

Question ID 002dba45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 002dba45

Line k is defined by $y = -\frac{17}{3}x + 5$. Line j is perpendicular to line k in the xy -plane. What is the slope of line j ?

ID: 002dba45 Answer

Correct Answer: .1764, .1765, 3/17

Rationale

The correct answer is $\frac{3}{17}$. It's given that line j is perpendicular to line k in the xy -plane. This means that the slope of line j is the negative reciprocal of the slope of line k . The equation of line k , $y = -\frac{17}{3}x + 5$, is written in slope-intercept form $y = mx + b$, where m is the slope of the line and b is the y -coordinate of the y -intercept of the line. It follows that the slope of line k is $-\frac{17}{3}$. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of $-\frac{17}{3}$ is $\frac{-1}{-\frac{17}{3}}$, 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	<div><div></div><div></div><div></div></div>

ID: f224df07

A cargo helicopter delivers only 100-pound packages and 120-pound packages. For each delivery trip, the helicopter must carry at least 10 packages, and the total weight of the packages can be at most 1,100 pounds. What is the maximum number of 120-pound packages that the helicopter can carry per trip?

- A. 2
- B. 4
- C. 5
- D. 6

ID: f224df07 Answer

Correct Answer: C

Rationale

Choice C is correct. Let a equal the number of 120-pound packages, and let b equal the number of 100-pound packages. It's given that the total weight of the packages can be at most 1,100 pounds: the inequality $120a + 100b \leq 1,100$ represents this situation. It's also given that the helicopter must carry at least 10 packages: the inequality $a + b \geq 10$ represents this situation. Values of a and b that satisfy these two inequalities represent the allowable numbers of 120-pound packages and 100-pound packages the helicopter can transport. To maximize the number of 120-pound packages, a , in the helicopter, the number of 100-pound packages, b , in the helicopter needs to be minimized. Expressing b in terms of a in the second inequality yields $b \geq 10 - a$, so the minimum value of b is equal to $10 - a$. Substituting $10 - a$ for b in the first inequality results in $120a + 100(10 - a) \leq 1,100$. Using the distributive property to rewrite this inequality yields $120a + 1,000 - 100a \leq 1,100$, or $20a + 1,000 \leq 1,100$. Subtracting 1,000 from both sides of this inequality yields $20a \leq 100$. Dividing both sides of this inequality by 20 results in $a \leq 5$. This means that the maximum number of 120-pound packages that the helicopter can carry per trip is 5.

Choices A, B, and D are incorrect and may result from incorrectly creating or solving the system of inequalities.

Question Difficulty: Medium

Question ID 3008cfc3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 3008cfc3

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: 3008cfc3 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	<div><div></div><div></div><div></div></div>

ID: d1b66ae6

$$\begin{aligned} -x + y &= -3.5 \\ x + 3y &= 9.5 \end{aligned}$$

If (x, y) satisfies the system of equations above, what is the value of y ?

ID: d1b66ae6 Answer

Rationale

The correct answer is $\frac{3}{2}$. One method for solving the system of equations for y is to add corresponding sides of the two equations. Adding the left-hand sides gives $(-x + y) + (x + 3y)$, or $4y$. Adding the right-hand sides yields $-3.5 + 9.5 = 6$. It follows that $4y = 6$. Finally, dividing both sides of $4y = 6$ by 4 yields $y = \frac{6}{4}$ or $\frac{3}{2}$. Note that $3/2$ and 1.5 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID cb8f449f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: cb8f449f

$$\frac{1}{2}y = 4$$

$$x - \frac{1}{2}y = 2$$

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: ff501705

$$\begin{aligned}\frac{3}{2}y - \frac{1}{4}x &= \frac{2}{3} - \frac{3}{2}y \\ \frac{1}{2}x + \frac{3}{2} &= py + \frac{9}{2}\end{aligned}$$

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

ID: ff501705 Answer

Correct Answer: 6

Rationale

The correct answer is **6**. A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in standard form, $Ax + By = C$ and $Dx + Ey = F$, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation, meaning $\frac{D}{A} = \frac{E}{B}$; and the lines are distinct if the constants are not proportional, meaning $\frac{F}{C}$ is not equal to $\frac{D}{A}$ or $\frac{E}{B}$. The first equation in the given system is $\frac{3}{2}y - \frac{1}{4}x = \frac{2}{3} - \frac{3}{2}y$. Multiplying each side of this equation by **12** yields $18y - 3x = 8 - 18y$. Adding **18y** to each side of this equation yields $36y - 3x = 8$, or $-3x + 36y = 8$. The second equation in the given system is $\frac{1}{2}x + \frac{3}{2} = py + \frac{9}{2}$. Multiplying each side of this equation by **2** yields $x + 3 = 2py + 9$. Subtracting $2py$ from each side of this equation yields $x + 3 - 2py = 9$. Subtracting **3** from each side of this equation yields $x - 2py = 6$. Therefore, the two equations in the given system, written in standard form, are $-3x + 36y = 8$ and $x - 2py = 6$. As previously stated, if this system has no solution, the lines represented by the equations in the xy -plane are parallel and distinct, meaning the proportion $\frac{1}{-3} = \frac{-2p}{36}$, or $-\frac{1}{3} = -\frac{p}{18}$, is true and the proportion $\frac{6}{8} = \frac{-1}{-3}$ is not true. The proportion $\frac{6}{8} = \frac{-1}{-3}$ is not true. Multiplying each side of the true proportion, $-\frac{1}{3} = -\frac{p}{18}$, by **-18** yields **6 = p**. Therefore, if the system has no solution, then the value of p is **6**.

Question Difficulty: Hard

Question ID 8c5e6702

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 2937ef4f

Hector used a tool called an auger to remove corn from a storage bin at a constant rate. The bin contained 24,000 bushels of corn when Hector began to use the auger. After 5 hours of using the auger, 19,350 bushels of corn remained in the bin. If the auger continues to remove corn at this rate, what is the total number of hours Hector will have been using the auger when 12,840 bushels of corn remain in the bin?

