulty: Easy

Question ID f40552a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: f40552a9



What is the y -intercept of the line graphed?

- A. $(0, -8)$
- B. $(0, -\frac{1}{8})$
- C. $(0, 0)$
- D. $(0, 8)$

ID: f40552a9 Answer

Correct Answer: D

Rationale

Choice D is correct. The y -intercept of a line graphed in the xy -plane is the point where the line intersects the y -axis. The line graphed intersects the y -axis at the point $(0, 8)$. Therefore, the y -intercept of the line graphed is $(0, 8)$.

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 3ce92ce8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 3ce92ce8

$$f(x) = 2x + 3$$

For the given function f , the graph of $y = f(x)$ in the xy -plane is parallel to line j . What is the slope of line j ?

ID: 3ce92ce8 Answer

Correct Answer: 2

Rationale

The correct answer is 2. It's given that function f is defined by $f(x) = 2x + 3$. Therefore, the equation representing the graph of $y = f(x)$ in the xy -plane is $y = 2x + 3$, and the graph is a line. For a linear equation in the form $y = mx + b$, m represents the slope of the line. Since the value of m in the equation $y = 2x + 3$ is 2, the slope of the line defined by function f is 2. It's given that line j is parallel to the line defined by function f . The slopes of parallel lines are equal. Therefore, the slope of line j is also 2.

Question Difficulty: Medium

Question ID 7d89376f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 eafdbbbd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: eafdbbbd

$$\frac{1}{4}(x + 5) - \frac{1}{3}(x + 5) = -7$$

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

- A. **-12**
- B. **-5**
- C. **79**
- D. **204**

ID: eafdbbbd Answer

Correct Answer: C

Rationale

Choice C is correct. For the given equation, $(x + 5)$ is a factor of both terms on the left-hand side. Therefore, the given equation can be rewritten as $(\frac{1}{4} - \frac{1}{3})(x + 5) = -7$, or $(\frac{3}{12} - \frac{4}{12})(x + 5) = -7$, which is equivalent to $-\frac{1}{12}(x + 5) = -7$. Multiplying both sides of this equation by -12 yields $x + 5 = 84$. Subtracting 5 from both sides of this equation yields $x = 79$.

Choice A is incorrect. This is the value of x for which the left-hand side of the given equation equals $\frac{7}{12}$, not -7 .

Choice B is incorrect. This is the value of x for which the left-hand side of the given equation equals 0, not -7 .

Choice D is incorrect. This is the value of x for which the left-hand side of the given equation equals $-\frac{209}{12}$, not -7 .

Question Difficulty: Medium

Question ID fb43b85f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 1ecaa9c0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 b75f7812

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 45bba652

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 9ed4c1a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 628300a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 b544a348

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 .

$$\begin{array}{r} 5x + 3y = 38 \\ -(x + 3y = 10) \\ \hline 4x = 28 \end{array}$$

Dividing both sides of the resulting equation by 4 yields $x = 7$.

Question Difficulty: Medium

Question ID a1fd2304

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 $3/2$ are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID e53870b6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 0df106df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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.

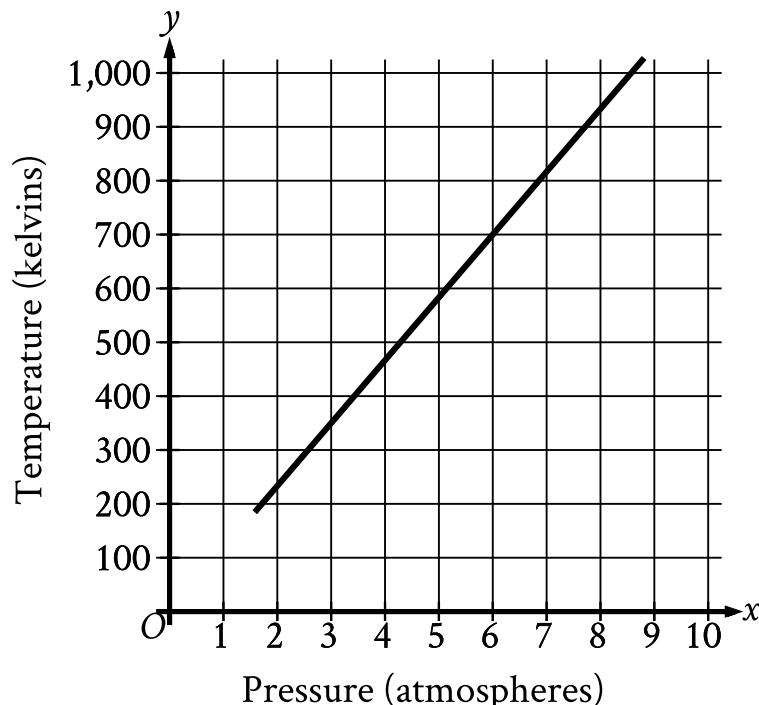
Question Difficulty: Easy

Question ID 0ea7ef01

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 5e08a055

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 5e08a055

$$y = 6x + 18$$

One of the equations in a system of two linear equations is given. The system has no solution. Which equation could be the second equation in the system?

- A. $-6x + y = 18$
- B. $-6x + y = 22$
- C. $-12x + y = 36$
- D. $-12x + y = 18$

ID: 5e08a055 Answer

Correct Answer: B

Rationale

Choice B is correct. 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 given equation, $y = 6x + 18$, can be written in standard form by subtracting $6x$ from both sides of the equation to yield $-6x + y = 18$. Therefore, the given equation can be written in the form $Ax + By = C$, where $A = -6$, $B = 1$, and $C = 18$. The equation in choice B, $-6x + y = 22$, is written in the form $Dx + Ey = F$, where $D = -6$, $E = 1$, and $F = 22$. Therefore, $\frac{D}{A} = \frac{-6}{-6} = 1$, which can be rewritten as $\frac{D}{A} = 1$; $\frac{E}{B} = \frac{1}{1} = 1$, which can be rewritten as $\frac{E}{B} = 1$; and $\frac{F}{C} = \frac{22}{18} = \frac{11}{9}$, which can be rewritten as $\frac{F}{C} = \frac{11}{9}$. Since $\frac{D}{A} = 1$, $\frac{E}{B} = 1$, and $\frac{F}{C}$ is not equal to 1, it follows that the given equation and the equation $-6x + y = 22$ are parallel and distinct. Therefore, a system of two linear equations consisting of the given equation and the equation $-6x + y = 22$ has no solution. Thus, the equation in choice B could be the second equation in the system.

Choice A is incorrect. The equation $-6x + y = 18$ and the given equation represent the same line in the xy -plane. Therefore, a system of these linear equations would have infinitely many solutions, rather than no solution.

Choice C is incorrect. The equation $-12x + y = 36$ and the given equation represent lines in the xy -plane that are distinct and not parallel. Therefore, a system of these linear equations would have exactly one solution, rather than no solution.

Choice D is incorrect. The equation $-12x + y = 18$ and the given equation represent lines in the xy -plane that are distinct and not parallel. Therefore, a system of these linear equations would have exactly one solution, rather than no solution.

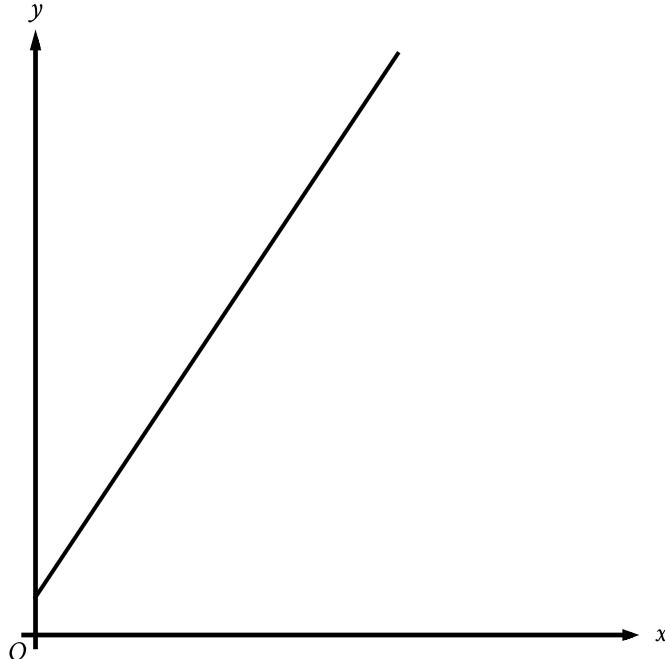
no solution.

Question Difficulty: Hard

Question ID f0773a55

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	■ ■ □

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 2eef7e61

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 2eef7e61

3

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 46f68129

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 441558e7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 441558e7

Scientists collected fallen acorns that each housed a colony of the ant species *P. ohioensis* and analyzed each colony's structure. For any of these colonies, if the colony has x worker ants, the equation $y = 0.67x + 2.6$, where $20 \leq x \leq 110$, gives the predicted number of larvae, y , in the colony. If one of these colonies has 58 worker ants, which of the following is closest to the predicted number of larvae in the colony?

- A. 41
- B. 61
- C. 83
- D. 190

ID: 441558e7 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the equation $y = 0.67x + 2.6$, where $20 \leq x \leq 110$, gives the predicted number of larvae, y , in a colony of ants if the colony has x worker ants. If one of these colonies has 58 worker ants, the predicted number of larvae in that colony can be found by substituting 58 for x in the given equation. Substituting 58 for x in the given equation yields $y = 0.67(58) + 2.6$, or $y = 41.46$. Of the given choices, 41 is closest to the predicted number of larvae in the colony.

Choice B is incorrect. This is closest to the predicted number of larvae in a colony with 87 worker ants.

Choice C is incorrect. This is closest to the number of worker ants for which the predicted number of larvae in a colony is 58.

Choice D is incorrect. This is closest to the predicted number of larvae in a colony with 280 worker ants.

Question Difficulty: Medium

Question ID 038d87d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 174885f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 174885f8

Jay walks at a speed of **3** miles per hour and runs at a speed of **5** miles per hour. He walks for w hours and runs for r hours for a combined total of **14** miles. Which equation represents this situation?

- A. $3w + 5r = 14$
- B. $\frac{1}{3}w + \frac{1}{5}r = 14$
- C. $\frac{1}{3}w + \frac{1}{5}r = 112$
- D. $3w + 5r = 112$

ID: 174885f8 Answer

Correct Answer: A

Rationale

Choice A is correct. Since Jay walks at a speed of **3** miles per hour for w hours, Jay walks a total of $3w$ miles. Since Jay runs at a speed of **5** miles per hour for r hours, Jay runs a total of $5r$ miles. Therefore, the total number of miles Jay travels can be represented by $3w + 5r$. Since the combined total number of miles is **14**, the equation $3w + 5r = 14$ represents this situation.

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 5ad9eff0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 8f0c82e2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 8f0c82e2

The minimum value of x is 12 less than 6 times another number n . Which inequality shows the possible values of x ?