- A. 3
- B. 7
- C. 8
- D. 12

ID: 2937ef4f Answer

Correct Answer: D

Rationale

Choice D is correct. After using the auger for 5 hours, Hector had removed $24,000 - 19,350 = 4,650$ bushels of corn from the storage bin. During the 5-hour period, the auger removed corn from the bin at a constant rate of $\frac{4,650}{5} = 930$ bushels per hour. Assuming the auger continues to remove corn at this rate, after x hours it will have removed $930x$ bushels of corn. Because the bin contained 24,000 bushels of corn when Hector started using the auger, the equation $24,000 - 930x = 12,840$ can be used to find the number of hours, x , Hector will have been using the auger when 12,840 bushels of corn remain in the bin. Subtracting 12,840 from both sides of this equation and adding $930x$ to both sides of the equation yields $11,160 = 930x$. Dividing both sides of this equation by 930 yields $x = 12$. Therefore, Hector will have been using the auger for 12 hours when 12,840 bushels of corn remain in the storage bin.

Choice A is incorrect. Three hours after Hector began using the auger, $24,000 - 3(930) = 21,210$ bushels of corn remained, not 12,840. Choice B is incorrect. Seven hours after Hector began using the auger, $24,000 - 7(930) = 17,490$ bushels of corn will remain, not 12,840. Choice C is incorrect. Eight hours after Hector began using the auger, $24,000 - 8(930) = 16,560$ bushels of corn will remain, not 12,840.

Question Difficulty: Hard

Question ID 548a4929

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 9bbce683

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 9bbce683

x	y
18	130
23	160
26	178

For line h , the table shows three values of x and their corresponding values of y . Line k is the result of translating line h down 5 units in the xy -plane. What is the x -intercept of line k ?

- A. $(-\frac{26}{3}, 0)$
- B. $(-\frac{9}{2}, 0)$
- C. $(-\frac{11}{3}, 0)$
- D. $(-\frac{17}{6}, 0)$

ID: 9bbce683 Answer

Correct Answer: D

Rationale

Choice D is correct. The equation of line h can be written in slope-intercept form $y = mx + b$, where m is the slope of the line and $(0, b)$ is the y -intercept of the line. It's given that line h contains the points $(18, 130)$, $(23, 160)$, and $(26, 178)$. Therefore, its slope m can be found as $\frac{160-130}{23-18}$, or 6. Substituting 6 for m in the equation $y = mx + b$ yields $y = 6x + b$. Substituting 130 for y and 18 for x in this equation yields $130 = 6(18) + b$, or $130 = 108 + b$. Subtracting 108 from both sides of this equation yields $22 = b$. Substituting 22 for b in $y = 6x + b$ yields $y = 6x + 22$. Since line k is the result of translating line h down 5 units, an equation of line k is $y = 6x + 22 - 5$, or $y = 6x + 17$. Substituting 0 for y in this equation yields $0 = 6x + 17$. Solving this equation for x yields $x = -\frac{17}{6}$. Therefore, the x -intercept of line k is $(-\frac{17}{6}, 0)$.

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

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

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

Question Difficulty: Hard

Question ID 2b15d65f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 2b15d65f

An economist modeled the demand Q for a certain product as a linear function of the selling price P . The demand was 20,000 units when the selling price was \$40 per unit, and the demand was 15,000 units when the selling price was \$60 per unit. Based on the model, what is the demand, in units, when the selling price is \$55 per unit?

- A. 16,250
- B. 16,500
- C. 16,750
- D. 17,500

ID: 2b15d65f Answer

Correct Answer: A

Rationale

Choice A is correct. Let the economist’s model be the linear function $Q = mP + b$, where Q is the demand, P is the selling price, m is the slope of the line, and b is the y-coordinate of the y-intercept of the line in the xy-plane, where $y = Q$. Two pairs of the selling price P and the demand Q are given. Using the coordinate pairs (P, Q) , two points that satisfy the function are $(40, 20,000)$ and $(60, 15,000)$. The slope m of the function can be found using the formula $m = \frac{Q_2 - Q_1}{P_2 - P_1}$. Substituting the given values into this formula yields $m = \frac{15,000 - 20,000}{60 - 40}$, or $m = -250$. Therefore, $Q = -250P + b$. The value of b can be found by substituting one of the points into the function. Substituting the values of P and Q from the point $(40, 20,000)$ yields $20,000 = -250(40) + b$, or $20,000 = -10,000 + b$. Adding 10,000 to both sides of this equation yields $b = 30,000$. Therefore, the linear function the economist used as the model is $Q = -250P + 30,000$. Substituting 55 for P yields $Q = -250(55) + 30,000 = 16,250$. It follows that when the selling price is \$55 per unit, the demand is 16,250 units.

Choices B, C, and D are incorrect and may result from calculation or conceptual errors.

Question ID 686b7244

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: b86123af

Hiro and Sofia purchased shirts and pants from a store. The price of each shirt purchased was the same and the price of each pair of pants purchased was the same. Hiro purchased 4 shirts and 2 pairs of pants for \$86, and Sofia purchased 3 shirts and 5 pairs of pants for \$166. Which of the following systems of linear equations represents the situation, if x represents the price, in dollars, of each shirt and y represents the price, in dollars, of each pair of pants?

- A.

$4x + 2y = 86$

$3x + 5y = 166$
- B.

$4x + 3y = 86$

$2x + 5y = 166$
- C.

$4x + 2y = 166$

$3x + 5y = 86$
- D.

$4x + 3y = 166$

$2x + 5y = 86$

ID: b86123af Answer

Correct Answer: A

Rationale

Choice A is correct. Hiro purchased 4 shirts and each shirt cost x dollars, so he spent a total of $4x$ dollars on shirts. Likewise, Hiro purchased 2 pairs of pants, and each pair of pants cost y dollars, so he spent a total of $2y$ dollars on pants. Therefore, the total amount that Hiro spent was $4x + 2y$. Since Hiro spent \$86 in total, this can be modeled by the equation $4x + 2y = 86$. Using the same reasoning, Sofia bought 3 shirts at x dollars each and 5 pairs of pants at y dollars each, so she spent a total of $3x + 5y$ dollars on shirts and pants. Since Sofia spent \$166 in total, this can be modeled by the equation $3x + 5y = 166$.

Choice B is incorrect and may be the result of switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased. Choice C is incorrect and may be the result of switching the total price each person paid. Choice D is incorrect and may be the result of switching the total price each person paid as well as switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased.

Question ID ee846db7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 608eeb6e

$$\begin{aligned}5x &= 15 \\ -4x + y &= -2\end{aligned}$$

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

- A. -17
- B. -13
- C. 13
- D. 17

ID: 608eeb6e Answer

Correct Answer: C

Rationale

Choice C is correct. Adding the second equation of the given system to the first equation yields $5x + (-4x + y) = 15 + (-2)$, which is equivalent to $x + y = 13$. So the value of $x + y$ is 13 .

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

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

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

Question Difficulty: Easy

Question ID 097e10f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

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 be9cb6a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: be9cb6a2

The cost of renting a backhoe for up to **10** days is **\$270** for the first day and **\$135** for each additional day. Which of the following equations gives the cost ***y***, in dollars, of renting the backhoe for ***x*** days, where ***x*** is a positive integer and **$x \leq 10$** ?

- A. $y = 270x - 135$
- B. $y = 270x + 135$
- C. $y = 135x + 270$
- D. $y = 135x + 135$

ID: be9cb6a2 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the cost of renting a backhoe for up to **10** days is **\$270** for the first day and **\$135** for each additional day. Therefore, the cost ***y***, in dollars, for ***x*** days, where **$x \leq 10$** , is the sum of the cost for the first day, **\$270**, and the cost for the additional **$x - 1$** days, **$\$135(x - 1)$** . It follows that **$y = 270 + 135(x - 1)$** , which is equivalent to **$y = 270 + 135x - 135$** , or **$y = 135x + 135$** .

Choice A is incorrect. This equation represents a situation where the cost of renting a backhoe is **\$135** for the first day and **\$270** for each additional day.

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

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

Question Difficulty: Hard

Question ID 84664a7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 84664a7c

The front of a roller-coaster car is at the bottom of a hill and is 15 feet above the ground. If the front of the roller-coaster car rises at a constant rate of 8 feet per second, which of the following equations gives the height h , in feet, of the front of the roller-coaster car s seconds after it starts up the hill?

- A. $h = 8s + 15$
- B. $h = 15s + \frac{335}{8}$
- C. $h = 8s + \frac{335}{15}$
- D. $h = 15s + 8$

ID: 84664a7c Answer

Correct Answer: A

Rationale

Choice A is correct. It’s given that the front of the roller-coaster car starts rising when it’s 15 feet above the ground. This initial height of 15 feet can be represented by a constant term, 15, in an equation. Each second, the front of the roller-coaster car rises 8 feet, which can be represented by $8s$. Thus, the equation $h = 8s + 15$ gives the height, in feet, of the front of the roller-coaster car s seconds after it starts up the hill.

Choices B and C are incorrect and may result from conceptual errors in creating a linear equation. Choice D is incorrect and may result from switching the rate at which the roller-coaster car rises with its initial height.

Question Difficulty: Easy

Question ID e62cfe5f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: e62cfe5f

According to a model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to four times the body weight of the bee, in grams.
According to the model, what would be the head width, in millimeters, of a worker bumblebee that has a body weight of 0.5 grams?

ID: e62cfe5f Answer

Rationale

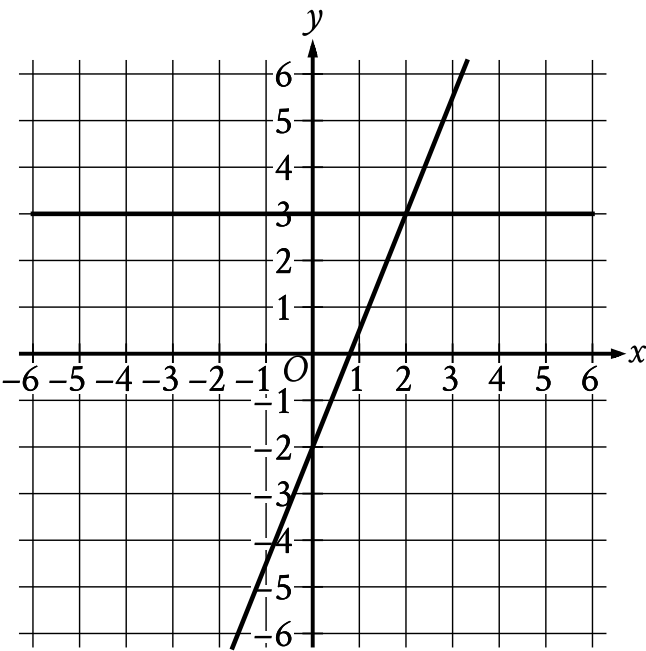
The correct answer is 2.6. According to the model, the head width, in millimeters, of a worker bumblebee can be estimated by adding 0.6 to 4 times the body weight, in grams, of the bee. Let x represent the body weight, in grams, of a worker bumblebee and let y represent the head width, in millimeters. Translating the verbal description of the model into an equation yields $y = 0.6 + 4x$. Substituting 0.5 grams for x in this equation yields $y = 0.6 + 4(0.5)$, or $y = 2.6$. Therefore, a worker bumblebee with a body weight of 0.5 grams has an estimated head width of 2.6 millimeters. Note that 2.6 and 13/5 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question ID b0fc3166

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: b0fc3166



The graph of a system of linear equations is shown. What is the solution (x, y) to the system?

- A. $(0, 3)$
- B. $(1, 3)$
- C. $(2, 3)$
- D. $(3, 3)$

ID: b0fc3166 Answer

Correct Answer: C

Rationale

Choice C is correct. The solution to this system of linear equations is represented by the point that lies on both lines shown, or the point of intersection of the two lines. According to the graph, the point of intersection occurs when $x = 2$ and $y = 3$, or at the point $(2, 3)$. Therefore, the solution (x, y) to the system is $(2, 3)$.

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

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

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

Question Difficulty: Easy

Question ID db422e7f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: db422e7f

Line p is defined by $4y + 8x = 6$. Line r is perpendicular to line p in the xy -plane. What is the slope of line r ?

ID: db422e7f Answer

Correct Answer: .5, 1/2

Rationale

The correct answer is $\frac{1}{2}$. For an equation in slope-intercept form $y = mx + b$, m represents the slope of the line in the xy -plane defined by this equation. It's given that line p is defined by $4y + 8x = 6$. Subtracting $8x$ from both sides of this equation yields $4y = -8x + 6$. Dividing both sides of this equation by 4 yields $y = -\frac{8}{4}x + \frac{6}{4}$, or $y = -2x + \frac{3}{2}$. Thus, the slope of line p is -2 . If line r is perpendicular to line p , then the slope of line r is the negative reciprocal of the slope of line p . The negative reciprocal of -2 is $-\frac{1}{(-2)} = \frac{1}{2}$. Note that 1/2 and .5 are examples of ways to enter a correct answer.