- A. $x \leq 6n - 12$
- B. $x \geq 6n - 12$
- C. $x \leq 12 - 6n$
- D. $x \geq 12 - 6n$

ID: 8f0c82e2 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the minimum value of x is 12 less than 6 times another number n . Therefore, the possible values of x are all greater than or equal to the value of 12 less than 6 times n . The value of 6 times n is given by the expression $6n$. The value of 12 less than $6n$ is given by the expression $6n - 12$. Therefore, the possible values of x are all greater than or equal to $6n - 12$. This can be shown by the inequality $x \geq 6n - 12$.

Choice A is incorrect. This inequality shows the possible values of x if the maximum, not the minimum, value of x is 12 less than 6 times n .

Choice C is incorrect. This inequality shows the possible values of x if the maximum, not the minimum, value of x is 6 times n less than 12, not 12 less than 6 times n .

Choice D is incorrect. This inequality shows the possible values of x if the minimum value of x is 6 times n less than 12, not 12 less than 6 times n .

Question Difficulty: Medium

Question ID c3989ef8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: c3989ef8

Henry receives a **\$60.00** gift card to pay for movies online. He uses his gift card to buy **3** movies for **\$7.50** each. If he spends the rest of his gift card balance on renting movies for **\$1.50** each, how many movies can Henry rent?

- A. **10**
- B. **25**
- C. **35**
- D. **40**

ID: c3989ef8 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that Henry uses his **\$60.00** gift card to buy **3** movies for **\$7.50** each. Therefore, Henry spends $3(\$7.50)$, or **\$22.50**, of his **\$60.00** gift card to buy **3** movies. After buying **3** movies with his **\$60.00** gift card, Henry has a gift card balance of $\$60.00 - \22.50 , or **\$37.50**. It's also given that Henry spends the rest of his gift card balance on renting movies for **\$1.50** each. Therefore, Henry can rent $\frac{\$37.50}{\$1.50}$, or **25**, movies.

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 6f6dfe3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	(Medium)

ID: 6f6dfe3e

x	y
-6	$n + 184$
-3	$n + 92$
0	n

The table shows three values of x and their corresponding values of y , where n is a constant, for the linear relationship between x and y . What is the slope of the line that represents this relationship in the xy -plane?

- A. $-\frac{92}{3}$
- B. $-\frac{3}{92}$
- C. $\frac{n+92}{-3}$
- D. $\frac{2n-92}{3}$

ID: 6f6dfe3e Answer

Correct Answer: A

Rationale

Choice A is correct. The slope, m , of a line in the xy -plane can be found using two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Based on the given table, the line representing the relationship between x and y in the xy -plane passes through the points $(-6, n + 184)$, $(-3, n + 92)$, and $(0, n)$, where n is a constant. Substituting two of these points, $(-3, n + 92)$ and $(0, n)$, for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{n - (n + 92)}{0 - (-3)}$, which is equivalent to $m = \frac{n - n - 92}{0 + 3}$, or $m = -\frac{92}{3}$. Therefore, the slope of the line that represents this relationship in the xy -plane is $-\frac{92}{3}$.

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 90bd9ef8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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. $\frac{4,332}{2,712} t$

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 a7a14e87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 89541f9b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 153ee763

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 153ee763

$$-3x + 21px = 84$$

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

- A. 0
- B. $\frac{1}{7}$
- C. $\frac{4}{3}$
- D. 4

ID: 153ee763 Answer

Correct Answer: B

Rationale

Choice B is correct. A linear equation in one variable has no solution if and only if the equation is false; that is, when there is no value of x that produces a true statement. It's given that in the equation $-3x + 21px = 84$, p is a constant and the equation has no solution for x . Therefore, the value of the constant p is one that results in a false equation. Factoring out the common factor of $-3x$ on the left-hand side of the given equation yields $-3x(1 - 7p) = 84$. Dividing both sides of this equation by -3 yields $x(1 - 7p) = -28$. Dividing both sides of this equation by $(1 - 7p)$ yields $x = \frac{-28}{1-7p}$. This equation is false if and only if $1 - 7p = 0$. Adding $7p$ to both sides of $1 - 7p = 0$ yields $1 = 7p$. Dividing both sides of this equation by 7 yields $\frac{1}{7} = p$. It follows that the equation $x = \frac{-28}{1-7p}$ is false if and only if $p = \frac{1}{7}$. Therefore, the given equation has no solution if and only if the value of p is $\frac{1}{7}$.

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 520e6f5b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 520e6f5b

Characteristics for Rock Types

Rock type	Weight per volume (lb/ft ³)	Cost per pound
Basalt	180	\$0.18
Granite	165	\$0.09
Limestone	120	\$0.03
Sandstone	135	\$0.22

A city is planning to build a rock retaining wall, a monument, and a garden in a park. The table above shows four rock types that will be considered for use in the project. Also shown for each rock type is its weight per volume, in pounds per cubic foot (lb/ft³), and the cost per pound, in dollars. The equation $0.03(120w) + 0.18(180z) + 3,385.80 = 7,576.20$ gives the total cost, in dollars, of the rocks used in the project in terms of the number of ft³ of limestone, w , and the number of ft³ of basalt, z . All four rock types are used in the project. Which of the following is the best interpretation of 3,385.80 in this context?

- A. The cost of the granite and sandstone needed for the project
- B. The cost of the basalt and limestone needed for the project
- C. The cost of the basalt needed for the project
- D. The cost of the sandstone needed for the project

ID: 520e6f5b Answer

Correct Answer: A

Rationale

Choice A is correct. The table shows the cost of limestone is \$0.03/lb, and the weight per volume for limestone is 120 lb/ft³. Therefore, the term $0.03(120w)$ represents the cost, in dollars, of w ft³ of limestone. Similarly, the term $0.18(180z)$ represents the cost, in dollars, of z ft³ of basalt. The given equation shows that the total cost of all the rocks used in the project is \$7,576.20. Since it's given that all four rock types are used in the project, the remaining term, 3,385.80, represents the cost, in dollars, of the granite and sandstone needed for the project.

Choice B is incorrect. The cost of basalt and limestone needed for the project can be represented by $0.18(180z) + 0.03(120w)$. Choice C is incorrect. The cost of the basalt needed for the project can be represented by the expression $0.18(180z)$. Choice D is incorrect and may result from neglecting to include granite in the rock types used for the project.

Question Difficulty: Easy

Question ID cc3e9528

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: cc3e9528

The graph of $9x - 10y = 19$ is translated down 4 units in the xy -plane. What is the x -coordinate of the x -intercept of the resulting graph?

ID: cc3e9528 Answer

Correct Answer: $\frac{59}{9}$, 6.555, 6.556

Rationale

The correct answer is $\frac{59}{9}$. When the graph of an equation in the form $Ax + By = C$, where A , B , and C are constants, is translated down k units in the xy -plane, the resulting graph can be represented by the equation $Ax + B(y + k) = C$. It's given that the graph of $9x - 10y = 19$ is translated down 4 units in the xy -plane. Therefore, the resulting graph can be represented by the equation $9x - 10(y + 4) = 19$, or $9x - 10y - 40 = 19$. Adding 40 to both sides of this equation yields $9x - 10y = 59$. The x -coordinate of the x -intercept of the graph of an equation in the xy -plane is the value of x in the equation when $y = 0$. Substituting 0 for y in the equation $9x - 10y = 59$ yields $9x - 10(0) = 59$, or $9x = 59$. Dividing both sides of this equation by 9 yields $x = \frac{59}{9}$. Therefore, the x -coordinate of the x -intercept of the resulting graph is $\frac{59}{9}$. Note that $\frac{59}{9}$, 6.555, and 6.556 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 915463e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 48fb34c8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ ■

ID: 48fb34c8

$$y > 13x - 18$$

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	21
5	47
8	86

B.

x	y
3	26
5	42
8	86

C.

x	y
3	16
5	42
8	81

D.

x	y
3	26
5	52
8	91

ID: 48fb34c8 Answer

Correct Answer: D

Rationale

Choice D is correct. 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 $y > 13(3) - 18$, or $y > 21$. Therefore, when $x = 3$, the corresponding value of y is greater than 21 . Substituting 5 for x in the given inequality yields $y > 13(5) - 18$, or $y > 47$. Therefore, when $x = 5$, the corresponding value of y is greater than 47 . Substituting 8 for x in the given inequality yields $y > 13(8) - 18$, or $y > 86$. Therefore, when $x = 8$, the corresponding value of y is greater than 86 . For the table in choice D, when $x = 3$, the corresponding value of y is 26 , which is greater than 21 ; when $x = 5$, the corresponding value of y is 52 , which is greater than 47 ; when $x = 8$, the corresponding value of y is 91 , which is greater than 86 . Therefore, the table in choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 21 , which is not greater than 21 ; when $x = 5$, the corresponding value of y is 47 , which is not greater than 47 ; when $x = 8$, the corresponding value of y is 86 , which is not greater than 86 .

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 42 , which is not greater than 47 ; when $x = 8$, the corresponding value of y is 86 , which is not greater than 86 .

Choice C is incorrect. In the table for choice C, when $x = 3$, the corresponding value of y is 16 , which is not greater than 21 ; when $x = 5$, the corresponding value of y is 42 , which is not greater than 47 ; when $x = 8$, the corresponding value of y is 81 , which is not greater than 86 .

Question Difficulty: Hard

Question ID 9f6f96ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 9f6f96ff

A wire with a length of **106** inches is cut into two parts. One part has a length of x inches, and the other part has a length of y inches. The value of x is **6** more than **4** times the value of y . What is the value of x ?

- A. **25**
- B. **28**
- C. **56**
- D. **86**

ID: 9f6f96ff Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that a wire with a length of **106** inches is cut into two parts. It's also given that one part has a length of x inches and the other part has a length of y inches. This can be represented by the equation $x + y = 106$. It's also given that the value of x is **6** more than **4** times the value of y . This can be represented by the equation $x = 4y + 6$. Substituting $4y + 6$ for x in the equation $x + y = 106$ yields $4y + 6 + y = 106$, or $5y + 6 = 106$. Subtracting **6** from each side of this equation yields $5y = 100$. Dividing each side of this equation by **5** yields $y = 20$. Substituting **20** for y in the equation $x = 4y + 6$ yields $x = 4(20) + 6$, or $x = 86$.

Choice A is incorrect. This value represents less than half of the total length of **106** inches; however, x represents the length of the longer part of the wire, since it's given that the value of x is **6** more than **4** times the value of y .

Choice B is incorrect. This value represents less than half of the total length of **106** inches; however, x represents the length of the longer part of the wire, since it's given that the value of x is **6** more than **4** times the value of y .

Choice C is incorrect. This represents a part that is **6** more than the length of the other part, rather than **6** more than **4** times the length of the other part.

Question Difficulty: Medium

Question ID 7e1bff94

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 7e1bff94

The table gives the number of hours, h , of labor and a plumber's total charge $f(h)$, in dollars, for two different jobs.

h	$f(h)$
1	155
3	285

There is a linear relationship between h and $f(h)$. Which equation represents this relationship?

- A. $f(h) = 25h + 130$
- B. $f(h) = 130h + 25$
- C. $f(h) = 65h + 90$
- D. $f(h) = 90h + 65$

ID: 7e1bff94 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that there is a linear relationship between a plumber's hours of labor, h , and the plumber's total charge $f(h)$, in dollars. It follows that the relationship can be represented by an equation of the form $f(h) = mh + b$, where m is the rate of change of the function f and b is a constant. The rate of change of f can be calculated by dividing the difference in two values of $f(h)$ by the difference in the corresponding values of h . Based on the values given in the table, the rate of change of f is $\frac{285 - 155}{3 - 1}$, or 65. Substituting 65 for m in the equation $f(h) = mh + b$ yields $f(h) = 65h + b$. The value of b can be found by substituting any value of h and its corresponding value of $f(h)$ for h and $f(h)$, respectively, in this equation. Substituting 1 for h and 155 for $f(h)$ yields $155 = 65(1) + b$, or $155 = 65 + b$. Subtracting 65 from both sides of this equation yields $90 = b$. Substituting 90 for b in the equation $f(h) = 65h + b$ yields $f(h) = 65h + 90$.

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 ce314070

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	(Medium)

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 f718c9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 $10x + 7(3) = 27$, or $10x + 21 = 27$. Subtracting 21 from both sides of this equation yields $10x = 6$. Dividing both sides of this equation by 10 yields $x = \frac{6}{10}$, or $x = \frac{3}{5}$. Therefore, the value of xy is $(\frac{3}{5})(3)$, 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 2875ba81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	(Medium)

ID: 2875ba81

$$\begin{aligned}6x + 7y &= 28 \\2x + 2y &= 10\end{aligned}$$

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 265f2a53

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 265f2a53

When line n is graphed in the xy -plane, it has an x -intercept of $(-4, 0)$ and a y -intercept of $(0, \frac{86}{3})$. What is the slope of line n ?

- A. $\frac{3}{344}$
- B. $\frac{6}{43}$
- C. $\frac{43}{6}$
- D. $\frac{344}{3}$

ID: 265f2a53 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that when line n is graphed in the xy -plane, it has an x -intercept of $(-4, 0)$ and a y -intercept of $(0, \frac{86}{3})$. The slope, m , of a line can be found using any two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(-4, 0)$ and $(0, \frac{86}{3})$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{\frac{86}{3} - 0}{0 - (-4)}$, or $m = \frac{43}{6}$. Therefore, the slope of line n is $\frac{43}{6}$.

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

Choice B is incorrect. This is the slope of a line that has an x -intercept of $(\frac{86}{3}, 0)$ and a y -intercept of $(0, -4)$.

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

Question Difficulty: Medium

Question ID ee031767

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 ?

A. $26b + 35g = 28$
 $b + g = 881$

B. $26b + 35g = 881$
 $b + g = 28$

C. $26g + 35b = 28$
 $b + g = 881$

D. $26g + 35b = 881$
 $b + g = 28$

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 0cadb20e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 0cadb20e

The function f is defined by $f(x) = \frac{x+15}{5}$, and $f(a) = 10$, where a is a constant. What is the value of a ?

- A. 5
- B. 10
- C. 35
- D. 65

ID: 0cadb20e Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $f(x) = \frac{x+15}{5}$ and $f(a) = 10$, where a is a constant. Therefore, for the given function f , when $x = a$, $f(x) = 10$. Substituting a for x and 10 for $f(x)$ in the given function f yields $10 = \frac{a+15}{5}$. Multiplying both sides of this equation by 5 yields $50 = a + 15$. Subtracting 15 from both sides of this equation yields $35 = a$. Therefore, the value of a is 35.

Choice A is incorrect. This is the value of a if $f(a) = 4$.

Choice B is incorrect. This is the value of a if $f(a) = 5$.

Choice D is incorrect. This is the value of a if $f(a) = 16$.

Question Difficulty: Medium

Question ID 466b87e3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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

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 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, 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	

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	

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 $(3)(13)$, or 39 , yields $(39)\left(\frac{x+6}{3}\right) = (39)\left(\frac{x+6}{13}\right)$, or $13(x + 6) = 3(x + 6)$. Subtracting $3(x + 6)$ from both sides of this equation yields $10(x + 6) = 0$. 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 84d0d07e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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	

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 f81a0503

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: f81a0503

In the xy -plane, line k passes through the points $(0, -5)$ and $(1, -1)$. Which equation defines line k ?

- A. $y = -x + \frac{1}{4}$
- B. $y = \frac{1}{4}x - 5$
- C. $y = -x + 4$
- D. $y = 4x - 5$

ID: f81a0503 Answer

Correct Answer: D

Rationale

Choice D is correct. An equation defining a line in the xy -plane can be written in the form $y = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the line. It's given that line k passes through the point $(0, -5)$; therefore, $b = -5$. The slope, m , of a line can be found using any two points on the line, (x_1, y_1) and (x_2, y_2) , and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(0, -5)$ and $(1, -1)$ for (x_1, y_1) and (x_2, y_2) , respectively, in the slope formula yields $m = \frac{(-1 - (-5))}{(1 - 0)}$, or $m = 4$. Substituting 4 for m and -5 for b in the equation $y = mx + b$ yields $y = 4x - 5$.

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: Medium

Question ID 0366d965

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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 13909d78

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 13909d78

The function f is defined by the equation $f(x) = 100x + 2$. What is the value of $f(x)$ when $x = 9$?

- A. 111
- B. 118
- C. 900
- D. 902

ID: 13909d78 Answer

Correct Answer: D

Rationale

Choice D is correct. Substituting 9 for x in the given equation yields $f(9) = 100(9) + 2$, or $f(9) = 902$. Therefore, the value of $f(x)$ when $x = 9$ is 902.

Choice A is incorrect. This is the value of $f(x)$ when $x = 1.09$.

Choice B is incorrect. This is the value of $f(x)$ when $x = 1.16$.

Choice C is incorrect. This is the value of $f(x)$ when $x = 8.98$.

Question Difficulty: Easy

Question ID 10c448d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 10c448d6

A line in the xy -plane has a slope of $\frac{1}{9}$ and passes through the point $(0, 14)$. Which equation represents this line?

- A. $y = -\frac{1}{9}x - 14$
- B. $y = -\frac{1}{9}x + 14$
- C. $y = \frac{1}{9}x - 14$
- D. $y = \frac{1}{9}x + 14$

ID: 10c448d6 Answer

Correct Answer: D

Rationale

Choice D is correct. The equation of a line in the xy -plane can be written as $y = mx + b$, where m represents the slope of the line and $(0, b)$ represents the y -intercept of the line. It's given that the slope of the line is $\frac{1}{9}$. It follows that $m = \frac{1}{9}$. It's also given that the line passes through the point $(0, 14)$. It follows that $b = 14$. Substituting $\frac{1}{9}$ for m and 14 for b in $y = mx + b$ yields $y = \frac{1}{9}x + 14$. Thus, the equation $y = \frac{1}{9}x + 14$ represents this line.

Choice A is incorrect. This equation represents a line with a slope of $-\frac{1}{9}$ and a y -intercept of $(0, -14)$.

Choice B is incorrect. This equation represents a line with a slope of $-\frac{1}{9}$ and a y -intercept of $(0, 14)$.

Choice C is incorrect. This equation represents a line with a slope of $\frac{1}{9}$ and a y -intercept of $(0, -14)$.

Question Difficulty: Easy

Question ID 7038b587

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 7038b587

Vivian bought party hats and cupcakes for **\$71**. Each package of party hats cost **\$3**, and each cupcake cost **\$1**. If Vivian bought **10** packages of party hats, how many cupcakes did she buy?

ID: 7038b587 Answer

Correct Answer: 41

Rationale

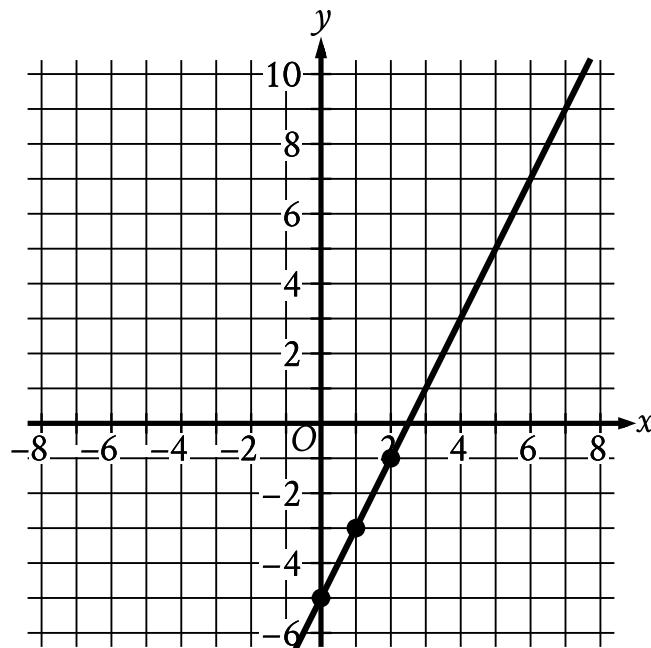
The correct answer is **41**. The number of cupcakes Vivian bought can be found by first finding the amount Vivian spent on cupcakes. The amount Vivian spent on cupcakes can be found by subtracting the amount Vivian spent on party hats from the total amount Vivian spent. The amount Vivian spent on party hats can be found by multiplying the cost per package of party hats by the number of packages of party hats, which yields $\$3 \cdot 10$, or **\$30**. Subtracting the amount Vivian spent on party hats, **\$30**, from the total amount Vivian spent, **\$71**, yields $\$71 - \30 , or **\$41**. Since the amount Vivian spent on cupcakes was **\$41** and each cupcake cost **\$1**, it follows that Vivian bought **41** cupcakes.

Question Difficulty: Easy

Question ID 4acd05cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

ID: 4acd05cd



The graph shows the linear relationship between x and y . Which table gives three values of x and their corresponding values of y for this relationship?

A.

x	y
0	0
1	-7
2	-9

B.

x	y
0	0
1	-3
2	-1

C.

x	y
0	-5
1	-7

2	-9
---	----

D.

x	y
0	-5
1	-3
2	-1

ID: 4acd05cd Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the graph shows the linear relationship between x and y . The given graph passes through the points $(0, -5)$, $(1, -3)$, and $(2, -1)$. It follows that when $x = 0$, the corresponding value of y is -5 , when $x = 1$, the corresponding value of y is -3 , and when $x = 2$, the corresponding value of y is -1 . Of the given choices, only the table in choice D gives these three values of x and their corresponding values of y for the relationship shown in the graph.