Question Difficulty: Hard

Question ID 01682aa5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 45cfb9de

Adam’s school is a 20-minute walk or a 5-minute bus ride away from his house. The bus runs once every 30 minutes, and the number of minutes, w , that Adam waits for the bus varies between 0 and 30. Which of the following inequalities gives the values of w for which it would be faster for Adam to walk to school?

- A. $w - 5 < 20$
- B. $w - 5 > 20$
- C. $w + 5 < 20$
- D. $w + 5 > 20$

ID: 45cfb9de Answer

Correct Answer: D

Rationale

Choice D is correct. It is given that w is the number of minutes that Adam waits for the bus. The total time it takes Adam to get to school on a day he takes the bus is the sum of the minutes, w , he waits for the bus and the 5 minutes the bus ride takes; thus, this time, in minutes, is $w + 5$. It is also given that the total amount of time it takes Adam to get to school on a day that he walks is 20 minutes. Therefore, $w + 5 > 20$ gives the values of w for which it would be faster for Adam to walk to school.

Choices A and B are incorrect because $w - 5$ is not the total length of time for Adam to wait for and then take the bus to school. Choice C is incorrect because the inequality should be true when walking 20 minutes is faster than the time it takes Adam to wait for and ride the bus, not less.

Question Difficulty: Hard

Question ID 06fc1726

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 06fc1726

If f is the function defined by $f(x) = \frac{2x-1}{3}$,
what is the value of $f(5)$?

- A. $\frac{4}{3}$
- B. $\frac{7}{3}$
- C. 3
- D. 9

ID: 06fc1726 Answer

Correct Answer: C

Rationale

Choice C is correct. If $f(x) = \frac{2x-1}{3}$, then $f(5) = \frac{2(5)-1}{3} = \frac{10-1}{3} = \frac{9}{3} = 3$.

Choice A is incorrect and may result from not multiplying x by 2 in the numerator. Choice B is incorrect and may result from dividing 2x by 3 and then subtracting 1. Choice D is incorrect and may result from evaluating only the numerator 2x – 1.

Question Difficulty: Easy

Question ID 6863c7ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 0b332f00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 a5834ea4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 349a5bc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 7e3f8363

In the xy -plane, the graph of the linear function f contains the points $(0, 3)$ and $(7, 31)$. Which equation defines f , where $y = f(x)$?

- A. $f(x) = 28x + 34$
- B. $f(x) = 3x + 38$
- C. $f(x) = 4x + 3$
- D. $f(x) = 7x + 3$

ID: 7e3f8363 Answer

Correct Answer: C

Rationale

Choice C is correct. In the xy -plane, an equation of the graph of a linear function can be written in the form $f(x) = mx + b$, 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	<div><div></div><div></div><div></div></div>

ID: 0eae6be1

The number y is ~~84~~ less than the number x . Which equation represents the relationship between x and y ?

- A. $y = x + 84$
- B. $y = \frac{1}{84}x$
- C. $y = 84x$
- D. $y = x - 84$

ID: 0eae6be1 Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that the number y is ~~84~~ less than the number x . A number that’s ~~84~~ less than the number x is equivalent to ~~84~~ subtracted from the number x , or $x - 84$. Therefore, the equation $y = x - 84$ represents the relationship between x and y .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 447fa970

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 Odd6227f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: Odd6227f

At how many points do the graphs of the equations $y = x + 20$ and $y = 8x$ intersect in the xy -plane?

- A. 0
- B. 1
- C. 2
- D. 8

ID: Odd6227f Answer

Correct Answer: B

Rationale

Choice B is correct. Each given equation is written in slope-intercept form, $y = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the graph of the equation in the xy -plane. The graphs of two lines that have different slopes will intersect at exactly one point. The graph of the first equation is a line with slope **1**. The graph of the second equation is a line with slope **8**. Since the graphs are lines with different slopes, they will intersect at exactly one point.

Choice A is incorrect because two graphs of linear equations have **0** intersection points only if they are parallel and therefore have the same slope.

Choice C is incorrect because two graphs of linear equations in the xy -plane can have only **0**, **1**, or infinitely many points of intersection.

Choice D is incorrect because two graphs of linear equations in the xy -plane can have only **0**, **1**, or infinitely many points of intersection.

Question Difficulty: Medium

Question ID b1228811

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 7efe5495

$$\begin{aligned}y &= 3x \\ 2x + y &= 12\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $5x$?

- A. 24
- B. 15
- C. 12
- D. 5

ID: 7efe5495 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = 3x$. Substituting $3x$ for y in the equation $2x + y = 12$ yields $2x + 3x = 12$, or $5x = 12$.

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

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

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

Question Difficulty: Medium

Question ID 2c121b25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

ID: 2c121b25

Valentina bought two containers of beads. In the first container 30% of the beads are red, and in the second container 70% of the beads are red. Together, the containers have at least 400 red beads. Which inequality shows this relationship, where x is the total number of beads in the first container and y is the total number of beads in the second container?

- A. $0.3x + 0.7y \geq 400$
- B. $0.7x + 0.3y \leq 400$
- C. $\frac{x}{3} + \frac{y}{7} \leq 400$
- D. $30x + 70y \geq 400$

ID: 2c121b25 Answer

Correct Answer: A

Rationale

Choice A is correct. It is given that x is the total number of beads in the first container and that 30% of those beads are red; therefore, the expression $0.3x$ represents the number of red beads in the first container. It is given that y is the total number of beads in the second container and that 70% of those beads are red; therefore, the expression $0.7y$ represents the number of red beads in the second container. It is also given that, together, the containers have at least 400 red beads, so the inequality that shows this relationship is $0.3x + 0.7y \geq 400$.

Choice B is incorrect because it represents the containers having a total of at most, rather than at least, 400 red beads. Choice C is incorrect and may be the result of misunderstanding how to represent a percentage of beads in each container. Also, the inequality shows the containers having a combined total of at most, rather than at least, 400 red beads. Choice D is incorrect because the percentages were not converted to decimals.