Choice A is incorrect. This table represents a relationship between x and y such that the graph passes through the points $(0, 0)$, $(1, -7)$, and $(2, -9)$.

Choice B is incorrect. This table represents a relationship between x and y such that the graph passes through the points $(0, 0)$, $(1, -3)$, and $(2, -1)$.

Choice C is incorrect. This table represents a linear relationship between x and y such that the graph passes through the points $(0, -5)$, $(1, -7)$, and $(2, -9)$.

Question Difficulty: Easy

Question ID 963da34c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 b2de69bd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 28c2253f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 28c2253f

Characteristics for Rock Types

Rock type	Weight per volume (lb/ft ³)	Cost per pound
Basalt	180	\$0.18
Granite	165	\$0.09
Limestone	120	\$0.03
Sandstone	135	\$0.22

A city is planning to build a rock retaining wall, a monument, and a garden in a park. The table above shows four rock types that will be considered for use in the project. Also shown for each rock type is its weight per volume, in pounds per cubic foot (lb/ft³), and the cost per pound, in dollars. Only basalt, granite, and limestone will be used in the garden. The rocks in the garden will have a total weight of 1,000 pounds. If 330 pounds of granite is used, which of the following equations could show the relationship between the amounts, x and y , in ft³, for each of the other rock types used?

- A. $165x + 180y = 670$
- B. $165x + 120y = 1,000$
- C. $120x + 180y = 670$
- D. $120x + 180y = 1,000$

ID: 28c2253f Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the weight of the granite used in the garden is 330 pounds. The weight of the limestone used in the garden is a product of its weight per volume, in lb/ft³, and its volume, in ft³. Therefore, the weight of the limestone used in the garden can be represented by $120x$, where x is the volume, in ft³, of the

limestone used. Similarly, the weight of the basalt used in the garden can be represented by $180y$, where y is the volume, in ft^3 , of the basalt used. It's given that the total weight of the rocks used in the garden will be 1,000 pounds. Thus, the sum of the weights of the three rock types used is 1,000 pounds, which can be represented by the equation $120x + 180y + 330 = 1,000$. Subtracting 330 from both sides of this equation yields $120x + 180y = 670$.

Choice A is incorrect. This equation uses the weight per volume of granite instead of limestone. Choice B is incorrect. This equation uses the weight per volume of granite instead of basalt, and doesn't take into account the 330 pounds of granite that will be used in the garden. Choice D is incorrect. This equation doesn't take into account the 330 pounds of granite that will be used in the garden.

Question Difficulty: Medium

Question ID 042aa429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $g(2) = 7(2)$, 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 aad7e1b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: aad7e1b9

The function f is defined by $f(x) = \frac{1}{10}x - 2$. What is the y -intercept of the graph of $y = f(x)$ in the xy -plane?

- A. $(-2, 0)$
- B. $(0, -2)$
- C. $(0, \frac{1}{10})$
- D. $(\frac{1}{10}, 0)$

ID: aad7e1b9 Answer

Correct Answer: B

Rationale

Choice B is correct. The y -intercept of the graph of a function in the xy -plane is the point on the graph where $x = 0$. It's given that $f(x) = \frac{1}{10}x - 2$. Substituting 0 for x in this equation yields $f(0) = \frac{1}{10}(0) - 2$, or $f(0) = -2$. Since it's given that $y = f(x)$, it follows that $y = -2$ when $x = 0$. Therefore, the y -intercept of the graph of $y = f(x)$ in the xy -plane 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 e77a76ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 9ff10b3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 78391fcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	3

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 cee5b352

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: cee5b352

The length, y , of a white whale was **162 centimeters (cm)** when it was born and increased an average of **4.8 cm** per month for the first **12** months after it was born. Which equation best represents this situation, where x is the number of months after the whale was born and y is the length, in **cm**, of the whale?

- A. $y = 162x$
- B. $y = 162x + 162$
- C. $y = 4.8x + 4.8$
- D. $y = 4.8x + 162$

ID: cee5b352 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the length of the whale was **162 cm** when it was born and that its length increased an average of **4.8 cm** per month for the first **12** months after it was born. Since x represents the number of months after the whale was born, the total increase in the whale's length, in **cm**, is **4.8 times x** , or **$4.8x$** . The length of the whale y , in **cm**, can be found by adding the whale's length at birth, **162 cm**, to the total increase in length, **$4.8x$ cm**. Therefore, the equation that best represents this situation is $y = 4.8x + 162$.

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 1e11190a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 $(5.50r)(6.5) + (3.00b)(6.5) = (37.00)(6.5)$, or $35.75r + 19.5b = 240.5$. Multiplying both sides of the equation for store B by 5.5 yields $(6.50r)(5.5) + (8.00b)(5.5) = (66.00)(5.5)$, 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 2d54c272

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 4ec95eab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 4ec95eab

$$\begin{aligned}y &= -3x \\4x + y &= 15\end{aligned}$$

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

- A. 1
- B. 5
- C. 15
- D. 45

ID: 4ec95eab Answer

Correct Answer: C

Rationale

Choice C is correct. The given system of linear equations can be solved by the substitution method. Substituting $-3x$ for y from the first equation in the given system into the second equation yields $4x + (-3x) = 15$, or $x = 15$.

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. This is the absolute value of y , not the value of x .

Question Difficulty: Easy

Question ID de6fe450

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 03503d49

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: 03503d49

A business owner plans to purchase the same model of chair for each of the **81** employees. The total budget to spend on these chairs is **\$14,000**, which includes a **7%** sales tax. Which of the following is closest to the maximum possible price per chair, before sales tax, the business owner could pay based on this budget?

- A. **\$148.15**
- B. **\$161.53**
- C. **\$172.84**
- D. **\$184.94**

ID: 03503d49 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a business owner plans to purchase **81** chairs. If p is the price per chair, the total price of purchasing **81** chairs is $81p$. It's also given that **7%** sales tax is included, which is equivalent to $81p$ multiplied by 1.07 , or $81(1.07)p$. Since the total budget is **\$14,000**, the inequality representing the situation is given by $81(1.07)p \leq 14,000$. Dividing both sides of this inequality by $81(1.07)$ and rounding the result to two decimal places gives $p \leq 161.53$. To not exceed the budget, the maximum possible price per chair is **\$161.53**.

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

Choice C is incorrect. This is the maximum possible price per chair including sales tax, not the maximum possible price per chair before sales tax.

Choice D is incorrect. This is the maximum possible price if the sales tax is added to the total budget, not the maximum possible price per chair before sales tax.

Question Difficulty: Hard

Question ID a35c7164

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

ID: a35c7164

$$\begin{aligned}5x + 7y &= 1 \\ax + by &= 1\end{aligned}$$

In the given pair of equations, a and b are constants. The graph of this pair of equations in the xy -plane is a pair of perpendicular lines. Which of the following pairs of equations also represents a pair of perpendicular lines?

A. $10x + 7y = 1$
 $ax - 2by = 1$

B. $10x + 7y = 1$
 $ax + 2by = 1$

C. $10x + 7y = 1$
 $2ax + by = 1$

D. $5x - 7y = 1$
 $ax + by = 1$

ID: a35c7164 Answer

Correct Answer: B

Rationale

Choice B is correct. Two lines are perpendicular if their slopes are negative reciprocals, meaning that the slope of the first line is equal to -1 divided by the slope of the second line. Each equation in the given pair of equations 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. For the first equation, $5x + 7y = 1$, subtracting $5x$ from both sides gives $7y = -5x + 1$, and dividing both sides of this equation by 7 gives $y = -\frac{5}{7}x + \frac{1}{7}$. Therefore, the slope of the graph of this equation is $-\frac{5}{7}$. For the second equation, $ax + by = 1$, subtracting ax from both sides gives $by = -ax + 1$, and dividing both sides of this equation by b gives $y = -\frac{a}{b}x + \frac{1}{b}$. Therefore, the slope of the graph of this equation is $-\frac{a}{b}$. Since the graph of the given pair of equations is a pair of perpendicular lines, the slope of the graph of the second equation, $-\frac{a}{b}$, must be the negative reciprocal of the slope of the graph of the first equation, $-\frac{5}{7}$. The negative reciprocal of $-\frac{5}{7}$ is $\frac{-1}{(-\frac{5}{7})}$, or $\frac{7}{5}$. Therefore, $-\frac{a}{b} = \frac{7}{5}$, or $\frac{a}{b} = -\frac{7}{5}$. Similarly, rewriting the equations in choice B in slope-intercept form yields $y = -\frac{10}{7}x + \frac{1}{7}$ and $y = -\frac{a}{2b}x + \frac{1}{2b}$. It follows that the slope of the graph of the first equation in choice B is $-\frac{10}{7}$ and the slope of the graph of the second equation in choice B is $-\frac{a}{2b}$. Since $\frac{a}{b} = -\frac{7}{5}$, $-\frac{a}{2b}$ is equal to $-(\frac{1}{2})(-\frac{7}{5})$, or $\frac{7}{10}$. Since $\frac{7}{10}$ is the negative reciprocal of $-\frac{10}{7}$, the pair of equations in choice B represents a pair of perpendicular lines.

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 e2e3942f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 cd33b015

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 f03465dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: f03465dc

$$\begin{aligned}8x + 7y &= 9 \\24x + 21y &= 27\end{aligned}$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $(r, -\frac{8r}{7} + \frac{9}{7})$
- B. $(-\frac{8r}{7} + \frac{9}{7}, r)$
- C. $(-\frac{8r}{7} + 9, \frac{8r}{7} + 27)$
- D. $(\frac{r}{3} + 9, -\frac{r}{3} + 27)$

ID: f03465dc Answer

Correct Answer: A

Rationale

Choice A is correct. Dividing both sides of the second equation in the given system by 3 yields $8x + 7y = 9$, which is the first equation in the given system. Therefore, the first and second equations represent the same line in the xy -plane. If the x - and y -coordinates of a point satisfy an equation, the point lies on the graph of the equation in the xy -plane. Choice A is a point with x -coordinate r and y -coordinate $-\frac{8r}{7} + \frac{9}{7}$. Substituting r for x and $-\frac{8r}{7} + \frac{9}{7}$ for y in the equation $8x + 7y = 9$ yields $8r + 7(-\frac{8r}{7} + \frac{9}{7}) = 9$. Applying the distributive property to the left-hand side of this equation yields $8r - 8r + 9 = 9$. Combining like terms on the left-hand side of this equation yields $9 = 9$, so the coordinates of the point $(r, -\frac{8r}{7} + \frac{9}{7})$ satisfy both equations in the given system. Therefore, for each real number r , the point $(r, -\frac{8r}{7} + \frac{9}{7})$ lies on the graph of each equation in the xy -plane for the given system.