Question Difficulty: Easy

Question ID 83f2c3bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: b23bba4c

$3a + 4b = 25$

A shipping company charged a customer \$25 to ship some small boxes and some large boxes. The equation above represents the relationship between a , the number of small boxes, and b , the number of large boxes, the customer had shipped. If the customer had 3 small boxes shipped, how many large boxes were shipped?

- A. 3
- B. 4
- C. 5
- D. 6

ID: b23bba4c Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a represents the number of small boxes and b represents the number of large boxes the customer had shipped. If the customer had 3 small boxes shipped, then $a = 3$. Substituting 3 for a in the equation $3a + 4b = 25$ yields $3(3) + 4b = 25$ or $9 + 4b = 25$. Subtracting 9 from both sides of the equation yields $4b = 16$. Dividing both sides of this equation by 4 yields $b = 4$. Therefore, the customer had 4 large boxes shipped.

Choices A, C, and D are incorrect. If the number of large boxes shipped is 3, then $b = 3$. Substituting 3 for b in the given equation yields $3a + 4(3) = 25$ or $3a + 12 = 25$. Subtracting 12 from both sides of the equation and then dividing by 3 yields $a = \frac{13}{3}$. However, it's given that the number of small boxes shipped, a , is 3, not $\frac{13}{3}$, so b cannot equal 3. Similarly, if $b = 5$ or $b = 6$, then $a = \frac{5}{3}$ or $a = \frac{1}{3}$, respectively, which is also not true.

Question Difficulty: Easy

Question ID 24854644

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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 71189542

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 71189542

A group of 202 people went on an overnight camping trip, taking 60 tents with them. Some of the tents held 2 people each, and the rest held 4 people each. Assuming all the tents were filled to capacity and every person got to sleep in a tent, exactly how many of the tents were 2-person tents?

- A. 30
- B. 20
- C. 19
- D. 18

ID: 71189542 Answer

Correct Answer: C

Rationale

Choice C is correct. Let x represent the number of 2-person tents and let y represent the number of 4-person tents. It is given that the total number of tents was 60 and the total number of people in the group was 202. This situation can be expressed as a system of two equations, $x + y = 60$ and $2x + 4y = 202$. The first equation can be rewritten as $y = -x + 60$. Substituting $-x + 60$ for y in the equation $2x + 4y = 202$ yields $2x + 4(-x + 60) = 202$. Distributing and combining like terms gives $-2x + 240 = 202$. Subtracting 240 from both sides of $-2x + 240 = 202$ and then dividing both sides by -2 gives $x = 19$. Therefore, the number of 2-person tents is 19.

Alternate approach: If each of the 60 tents held 4 people, the total number of people that could be accommodated in tents would be 240. However, the actual number of people who slept in tents was 202. The difference of 38 accounts for the 2-person tents. Since each of these tents holds 2 people fewer than a 4-person tent, $\frac{38}{2} = 19$ gives the number of 2-person tents.

Choice A is incorrect. This choice may result from assuming exactly half of the tents hold 2 people. If that were true, then the total number of people who slept in tents would be $2(30) + 4(30) = 180$; however, the total number of people who slept in tents was 202, not 180. Choice B is incorrect. If 20 tents were 2-person tents, then the remaining 40 tents would be 4-person tents. Since all the tents were filled to capacity, the total number of people who slept in tents would be $2(20) + 4(40) = 40 + 160 = 200$; however, the total number of people who slept in tents was 202, not 200. Choice D is incorrect. If 18 tents were 2-person tents, then the remaining 42 tents would be 4-person tents. Since all the tents were filled

to capacity, the total number of people who slept in tents would be $2(18) + 4(42) = 36 + 168 = 204$; however, the total number of people who slept in tents was 202, not 204.

Question Difficulty: Medium

Question ID dba8d38a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: dba8d38a

A petting zoo sells two types of tickets. The standard ticket, for admission only, costs \$5. The premium ticket, which includes admission and food to give to the animals, costs \$12. One Saturday, the petting zoo sold a total of 250 tickets and collected a total of \$2,300 from ticket sales. Which of the following systems of equations can be used to find the number of standard tickets, s , and premium tickets, p , sold on that Saturday?

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

ID: dba8d38a Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the petting zoo sells two types of tickets, standard and premium, and that s represents the number of standard tickets sold and p represents the number of premium tickets sold. It's also given that the petting zoo sold 250 tickets on one Saturday; thus, $s + p = 250$. It's also given that each standard ticket costs \$5 and each premium ticket costs \$12. Thus, the amount collected in ticket sales can be represented by $5s$ for standard tickets and $12p$ for premium tickets. On that Saturday the petting zoo collected a total of \$2,300 from ticket sales; thus, $5s + 12p = 2,300$. These two equations are correctly represented in choice A.

Choice B is incorrect. The second equation in the system represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12. Choices C and D are incorrect. The equations represent the total collected from standard and premium ticket sales as \$250, not \$2,300, and the total number of standard and premium tickets sold as \$2,300, not \$250. Additionally, the first equation in choice D represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12.

Question Difficulty: Easy

Question ID 64c85440

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

ID: 64c85440

In North America, the standard width of a parking space is at least 7.5 feet and no more than 9.0 feet. A restaurant owner recently resurfaced the restaurant’s parking lot and wants to determine the number of parking spaces, n , in the parking lot that could be placed perpendicular to a curb that is 135 feet long, based on the standard width of a parking space. Which of the following describes all the possible values of n ?

- A. $18 \leq n \leq 135$
- B. $7.5 \leq n \leq 9$
- C. $15 \leq n \leq 135$
- D. $15 \leq n \leq 18$

ID: 64c85440 Answer

Correct Answer: D

Rationale

Choice D is correct. Placing the parking spaces with the minimum width of 7.5 feet gives the maximum possible number of parking spaces. Thus, the maximum number that can be placed perpendicular to a 135-foot-long curb is $\frac{135}{7.5} = 18$. Placing the parking spaces with the maximum width of 9 feet gives the minimum number of parking spaces. Thus, the minimum number that can be placed perpendicular to a 135-foot-long curb is $\frac{135}{9} = 15$. Therefore, if n is the number of parking spaces in the lot, the range of possible values for n is $15 \leq n \leq 18$.

Choices A and C are incorrect. These choices equate the length of the curb with the maximum possible number of parking spaces. Choice B is incorrect. This is the range of possible values for the width of a parking space instead of the range of possible values for the number of parking spaces.