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 75012ee7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 75012ee7

$$\begin{aligned}2x + 3y &= 7 \\10x + 15y &= 35\end{aligned}$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $(\frac{r}{5} + 7, -\frac{r}{5} + 35)$
- B. $(-\frac{3r}{2} + \frac{7}{2}, r)$
- C. $(r, \frac{2r}{3} + \frac{7}{3})$
- D. $(r, -\frac{3r}{2} + \frac{7}{2})$

ID: 75012ee7 Answer

Correct Answer: B

Rationale

Choice B is correct. The two given equations are equivalent because the second equation can be obtained from the first equation by multiplying each side of the equation by 5. Thus, the graphs of the equations are coincident, so if a point lies on the graph of one of the equations, it also lies on the graph of the other equation. A point (x, y) lies on the graph of an equation in the xy -plane if and only if this point represents a solution to the equation. It is sufficient, therefore, to find the point that represents a solution to the first given equation. Substituting the x - and y -coordinates of choice B, $-\frac{3r}{2} + \frac{7}{2}$ and r , for x and y , respectively, in the first equation yields $2(-\frac{3r}{2} + \frac{7}{2}) + 3r = 7$, which is equivalent to $-3r + 7 + 3r = 7$, or $7 = 7$. Therefore, the point $(-\frac{3r}{2} + \frac{7}{2}, r)$ represents a solution to the first equation and thus lies on the graph of each equation in the xy -plane for the given system.

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 fbb0ea7f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: fbb0ea7f

A rocket contained **467,000** kilograms (kg) of propellant before launch. Exactly **21** seconds after launch, **362,105** kg of this propellant remained. On average, approximately how much propellant, in kg, did the rocket burn each second after launch?

- A. **4,995**
- B. **17,243**
- C. **39,481**
- D. **104,895**

ID: fbb0ea7f Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the rocket contained **467,000 kilograms (kg)** of propellant before launch and had **362,105 kg** remaining exactly **21** seconds after launch. Finding the difference between the amount, in **kg**, of propellant before launch and the remaining amount, in **kg**, of propellant after launch gives the amount, in **kg**, of propellant burned during the **21** seconds: $467,000 - 362,105 = 104,895$. Dividing the amount of propellant burned by the number of seconds yields $\frac{104,895}{21} = 4,995$. Thus, an average of **4,995 kg** of propellant burned each second after launch.

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 finding the amount of propellant burned, rather than the amount of propellant burned each second.

Question Difficulty: Easy

Question ID 686b7cad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 686b7cad

A proposal for a new library was included on an election ballot. A radio show stated that **3** times as many people voted in favor of the proposal as people who voted against it. A social media post reported that **15,000** more people voted in favor of the proposal than voted against it. Based on these data, how many people voted against the proposal?

- A. **7,500**
- B. **15,000**
- C. **22,500**
- D. **45,000**

ID: 686b7cad Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that a radio show stated that **3** times as many people voted in favor of the proposal as people who voted against it. Let x represent the number of people who voted against the proposal. It follows that $3x$ is the number of people who voted in favor of the proposal and $3x - x$, or $2x$, is how many more people voted in favor of the proposal than voted against it. It's also given that a social media post reported that **15,000** more people voted in favor of the proposal than voted against it. Thus, $2x = 15,000$. Since $2x = 15,000$, the value of x must be half of **15,000**, or **7,500**. Therefore, **7,500** people voted against the proposal.

Choice B is incorrect. This is how many more people voted in favor of the proposal than voted against it, not the number of people who voted against the proposal.

Choice C is incorrect. This is the number of people who voted in favor of the proposal, not the number of people who voted against the proposal.

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

Question Difficulty: Medium

Question ID 023c0a8d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 0d1dca87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 0d1dca87

$$3x + y = 29$$

$$x = 2$$

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	

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 3f8a701b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $9b$. 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 daad7c32

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 f02b4509

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

ID: f02b4509

A moving truck can tow a trailer if the combined weight of the trailer and the boxes it contains is no more than **4,600** pounds. What is the maximum number of boxes this truck can tow in a trailer with a weight of **500** pounds if each box weighs **120** pounds?

- A. **34**
- B. **35**
- C. **38**
- D. **39**

ID: f02b4509 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the truck can tow a trailer if the combined weight of the trailer and the boxes it contains is no more than **4,600** pounds. If the trailer has a weight of **500** pounds and each box weighs **120** pounds, the expression $500 + 120b$, where b is the number of boxes, gives the combined weight of the trailer and the boxes. Since the combined weight must be no more than **4,600** pounds, the possible numbers of boxes the truck can tow are given by the inequality $500 + 120b \leq 4,600$. Subtracting **500** from both sides of this inequality yields $120b \leq 4,100$. Dividing both sides of this inequality by **120** yields $b \leq \frac{205}{6}$, or b is less than or equal to approximately **34.17**. Since the number of boxes, b , must be a whole number, the maximum number of boxes the truck can tow is the greatest whole number less than **34.17**, which is **34**.

Choice B is incorrect. Towing the trailer and **35** boxes would yield a combined weight of **4,700** pounds, which is greater than **4,600** pounds.

Choice C is incorrect. Towing the trailer and **38** boxes would yield a combined weight of **5,060** pounds, which is greater than **4,600** pounds.

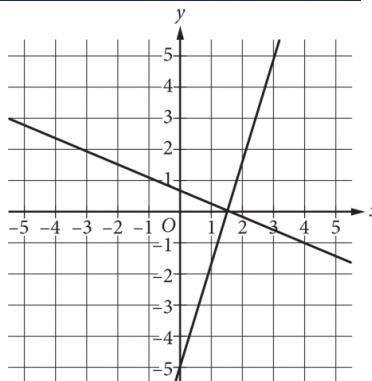
Choice D is incorrect. Towing the trailer and **39** boxes would yield a combined weight of **5,180** pounds, which is greater than **4,600** pounds.

Question Difficulty: Medium

Question ID 2704399f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	■ ■ □

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. $y = 0$
 $x = 0$

C. $y = 1$
 $x = 1$

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 $(\frac{3}{2}, 0)$, respectively, not $(\frac{3}{2}, 0)$.

Question Difficulty: Medium

Question ID a04050d8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: a04050d8

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 the 180 food calories in a granola bar come entirely from p grams of protein, f grams of fat, and c grams of carbohydrate, which of the following expresses f in terms of p and c ?

A. $f = 20 + \frac{4}{9}(p + c)$

B. $f = 20 - \frac{4}{9}(p + c)$

C. $f = 20 - \frac{4}{9}(p - c)$

D. $f = 20 + \frac{9}{4}(p + c)$

ID: a04050d8 Answer

Correct Answer: B

Rationale

Choice B is correct. It is given that there are 4.0 food calories per gram of protein, 9.0 food calories per gram of fat, and 4.0 food calories per gram of carbohydrate. If 180 food calories in a granola bar came from p grams of protein, f grams of fat, and c grams of carbohydrate, then the situation can be represented by the equation $180 = 4p + 9f + 4c$. The equation can then be rewritten in terms of f by subtracting $4p$ and $4c$ from both sides of the equation and then dividing both sides of the equation by 9. The result is the equation $f = 20 - \frac{4}{9}(p + c)$.

Choices A, C, and D are incorrect and may be the result of not representing the situation with the correct equation or incorrectly rewriting the equation in terms of f .

Question Difficulty: Hard

Question ID 5a7ab8e8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 5a7ab8e8

$$66x = 66x$$

How many solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 5a7ab8e8 Answer

Correct Answer: C

Rationale

Choice C is correct. If the two sides of a linear equation are equivalent, then the equation is true for any value. If an equation is true for any value, it has infinitely many solutions. Since the two sides of the given linear equation $66x = 66x$ are equivalent, 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.

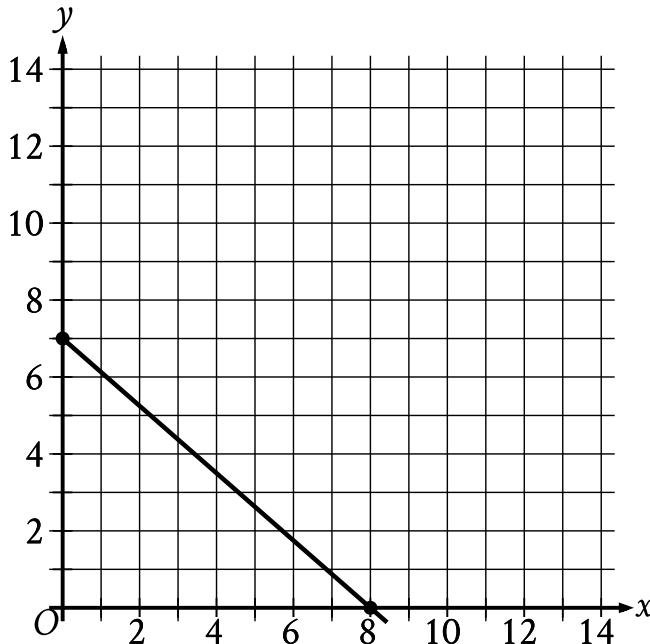
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 9d0396d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

ID: 9d0396d4



The point with coordinates $(d, 4)$ lies on the line shown. What is the value of d ?

- A. $\frac{7}{2}$
- B. $\frac{26}{7}$
- C. $\frac{24}{7}$
- D. $\frac{27}{8}$

ID: 9d0396d4 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given from the graph that the points $(0, 7)$ and $(8, 0)$ lie on the line. For two points on a line, (x_1, y_1) and (x_2, y_2) , the slope of the line can be calculated using the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting $(0, 7)$ for (x_1, y_1) and $(8, 0)$ for (x_2, y_2) in this formula, the slope of the line can be calculated as $m = \frac{0 - 7}{8 - 0}$, or $m = -\frac{7}{8}$. It's also given that the point $(d, 4)$ lies on the line. Substituting $(d, 4)$ for (x_1, y_1) , $(8, 0)$ for (x_2, y_2) , and $-\frac{7}{8}$ for m in the slope formula yields $-\frac{7}{8} = \frac{0 - 4}{8 - d}$, or $-\frac{7}{8} = \frac{-4}{8 - d}$. Multiplying both sides of this equation by $8 - d$ yields $-\frac{7}{8}(8 - d) = -4$. Expanding the left-hand side of this equation yields $-7 + \frac{7}{8}d = -4$. Adding 7 to both sides of this equation yields $\frac{7}{8}d = 3$. Multiplying both sides of this equation by $\frac{8}{7}$ yields $d = \frac{24}{7}$. Thus, the value of d is $\frac{24}{7}$.

Choice A is incorrect. This is the value of y when $x = 4$.

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 567ac7ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

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 81390d6c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 81390d6c

The function h is defined by $h(x) = x + 200$. What is the value of $h(50)$?

- A. 200
- B. 250
- C. 10,000
- D. 50,200

ID: 81390d6c Answer

Correct Answer: B

Rationale

Choice B is correct. Substituting 50 for x in the given function yields $h(50) = 50 + 200$, or $h(50) = 250$. Therefore, the value of $h(50)$ is 250.

Choice A is incorrect. This is the value of $h(0)$.

Choice C is incorrect. This is the value of $h(9,800)$.

Choice D is incorrect. This is the value of $h(50,000)$.

Question Difficulty: Easy

Question ID cb58833c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 c841e8e8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: c841e8e8

$$k + 12 = 336$$

What is the solution to the given equation?

- A. 28
- B. 324
- C. 348
- D. 4,032

ID: c841e8e8 Answer

Correct Answer: B

Rationale

Choice B is correct. Subtracting 12 from both sides of the given equation yields $k = 324$. Therefore, the solution to the given equation is 324.

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 e9ef0e6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 $72(16)$ miles total. If one of these whales travels **77** miles each day for **16** days, then the whale travels $77(16)$ miles total. Therefore, the model estimates that in **16** days of its migration, a whale from the genus *Eschrichtius* could travel at least $72(16)$ and at most $77(16)$ miles total. Thus, the inequality $(72)(16) \leq x \leq (77)(16)$ 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 4f7981a0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 73b5f330

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 73b5f330

The function f is defined by $f(x) = 5x + 8$. For what value of x does $f(x) = 58$?

- A. 10
- B. 13
- C. 50
- D. 298

ID: 73b5f330 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the function f is defined by $f(x) = 5x + 8$. Substituting 58 for $f(x)$ in this equation yields $58 = 5x + 8$. Subtracting 8 from both sides of this equation yields $50 = 5x$. Dividing both sides of this equation by 5 yields $10 = x$. Therefore, the value of x when $f(x) = 58$ is 10.

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 value of $f(58)$, not the value of x when $f(x) = 58$.

Question Difficulty: Easy

Question ID 1efd8202

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 36ab4122

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 74c98c82

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 776cfa7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 776cfa7c

Hana deposited a fixed amount into her bank account each month. The function $f(t) = 100 + 25t$ gives the amount, in dollars, in Hana's bank account after t monthly deposits. What is the best interpretation of **25** in this context?

- A. With each monthly deposit, the amount in Hana's bank account increased by **\$25**.
- B. Before Hana made any monthly deposits, the amount in her bank account was **\$25**.
- C. After **1** monthly deposit, the amount in Hana's bank account was **\$25**.
- D. Hana made a total of **25** monthly deposits.

ID: 776cfa7c Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that t represents the number of monthly deposits. In the given function $f(t) = 100 + 25t$, the coefficient of t is 25. This means that for every increase in the value of t by 1, the value of $f(t)$ increases by 25. It follows that with each monthly deposit, the amount in Hana's bank account increased by \$25.

Choice B is incorrect. Before Hana made any monthly deposits, the amount in her bank account was \$100.

Choice C is incorrect. After 1 monthly deposit, the amount in Hana's bank account was \$125.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 637022d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 637022d2

$$2.5b + 5r = 80$$

The given equation describes the relationship between the number of birds, b , and the number of reptiles, r , that can be cared for at a pet care business on a given day. If the business cares for 16 reptiles on a given day, how many birds can it care for on this day?

- A. 0
- B. 5
- C. 40
- D. 80

ID: 637022d2 Answer

Correct Answer: A

Rationale

Choice A is correct. The number of birds can be found by calculating the value of b when $r = 16$ in the given equation. Substituting 16 for r in the given equation yields $2.5b + 5(16) = 80$, or $2.5b + 80 = 80$. Subtracting 80 from both sides of this equation yields $2.5b = 0$. Dividing both sides of this equation by 2.5 yields $b = 0$. Therefore, if the business cares for 16 reptiles on a given day, it can care for 0 birds on this 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.

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

Question Difficulty: Medium

Question ID 6efcc0a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $h(x) = ax + b$, where a and b are constants. It's given that $h(0) = 41$. Substituting 0 for x and 41 for $h(x)$ in the equation $h(x) = ax + b$ yields $41 = a(0) + b$, or $b = 41$. Substituting 41 for b in the equation $h(x) = ax + b$ yields $h(x) = ax + 41$. It's also given that $h(1) = 40$. Substituting 1 for x and 40 for $h(x)$ in the equation $h(x) = ax + 41$ yields $40 = a(1) + 41$, 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 $h(x) = ax + 41$ yields $h(x) = -1x + 41$, or $h(x) = -x + 41$.

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

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

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

Question Difficulty: Easy

Question ID 14360f84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 14360f84

$$\begin{aligned}4x - 9y &= 9y + 5 \\hy &= 2 + 4x\end{aligned}$$

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

- A. -9
- B. 0
- C. 9
- D. 18

ID: 14360f84 Answer

Correct Answer: D

Rationale

Choice D is correct. 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 distinct and parallel. The graphs of two lines in the xy -plane represented by equations in the form $Ax + By = C$, where A , B , and C are constants, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation. The first equation in the given system can be written in the form $Ax + By = C$ by subtracting $9y$ from both sides of the equation to yield $4x - 18y = 5$. The second equation in the given system can be written in the form $Ax + By = C$ by subtracting $4x$ from both sides of the equation to yield $-4x + hy = 2$. The coefficient of x in this second equation, -4 , is -1 times the coefficient of x in the first equation, 4 . For the lines to be parallel, the coefficient of y in the second equation, h , must also be -1 times the coefficient of y in the first equation, -18 . Thus, $h = -1(-18)$, or $h = 18$. Therefore, if the given system has no solution, the value of h is 18 .

Choice A is incorrect. If the value of h is -9 , then the given system would have one solution, rather than no solution.

Choice B is incorrect. If the value of h is 0 , then the given system would have one solution, rather than no solution.

Choice C is incorrect. If the value of h is 9 , then the given system would have one solution, rather than no solution.

Question Difficulty: Hard

Question ID c5479c1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: c5479c1a

A shipment consists of 5-pound boxes and 10-pound boxes with a total weight of 220 pounds. There are 13 10-pound boxes in the shipment. How many 5-pound boxes are in the shipment?

- A. 5
- B. 10
- C. 13
- D. 18

ID: c5479c1a Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the shipment consists of 5-pound boxes and 10-pound boxes with a total weight of 220 pounds. Let x represent the number of 5-pound boxes and y represent the number of 10-pound boxes in the shipment. Therefore, the equation $5x + 10y = 220$ represents this situation. It's given that there are 13 10-pound boxes in the shipment. Substituting 13 for y in the equation $5x + 10y = 220$ yields $5x + 10(13) = 220$, or $5x + 130 = 220$. Subtracting 130 from both sides of this equation yields $5x = 90$. Dividing both sides of this equation by 5 yields 18. Thus, there are 18 5-pound boxes in the shipment.

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 number of 10-pound boxes in the shipment.

Question Difficulty: Easy

Question ID 5e422ff9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	 难易度

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	

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 2e1a7f66

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 029c2dc2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 113b938e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 4e77195b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 4e77195b

If $2 + x = 60$, what is the value of $16 + 8x$?

ID: 4e77195b Answer

Correct Answer: 480

Rationale

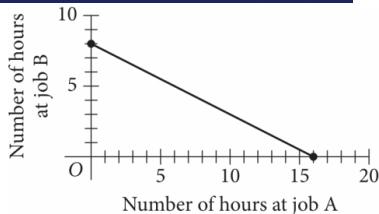
The correct answer is 480. Multiplying both sides of the given equation by 8 yields $8(2 + x) = 8(60)$, or $16 + 8x = 480$. Therefore, if $2 + x = 60$, the value of $16 + 8x$ is 480.

Question Difficulty: Easy

Question ID c4ea43ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	3

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 c8e0f511

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: c8e0f511

For a camping trip a group bought x one-liter bottles of water and y three-liter bottles of water, for a total of **240** liters of water. Which equation represents this situation?

- A. $x + 3y = 240$
- B. $x + y = 240$
- C. $3x + 3y = 240$
- D. $3x + y = 240$

ID: c8e0f511 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that for a camping trip a group bought x one-liter bottles of water and y three-liter bottles of water. Since the group bought x one-liter bottles of water, the total number of liters bought from x one-liter bottles of water is represented as $1x$, or x . Since the group bought y three-liter bottles of water, the total number of liters bought from y three-liter bottles of water is represented as $3y$. It's given that the group bought a total of **240** liters; thus, the equation $x + 3y = 240$ represents this situation.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect. This equation represents a situation where the group bought x three-liter bottles of water and y one-liter bottles of water, for a total of **240** liters of water.

Question Difficulty: Easy

Question ID 830120b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	3

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 b8e73b5b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	

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 2d0e13a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: 2d0e13a6

Line k is defined by $y = \frac{1}{4}x + 1$. Line j is parallel to line k in the xy -plane. What is the slope of j ?

ID: 2d0e13a6 Answer

Correct Answer: .25, 1/4

Rationale

The correct answer is $\frac{1}{4}$. It's given that line k is defined by $y = \frac{1}{4}x + 1$. It's also given that line j is parallel to line k in the xy -plane. A line in the xy -plane represented by an equation in slope-intercept form $y = mx + b$ has a slope of m and a y -intercept of $(0, b)$. Therefore, the slope of line k is $\frac{1}{4}$. Since parallel lines have equal slopes, the slope of line j is $\frac{1}{4}$. Note that $1/4$ and $.25$ are examples of ways to enter a correct answer.

Question Difficulty: Easy

Question ID b3c7ca1d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: b3c7ca1d

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

- A. $x = 3$
 $y = 5$
- B. $y = 6x + 6$
 $y = 5x + 6$
- C. $y = 16x + 3$
 $y = 16x + 19$
- D. $y = 5$
 $y = 5x + 5$

ID: b3c7ca1d Answer

Correct Answer: C

Rationale

Choice C 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 $y = 16x + 3$ and $y = 16x + 19$, the values of m are each 16, and the values of b are 3 and 19, 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 C has no solution.

Choice A is incorrect. The lines represented by the equations in this system are a vertical line and a horizontal line. Therefore, this system has a solution, $(3, 5)$, rather than no solution.

Choice B 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, $(0, 6)$, rather than no solution.

Choice D is incorrect. The two lines represented by these equations are a horizontal line and a line with a slope of 5 that have the same y -coordinate of the y -intercept. Therefore, this system has a solution, $(0, 5)$, rather than no solution.

Question Difficulty: Medium

Question ID 1bc11c4e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 1bc11c4e

$$g(m) = -0.05m + 12.1$$

The given function g models the number of gallons of gasoline that remains from a full gas tank in a car after driving m miles. According to the model, about how many gallons of gasoline are used to drive each mile?

- A. 0.05
- B. 12.1
- C. 20
- D. 242.0

ID: 1bc11c4e Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the function g models the number of gallons that remain from a full gas tank in a car after driving m miles. In the given function $g(m) = -0.05m + 12.1$, the coefficient of m is -0.05 . This means that for every increase in the value of m by 1, the value of $g(m)$ decreases by 0.05. It follows that for each mile driven, there is a decrease of 0.05 gallons of gasoline. Therefore, 0.05 gallons of gasoline are used to drive each mile.