Question Difficulty: Medium

Question ID 87322577

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 87322577

$x + y = 75$

The equation above relates the number of minutes, x , Maria spends running each day and the number of minutes, y , she spends biking each day. In the equation, what does the number 75 represent?

- A. The number of minutes spent running each day
- B. The number of minutes spent biking each day
- C. The total number of minutes spent running and biking each day
- D. The number of minutes spent biking for each minute spent running

ID: 87322577 Answer

Correct Answer: C

Rationale

Choice C is correct. Maria spends x minutes running each day and y minutes biking each day. Therefore, $x + y$ represents the total number of minutes Maria spent running and biking each day. Because $x + y = 75$, it follows that 75 is the total number of minutes that Maria spent running and biking each day.

Choices A and B are incorrect. The number of minutes Maria spent running each day is represented by x and need not be 75. Similarly, the number of minutes that Maria spends biking each day is represented by y and need not be 75. The number of minutes Maria spends running each day and biking each day may vary; however, the total number of minutes she spends each day on these activities is constant and equal to 75. Choice D is incorrect. The number of minutes Maria spent biking for each minute spent running cannot be determined from the information provided.

Question Difficulty: Easy

Question ID 5c94e6fa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

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 7a5a74a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 7a5a74a6

$3(2x - 6) - 11 = 4(x - 3) + 6$

If x is the solution to the equation above, what is the value of $x - 3$?

- A. $\frac{23}{2}$
- B. $\frac{17}{2}$
- C. $\frac{15}{2}$
- D. $-\frac{15}{2}$

ID: 7a5a74a6 Answer

Correct Answer: B

Rationale

Choice B is correct. Because 2 is a factor of both $2x$ and 6, the expression $2x - 6$ can be rewritten as $2(x - 3)$. Substituting $2(x - 3)$ for $(2x - 6)$ on the left-hand side of the given equation yields $3(2)(x - 3) - 11 = 4(x - 3) + 6$, or $6(x - 3) - 11 = 4(x - 3) + 6$. Subtracting $4(x - 3)$ from both sides of this equation yields $2(x - 3) - 11 = 6$. Adding 11 to both sides of this equation yields $2(x - 3) = 17$. Dividing both sides of this equation by 2 yields $x - 3 = \frac{17}{2}$.

Alternate approach: Distributing 3 to the quantity $(2x - 6)$ on the left-hand side of the given equation and distributing 4 to the quantity $(x - 3)$ on the right-hand side yields $6x - 18 - 11 = 4x - 12 + 6$, or $6x - 29 = 4x - 6$. Subtracting $4x$ from both sides of this equation yields $2x - 29 = -6$. Adding 29 to both sides of this equation yields $2x = 23$. Dividing both sides of this equation by 2 yields $x = \frac{23}{2}$. Therefore, the value of $x - 3$ is $\frac{23}{2} - 3$, or $\frac{17}{2}$.

Choice A is incorrect. This is the value of x , not $x - 3$. Choices C and D are incorrect. If the value of $x - 3$ is $\frac{15}{2}$ or $-\frac{15}{2}$, it follows that the value of x is $\frac{21}{2}$ or $-\frac{9}{2}$, respectively. However, solving the given equation for x yields $x = \frac{23}{2}$.

Therefore, the value of $x - 3$ can't be $\frac{15}{2}$ or $-\frac{15}{2}$.

Question Difficulty: Medium

Question ID b7e6394d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: b7e6394d

Alan drives an average of 100 miles each week. His car can travel an average of 25 miles per gallon of gasoline. Alan would like to reduce his weekly expenditure on gasoline by \$5. Assuming gasoline costs \$4 per gallon, which equation can Alan use to determine how many fewer average miles, m , he should drive each week?

- A. $\frac{25}{4}m = 95$
- B. $\frac{25}{4}m = 5$
- C. $\frac{4}{25}m = 95$
- D. $\frac{4}{25}m = 5$

ID: b7e6394d Answer

Correct Answer: D

Rationale

Choice D is correct. Since gasoline costs \$4 per gallon, and since Alan’s car travels an average of 25 miles per gallon, the expression $\frac{4}{25}$ gives the cost, in dollars per mile, to drive the car. Multiplying $\frac{4}{25}$ by m gives the cost for Alan to drive m miles in his car. Alan wants to reduce his weekly spending by \$5, so setting $\frac{4}{25}m$ equal to 5 gives the number of miles, m , by which he must reduce his driving.

Choices A, B, and C are incorrect. Choices A and B transpose the numerator and the denominator in the fraction. The fraction $\frac{25}{4}$ would result in the unit miles per dollar, but the question requires a unit of dollars per mile. Choices A and C set the expression equal to 95 instead of 5, a mistake that may result from a misconception that Alan wants to reduce his driving by 5 miles each week; instead, the question says he wants to reduce his weekly expenditure by \$5.

Question Difficulty: Hard

Question ID 95cad55f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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 bf36c815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: bf36c815

The function g is defined by $g(x) = -x + 8$.

What is the value of $g(0)$?

- A. -8
- B. 0
- C. 4
- D. 8

ID: bf36c815 Answer

Correct Answer: D

Rationale

Choice D is correct. The value of $g(0)$ is found by substituting 0 for x in the function g . This yields $g(0) = -0 + 8$, which can be rewritten as $g(0) = 8$.

Choice A is incorrect and may result from misinterpreting the equation as $g(x) = x + (-8)$ instead of $g(x) = -x + 8$. Choice B is incorrect. This is the value of x , not $g(x)$. Choice C is incorrect and may result from calculation errors.

Question Difficulty: Easy

Question ID 968e9e51

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

ID: 968e9e51

$$y \leq x$$
$$y \leq -x$$

Which of the following ordered pairs (x,y) is a solution to the system of inequalities above?

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

ID: 968e9e51 Answer

Correct Answer: D

Rationale

Choice D is correct. The solutions to the given system of inequalities is the set of all ordered pairs (x,y) that satisfy both inequalities in the system. For an ordered pair to satisfy the inequality $y \leq x$, the value of the ordered pair's y-coordinate must be less than or equal to the value of the ordered pair's x-coordinate. This is true of the ordered pair $(0,-1)$, because $-1 \leq 0$. To satisfy the inequality $y \leq -x$, the value of the ordered pair's y-coordinate must be less than or equal to the value of the additive inverse of the ordered pair's x-coordinate. This is also true of the ordered pair $(0,-1)$. Because 0 is its own additive inverse, $-1 \leq -(0)$ is the same as $-1 \leq 0$. Therefore, the ordered pair $(0,-1)$ is a solution to the given system of inequalities.