Choice B is incorrect and represents the number of gallons of gasoline in a full gas tank.

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 12255364

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 12255364

A gym charges its members a onetime **\$36** enrollment fee and a membership fee of **\$19** per month. If there are no charges other than the enrollment fee and the membership fee, after how many months will a member have been charged a total of **\$188** at the gym?

- A. 4
- B. 5
- C. 8
- D. 10

ID: 12255364 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that a gym charges its members a onetime **\$36** enrollment fee and a membership fee of **\$19** per month. Let x represent the number of months at the gym after which a member will have been charged a total of **\$188**. If there are no charges other than the enrollment fee and the membership fee, the equation $36 + 19x = 188$ can be used to represent this situation. Subtracting **36** from both sides of this equation yields $19x = 152$. Dividing both sides of this equation by **19** yields $x = 8$. Therefore, a member will have been charged a total of **\$188** after **8** months at the gym.

Choice A is incorrect. A member will have been charged a total of $(36 + 19 \times 4)$, or **\$112**, after **4** months at the gym.

Choice B is incorrect. A member will have been charged a total of $(36 + 19 \times 5)$, or **\$131**, after **5** months at the gym.

Choice D is incorrect. A member will have been charged a total of $(36 + 19 \times 10)$, or **\$226**, after **10** months at the gym.

Question Difficulty: Easy

Question ID b82a943c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: b82a943c

If $7x = 28$, what is the value of $8x$?

- A. 21
- B. 32
- C. 168
- D. 224

ID: b82a943c Answer

Correct Answer: B

Rationale

Choice B is correct. Dividing both sides of the given equation $7x = 28$ by 7 yields $x = 4$. Substituting 4 for x in the expression $8x$ yields $8(4)$, which is equivalent to 32.

Choice A is incorrect. This is the value of $\frac{21}{4}x$.

Choice C is incorrect. This is the value of $42x$.

Choice D is incorrect. This is the value of $56x$.

Question Difficulty: Easy

Question ID 092ad67d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: 092ad67d

$$x + 2y = 6$$

$$x - 2y = 4$$

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

- A. 2.5
- B. 5
- C. 6
- D. 10

ID: 092ad67d Answer

Correct Answer: B

Rationale

Choice B is correct. Adding the first equation to the second equation in the given system yields $(x + 2y) + (x - 2y) = 6 + 4$, or $(x + x) + (2y - 2y) = 10$. Combining like terms in this equation yields $2x = 10$. Dividing both sides of this equation by 2 yields $x = 5$. Thus, the value of x is 5.

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 value of $2x$, not x .

Question Difficulty: Medium

Question ID 90095507

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	3

ID: 90095507

Townsend Realty Group Investments

Property address	Purchase price (dollars)	Monthly rental price (dollars)
Clearwater Lane	128,000	950
Driftwood Drive	176,000	1,310
Edgemont Street	70,000	515
Glenview Street	140,000	1,040
Hamilton Circle	450,000	3,365

The Townsend Realty Group invested in the five different properties listed in the table above. The table shows the amount, in dollars, the company paid for each property and the corresponding monthly rental price, in dollars, the company charges for the property at each of the five locations. Townsend Realty purchased the Glenview Street property and received a 40% discount off the original price along with an additional 20% off the discounted price for purchasing the property in cash. Which of the following best approximates the original price, in dollars, of the Glenview Street property?

- A. \$350,000
- B. \$291,700
- C. \$233,300
- D. \$175,000

ID: 90095507 Answer

Correct Answer: B

Rationale

Choice B is correct. Let x be the original price, in dollars, of the Glenview Street property. After the 40% discount, the price of the property became $0.6x$ dollars, and after the additional 20% off the discounted price, the price of the property became $0.8(0.6x)$. Thus, in terms of the original price of the property, x , the purchase price of the property is $0.48x$. It follows that $0.48x = 140,000$. Solving this equation for x gives $x = 291,666.\overline{6}$. Therefore, of the given choices, \$291,700 best approximates the original price of the Glenview Street property.

Choice A is incorrect because it is the result of dividing the purchase price of the property by 0.4, as though the purchase price were 40% of the original price. Choice C is incorrect because it is the closest to dividing the purchase price of the property by 0.6, as though the purchase price were 60% of the original price. Choice D is incorrect because it is the result of dividing the purchase price of the property by 0.8, as though the purchase price were 80% of the original price.

Question Difficulty: Hard

Question ID d9d83c02

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 ba79f10f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

ID: ba79f10f

x	y
0	18
1	13
2	8

The table shows three 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. $y = 18x + 13$
- B. $y = 18x + 18$
- C. $y = -5x + 13$
- D. $y = -5x + 18$

ID: ba79f10f Answer

Correct Answer: D

Rationale

Choice D is correct. A linear relationship can be represented by an equation of the form $y = mx + b$, where m and b are constants. It's given in the table that when $x = 0$, $y = 18$. Substituting 0 for x and 18 for y in $y = mx + b$ yields $18 = m(0) + b$, or $18 = b$. Substituting 18 for b in the equation $y = mx + b$ yields $y = mx + 18$. It's also given in the table that when $x = 1$, $y = 13$. Substituting 1 for x and 13 for y in the equation $y = mx + 18$ yields $13 = m(1) + 18$, or $13 = m + 18$. Subtracting 18 from both sides of this equation yields $-5 = m$. Therefore, the equation $y = -5x + 18$ represents the relationship between x 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: Easy

Question ID 3122fc7b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 3122fc7b

A linear model estimates the population of a city from **1991** to **2015**. The model estimates the population was **57** thousand in **1991**, **224** thousand in **2011**, and **x** thousand in **2015**. To the nearest whole number, what is the value of **x** ?

ID: 3122fc7b Answer

Correct Answer: 257

Rationale

The correct answer is **257**. It's given that a linear model estimates the population of a city from **1991** to **2015**. Since the population can be estimated using a linear model, it follows that there is a constant rate of change for the model. It's also given that the model estimates the population was **57** thousand in **1991**, **224** thousand in **2011**, and **x** thousand in **2015**. The change in the population between **2011** and **1991** is **224 – 57**, or **167**, thousand. The change in the number of years between **2011** and **1991** is **2011 – 1991**, or **20**, years. Dividing **167** by **20** gives **167/20**, or **8.35**, thousand per year. Thus, the change in population per year from **1991** to **2015** estimated by the model is **8.35** thousand. The change in the number of years between **2015** and **2011** is **2015 – 2011**, or **4**, years. Multiplying the change in population per year by the change in number of years yields the increase in population from **2011** to **2015** estimated by the model: **(8.35)(4)**, or **33.4**, thousand. Adding the change in population from **2011** to **2015** estimated by the model to the estimated population in **2011** yields the estimated population in **2015**. Thus, the estimated population in **2015** is **33.4 + 224**, or **257.4**, thousand. Therefore to the nearest whole number, the value of **x** is **257**.

Question Difficulty: Medium

Question ID eac739b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: eac739b2

If $4x + 2 = 12$, what is the value of $16x + 8$?

- A. 40
- B. 48
- C. 56
- D. 60

ID: eac739b2 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 4 yields $(4)(4x + 2) = (4)(12)$, or $16x + 8 = 48$. Therefore, the value of $16x + 8$ is 48.

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 3c4ce699

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 $3(6 + x) = 3(9)$, or $18 + 3x = 27$. Therefore, the value of $18 + 3x$ is 27.

Question Difficulty: Easy

Question ID 4f669597

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

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 56dc8045

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: 56dc8045

$$w(t) = 300 - 4t$$

The function w models the volume of liquid, in milliliters, in a container t seconds after it begins draining from a hole at the bottom. According to the model, what is the predicted volume, in milliliters, draining from the container each second?

- A. 300
- B. 296
- C. 75
- D. 4

ID: 56dc8045 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the function w models the volume of liquid, in milliliters, in a container t seconds after it begins draining from a hole at the bottom. The given function $w(t) = 300 - 4t$ can be rewritten as $w(t) = -4t + 300$. Thus, for each increase of t by 1, the value of $w(t)$ decreases by 4(1), or 4. Therefore, the predicted volume, in milliliters, draining from the container each second is 4 milliliters.

Choice A is incorrect. This is the amount of liquid, in milliliters, in the container before the liquid begins draining.

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 f88970cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: f88970cc

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

Which of the following points (x, y) is the solution to the given system of equations in the xy -plane?

- A. $(0, 0)$
- B. $(5, -3)$
- C. $(5, -8)$
- D. $(5, 8)$

ID: f88970cc Answer

Correct Answer: B

Rationale

Choice B is correct. A solution to a system of equations in the xy -plane is a point (x, y) that lies on the graph of each equation in the system. The first equation given is $x = 5$. Substituting 5 for x in the second given equation yields $y = 5 - 8$, or $y = -3$. It follows that in the xy -plane, the point $(5, -3)$ lies on the graph of each equation in the system. Therefore, the solution to the given system of equations in the xy -plane is $(5, -3)$.

Choice A is incorrect. The point $(0, 0)$ doesn't lie on the graph of either equation in the given system.

Choice C is incorrect. The point $(5, -8)$ doesn't lie on the graph of the second equation in the given system.

Choice D is incorrect. The point $(5, 8)$ doesn't lie on the graph of the second equation in the given system.

Question Difficulty: Easy

Question ID d909cd31

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: d909cd31

$$-15x + 25y = 65$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. Which of the following could be the second equation in the system?

- A. $12x + 20y = 52$
- B. $12x + 20y = -52$
- C. $-12x + 20y = 52$
- D. $-12x + 20y = -52$

ID: d909cd31 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions when the two linear equations are equivalent. Dividing both sides of the given equation by 5 yields $-3x + 5y = 13$. Dividing both sides of choice C by 4 also yields $-3x + 5y = 13$, so choice C is equivalent to the given equation. Thus, choice C could be the second equation in the system.

Choice A is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions.

Choice B is incorrect. The system consisting of this equation and the given equation has one solution, not infinitely many solutions.

Choice D is incorrect. The system consisting of this equation and the given equation has no solution, not infinitely many solutions.

Question Difficulty: Medium

Question ID c8fb6bcb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: c8fb6bcb

$$f(x) = 2x + 244$$

The given function f represents the perimeter, in centimeters (cm), of a rectangle with a length of x cm and a fixed width. What is the width, in cm, of the rectangle?

- A. 2
- B. 122
- C. 244
- D. 488

ID: c8fb6bcb Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that $f(x) = 2x + 244$ represents the perimeter, in centimeters (cm), of a rectangle with a length of x cm and a fixed width. If w represents a fixed width, in cm, then the perimeter, in cm, of a rectangle with a length of x cm and a fixed width of w cm can be given by the function $f(x) = 2x + 2w$. Therefore, $2x + 2w = 2x + 244$. Subtracting $2x$ from both sides of this equation yields $2w = 244$. Dividing both sides of this equation by 2 yields $w = 122$. Therefore, the width, in cm, of the rectangle is 122.