Choice A is incorrect. This ordered pair satisfies only the inequality $y \leq x$ in the given system, not both inequalities. Choice B is incorrect. This ordered pair satisfies only the inequality $y \leq -x$ in the system, but not both inequalities. Choice C is incorrect. This ordered pair satisfies neither inequality.

Question Difficulty: Medium

Question ID 9f3cb472

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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 aa85b138

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: aa85b138

$2n + 6 = 14$

A tree had a height of 6 feet when it was planted. The equation above can be used to find how many years n it took the tree to reach a height of 14 feet. Which of the following is the best interpretation of the number 2 in this context?

- A. The number of years it took the tree to double its height
- B. The average number of feet that the tree grew per year
- C. The height, in feet, of the tree when the tree was 1 year old
- D. The average number of years it takes similar trees to grow 14 feet

ID: aa85b138 Answer

Correct Answer: B

Rationale

Choice B is correct. The height of the tree at a given time is equal to its height when it was planted plus the number of feet that the tree grew. In the given equation, 14 represents the height of the tree at the given time, and 6 represents the height of the tree when it was planted. It follows that $2n$ represents the number of feet the tree grew from the time it was planted until the time it reached a height of 14 feet. Since n represents the number of years between the given time and the time the tree was planted, 2 must represent the average number of feet the tree grew each year.

Choice A is incorrect and may result from interpreting the coefficient 2 as doubling instead of as increasing by 2 each year. Choice C is incorrect. The height of the tree when it was 1 year old was $2(1) + 6 = 8$ feet, not 2 feet. Choice D is incorrect. No information is given to connect the growth of one particular tree to the growth of similar trees.

Question Difficulty: Medium

Question ID 15daa8d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 15daa8d6

$$2x + 16 = a(x + 8)$$

In the given equation, a is a constant. If the equation has infinitely many solutions, what is the value of a ?

ID: 15daa8d6 Answer

Correct Answer: 2

Rationale

The correct answer is **2**. An equation with one variable, x , has infinitely many solutions only when both sides of the equation are equal for any defined value of x . It's given that $2x + 16 = a(x + 8)$, 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 2f0a43b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

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 ebf8d2b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

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 12ee1edc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 12ee1edc

$(b - 2)x = 8$

In the given equation, b is a constant. If the equation has no solution, what is the value of b ?

- A. 2
- B. 4
- C. 6
- D. 10

ID: 12ee1edc Answer

Correct Answer: A

Rationale

Choice A is correct. This equation has no solution when there is no value of x that produces a true statement. Solving the given equation for x by dividing both sides by $(b - 2)$ gives $x = \frac{8}{(b - 2)}$. When $(b - 2) = 0$, the right-hand side of this equation will be undefined, and the equation will have no solution. Therefore, when $b = 2$, there is no value of x that satisfies the given equation.

Choices B, C, and D are incorrect. Substituting 4, 6, and 10 for b in the given equation yields exactly one solution, rather than no solution, for x . For example, substituting 4 for b in the given equation yields $(4 - 2)x = 8$, or $2x = 8$. Dividing both sides of $2x = 8$ by 2 yields $x = 4$. Similarly, if $b = 6$ or $b = 10$, $x = 2$ and $x = 1$, respectively.

Question Difficulty: Medium

Question ID c6b151d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: c6b151d4

A total of **364** paper straws of equal length were used to construct two types of polygons: triangles and rectangles. The triangles and rectangles were constructed so that no two polygons had a common side. The equation $3x + 4y = 364$ represents this situation, where x is the number of triangles constructed and y is the number of rectangles constructed. What is the best interpretation of $(x, y) = (24, 73)$ in this context?

- A. If **24** triangles were constructed, then **73** rectangles were constructed.
- B. If **24** triangles were constructed, then **73** paper straws were used.
- C. If **73** triangles were constructed, then **24** rectangles were constructed.
- D. If **73** triangles were constructed, then **24** paper straws were used.

ID: c6b151d4 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that **364** paper straws of equal length were used to construct triangles and rectangles, where no two polygons had a common side. It's also given that the equation $3x + 4y = 364$ represents this situation, where x is the number of triangles constructed and y is the number of rectangles constructed. The equation $(x, y) = (24, 73)$ means that if $x = 24$, then $y = 73$. Substituting **24** for x and **73** for y in $3x + 4y = 364$ yields $3(24) + 4(73) = 364$, or $364 = 364$, which is true. Therefore, in this context, the equation $(x, y) = (24, 73)$ means that if **24** triangles were constructed, then **73** rectangles were constructed.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 0d391910

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 ee439cff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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 **35*r*** 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 **40*j*** miles, or the distance that Jessica drove. The total distance, in miles, that Rhett and Jessica drove can be represented by the expression **35*r* + 40*j***. It's given that the total distance they drove was under **220** miles. Therefore, the inequality **35*r* + 40*j* < 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 ee2f611f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

ID: ee2f611f

A local transit company sells a monthly pass for \$95 that allows an unlimited number of trips of any length. Tickets for individual trips cost \$1.50, \$2.50, or \$3.50, depending on the length of the trip. What is the minimum number of trips per month for which a monthly pass could cost less than purchasing individual tickets for trips?

ID: ee2f611f Answer

Rationale

The correct answer is 28. The minimum number of individual trips for which the cost of the monthly pass is less than the cost of individual tickets can be found by assuming the maximum cost of the individual tickets, \$3.50. If n tickets costing \$3.50 each are purchased in one month, the inequality $95 < 3.50n$ represents this situation. Dividing both sides of the inequality by 3.50 yields $27.14 < n$, which is equivalent to $n > 27.14$. Since only a whole number of tickets can be purchased, it follows that 28 is the minimum number of trips.

Question Difficulty: Hard

Question ID 8c98c834

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 8c98c834

The equation $y = 0.1x$ models the relationship between the number of different pieces of music a certain pianist practices, y , during an x -minute practice session. How many pieces did the pianist practice if the session lasted 30 minutes?