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 23dedddd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $f(x) = ax + b$, where a and b are constants. It's given that $f(0) = 8$. Substituting 0 for x and 8 for $f(x)$ in the equation $f(x) = ax + b$ yields $8 = a(0) + b$, or $8 = b$. Substituting 8 for b in the equation $f(x) = ax + b$ yields $f(x) = ax + 8$. It's given that $f(1) = 12$. Substituting 1 for x and 12 for $f(x)$ in the equation $f(x) = ax + 8$ yields $12 = a(1) + 8$, or $12 = a + 8$. Subtracting 8 from both sides of this equation yields $a = 4$. Substituting 4 for a in the equation $f(x) = ax + 8$ yields $f(x) = 4x + 8$. Therefore, an equation that defines f is $f(x) = 4x + 8$.

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

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

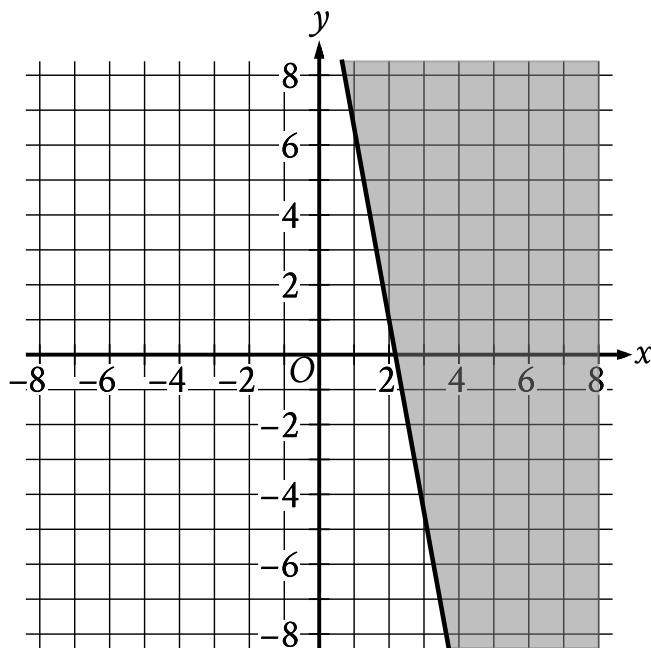
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 59a49431

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ □ □

ID: 59a49431



The shaded region shown represents solutions to an inequality. Which ordered pair (x, y) is a solution to this inequality?

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

ID: 59a49431 Answer

Correct Answer: D

Rationale

Choice D is correct. Since the shaded region shown represents solutions to an inequality, an ordered pair (x, y) is a solution to the inequality if it's represented by a point in the shaded region. Of the given choices, only $(4, 0)$ is represented by a point in the shaded region. Therefore, $(4, 0)$ is a solution to the inequality.

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 98d3393a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 d8539e09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ ■

ID: d8539e09

$$y < 6x + 2$$

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	20
5	32
7	44

B.

x	y
3	16
5	36
7	40

C.

x	y
3	16
5	28
7	40

D.

x	y
3	24
5	36
7	48

ID: d8539e09 Answer

Correct Answer: C

Rationale

Choice C is correct. 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 $y < 6(3) + 2$, or $y < 20$. Therefore, when $x = 3$, the corresponding value of y is less than 20. Substituting 5 for x in the given inequality yields $y < 6(5) + 2$, or $y < 32$. Therefore, when $x = 5$, the corresponding value of y is less than 32. Substituting 7 for x in the given inequality yields $y < 6(7) + 2$, or $y < 44$. Therefore, when $x = 7$, the corresponding value of y is less than 44. For the table in choice C, when $x = 3$, the corresponding value of y is 16, which is less than 20; when $x = 5$, the corresponding value of y is 28, which is less than 32; when $x = 7$, the corresponding value of y is 40, which is less than 44. Therefore, the table in choice C gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 20, which is not less than 20; when $x = 5$, the corresponding value of y is 32, which is not less than 32; when $x = 7$, the corresponding value of y is 44, which is not less than 44.

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 36, which is not less than 32.

Choice D is incorrect. In the table for choice D, when $x = 3$, the corresponding value of y is 24, which is not less than 20; when $x = 5$, the corresponding value of y is 36, which is not less than 32; when $x = 7$, the corresponding value of y is 48, which is not less than 44.

Question Difficulty: Hard

Question ID e8f9e117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	3

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 868fc236

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 $k = 4.2x$.

$$\frac{(x_2 - x_1)}{(k_2 - k_1)}$$

Choice A is incorrect and may be the result of calculating the rate of change using $\frac{(k_2 - k_1)}{(x_2 - x_1)}$. 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 431c3038

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 ID dfa45424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	

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 c01f4a95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: c01f4a95

$$j(x) = mx + 144$$

For the linear function j , m is a constant and $j(12) = 18$. What is the value of $j(10)$?

ID: c01f4a95 Answer

Correct Answer: 39

Rationale

The correct answer is 39. It's given that for the linear function j , m is a constant and $j(12) = 18$. Substituting 12 for x and 18 for $j(x)$ in the given equation yields $18 = m(12) + 144$. Subtracting 144 from both sides of this equation yields $-126 = m(12)$. Dividing both sides of this equation by 12 yields $-10.5 = m$. Substituting -10.5 for m in the given equation, $j(x) = mx + 144$, yields $j(x) = -10.5x + 144$. Substituting 10 for x in this equation yields $j(10) = (-10.5)(10) + 144$, or $j(10) = 39$. Therefore, the value of $j(10)$ is 39.

Question Difficulty: Medium

Question ID a1696f3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 255996a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 ece00725

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: ece00725

Connor has c dollars and Maria has m dollars. Connor has 4 times as many dollars as Maria, and together they have a total of \$25.00. Which system of equations represents this situation?

- A. $c = 4m$
 $c + m = 25$
- B. $m = 4c$
 $c + m = 25$
- C. $c = 25m$
 $c + m = 4$
- D. $m = 25c$
 $c + m = 4$

ID: ece00725 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that Connor has c dollars, Maria has m dollars, and Connor has 4 times as many dollars as Maria. This can be represented by the equation $c = 4m$. It's also given that together, Connor and Maria have a total of \$25.00, which can be represented by the equation $c + m = 25$. Therefore, the system consisting of the equations $c = 4m$ and $c + m = 25$ represents this situation.

Choice B is incorrect. The equation $m = 4c$ represents a situation where Maria has 4 times as many dollars as Connor, rather than the situation where Connor has 4 times as many dollars as Maria.

Choice C is incorrect. The equation $c = 25m$ represents a situation where Connor has 25 times, rather than 4 times, as many dollars as Maria. The equation $c + m = 4$ represents a situation where Connor and Maria together have a total of \$4.00, rather than \$25.00.

Choice D is incorrect. The equation $m = 25c$ represents a situation where Maria has 25 times as many dollars as Connor, rather than the situation where Connor has 4 times as many dollars as Maria. The equation $c + m = 4$ represents a situation where Connor and Maria together have a total of \$4.00, rather than \$25.00.

Question Difficulty: Easy

Question ID 0cb57740

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	

ID: 0cb57740

Each side of a 30-sided polygon has one of three lengths. The number of sides with length **8 centimeters (cm)** is 5 times the number of sides n with length **3 cm**. There are **6** sides with length **4 cm**. Which equation must be true for the value of n ?

- A. $5n + 6 = 30$
- B. $6n + 6 = 30$
- C. $8n + 3n + 4n = 30$
- D. $8(5n) + 3n + 4(6) = 30$

ID: 0cb57740 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that each side of a 30-sided polygon has one of three lengths. It's also given that the number of sides with length **8 centimeters (cm)** is 5 times the number of sides n with length **3 cm**. Therefore, there are $5 \times n$, or $5n$, sides with length **8 cm**. It's also given that there are **6** sides with length **4 cm**. Therefore, the number of **3 cm**, **4 cm**, and **8 cm** sides are n , **6**, and $5n$, respectively. Since there are a total of **30** sides, the equation $n + 6 + 5n = 30$ represents this situation. Combining like terms on the left-hand side of this equation yields $6n + 6 = 30$. Therefore, the equation that must be true for the value of n is $6n + 6 = 30$.

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 c4d49134

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

ID: c4d49134

$$s = 40 + 3t$$

The equation gives the speed s , in miles per hour, of a certain car t seconds after it began to accelerate. What is the speed, in miles per hour, of the car 5 seconds after it began to accelerate?

- A. 40
- B. 43
- C. 45
- D. 55

ID: c4d49134 Answer

Correct Answer: D

Rationale

Choice D is correct. In the given equation, s is the speed, in miles per hour, of a certain car t seconds after it began to accelerate. Therefore, the speed of the car, in miles per hour, 5 seconds after it began to accelerate can be found by substituting 5 for t in the given equation, which yields $s = 40 + 3(5)$, or $s = 55$. Thus, the speed of the car 5 seconds after it began to accelerate is 55 miles per hour.

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 6989c80a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	

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 ffb371f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	

ID: ffb371f5

$$\begin{aligned}3x &= 12 \\ -3x + y &= -6\end{aligned}$$

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

- A. **-3**
- B. **6**
- C. 18
- D. 30

ID: ffb371f5 Answer

Correct Answer: B

Rationale

Choice B is correct. Adding the second equation in the given system to the first equation in the given system yields $3x + (-3x + y) = 12 + (-6)$, which is equivalent to $y = 6$.

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 f2bbd43d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■ ■ □

ID: f2bbd43d

$$\begin{aligned}y &> 14 \\4x + y &< 18\end{aligned}$$

The point $(x, 53)$ is a solution to the system of inequalities in the xy -plane. Which of the following could be the value of x ?

- A. -9
- B. -5
- C. 5
- D. 9

ID: f2bbd43d Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the point $(x, 53)$ is a solution to the given system of inequalities in the xy -plane. This means that the coordinates of the point, when substituted for the variables x and y , make both of the inequalities in the system true. Substituting 53 for y in the inequality $y > 14$ yields $53 > 14$, which is true. Substituting 53 for y in the inequality $4x + y < 18$ yields $4x + 53 < 18$. Subtracting 53 from both sides of this inequality yields $4x < -35$. Dividing both sides of this inequality by 4 yields $x < -8.75$. Therefore, x must be a value less than -8.75 . Of the given choices, only -9 is less than -8.75 .

Choice B is incorrect. Substituting -5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(-5) + 53 < 18$, or $33 < 18$, which is not true.

Choice C is incorrect. Substituting 5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(5) + 53 < 18$, or $73 < 18$, which is not true.

Choice D is incorrect. Substituting 9 for x and 53 for y in the inequality $4x + y < 18$ yields $4(9) + 53 < 18$, or $89 < 18$, which is not true.

Question Difficulty: Medium