- A. 1
- B. 3
- C. 10
- D. 30

ID: 8c98c834 Answer

Correct Answer: B

Rationale

Choice B is correct. It’s given that the equation $y = 0.1x$ models the relationship between the number of different pieces of music a certain pianist practices, y , and the number of minutes in a practice session, x . Since it’s given that the session lasted 30 minutes, the number of pieces the pianist practiced can be found by substituting 30 for x in the given equation, which yields $y = 0.1(30)$, or $y = 3$.

Choices A and C are incorrect and may result from misinterpreting the values in the equation. Choice D is incorrect. This is the given value of x , not the value of y .

Question Difficulty: Easy

Question ID 563407e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

ID: 563407e5

A bakery sells trays of cookies. Each tray contains at least 50 cookies but no more than 60. Which of the following could be the total number of cookies on 4 trays of cookies?

- A. 165
- B. 205
- C. 245
- D. 285

ID: 563407e5 Answer

Correct Answer: B

Rationale

Choice B is correct. If each tray contains the least number of cookies possible, 50 cookies, then the least number of cookies possible on 4 trays is $50 \times 4 = 200$ cookies. If each tray contains the greatest number of cookies possible, 60 cookies, then the greatest number of cookies possible on 4 trays is $60 \times 4 = 240$ cookies. If the least number of cookies on 4 trays is 200 and the greatest number of cookies is 240, then 205 could be the total number of cookies on these 4 trays of cookies because $200 \leq 205 \leq 240$.

Choices A, C, and D are incorrect. The least number of cookies on 4 trays is 200 cookies, and the greatest number of cookies on 4 trays is 240 cookies. The choices 165, 245, and 285 are each either less than 200 or greater than 240; therefore, they cannot represent the total number of cookies on 4 trays.

Question Difficulty: Easy

Question ID 25e1cfed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 25e1cfed

How many solutions does the equation $10(15x - 9) = -15(6 - 10x)$ have?

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

ID: 25e1cfed Answer

Correct Answer: C

Rationale

Choice C is correct. Applying the distributive property to each side of the given equation yields $150x - 90 = -90 + 150x$. Applying the commutative property of addition to the right-hand side of this equation yields $150x - 90 = 150x - 90$. Since the two sides of the equation are equivalent, this equation is true for any value of x . Therefore, the given equation has infinitely many solutions.

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

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

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

Question Difficulty: Hard

Question ID 317e80f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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.

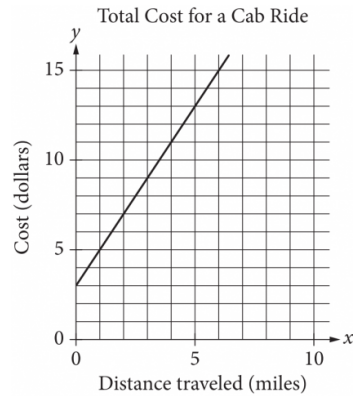
Question Difficulty: Easy

Question ID 3f5375d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 3f5375d9

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



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

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

ID: 3f5375d9 Answer

Correct Answer: A

Rationale

Choice A is correct. The cost of each additional mile traveled is represented by the slope of the given line. The slope of the line can be calculated by identifying two points on the line and then calculating the ratio of the change in y to the change in x between the two points. Using the points $(1, 5)$ and $(2, 7)$, the slope is equal to $\frac{7 - 5}{2 - 1}$, or 2. Therefore, the cost for each additional mile traveled of the cab ride is \$2.00.

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

Question Difficulty: Easy

Question ID fdee0fbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: fdee0fbf

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

ID: fdee0fbf Answer

Rationale

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

Question Difficulty: Hard

Question ID 541bef2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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	<div><div></div><div></div><div></div></div>

ID: 620fe971

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

$$y = 120 - 25x$$

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

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

ID: 620fe971 Answer

Correct Answer: A

Rationale

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

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

Question Difficulty: Medium

Question ID 6a87902f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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.

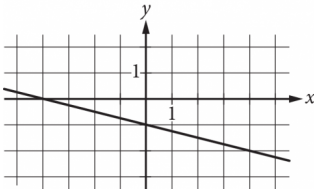
Choice D is incorrect. The graphs of a system of two linear equations have infinitely many intersection points when the lines represented by the equations have the same slope and the same y -coordinate of the y -intercept. Since the given equations represent lines with different y -coordinates of their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

Question Difficulty: Medium

Question ID b2845d88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: b2845d88



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

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

ID: b2845d88 Answer

Correct Answer: A

Rationale

Choice A is correct. The slope of the line can be found by choosing any two points on the line, such as $(4, -2)$ and $(0, -1)$. Subtracting the y -values results in $-2 - (-1) = -1$, the change in y . Subtracting the x -values results in $4 - 0 = 4$, the change in x . Dividing the change in y by the change in x yields $-1 \div 4 = -\frac{1}{4}$, the slope. The line intersects the y -axis at $(0, -1)$, so -1 is the y -coordinate of the y -intercept. This information can be expressed in slope-intercept form as the equation $y = -\frac{1}{4}x - 1$.

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

Question Difficulty: Easy

Question ID f75bd744

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: f75bd744

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

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

ID: f75bd744 Answer

Correct Answer: 8

Rationale

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

Alternate approach: A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in the form $Ax + By = C$, where A , B , and C are constant terms, are parallel if the ratio of the x -coefficients is equal to the ratio of the y -coefficients, and distinct if the ratio of the x -coefficients are not equal to the ratio of the constant terms. Subtracting $10y$ from both sides of the first equation in the given system yields $(4x - 6y) - (10y) = (10y + 2) - (10y)$, or $4x - 16y = 2$. Subtracting $2x$ from both sides of the second equation in the given system yields $(ty) - (2x) = (\frac{1}{2} + 2x) - (2x)$, or $-2x + ty = \frac{1}{2}$. The ratio of the x -coefficients for these equations is $-\frac{2}{4}$, or $-\frac{1}{2}$. The ratio of the y -coefficients for these equations is $-\frac{t}{16}$. The ratio of the constant terms for these equations is $\frac{1/2}{2}$, 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 b450ab03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

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 B 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 A 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 C is incorrect. This equation represents a situation where it takes the employee **1** minute, rather than **1.5** minutes, to prepare a sandwich and **1** minute, 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 b3abf40f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: b3abf40f

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

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

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

ID: b3abf40f Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 6ac23de7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 6ac23de7

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

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

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

ID: 6ac23de7 Answer

Correct Answer: A

Rationale

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

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

Question Difficulty: Easy

Question ID 6e6a3241

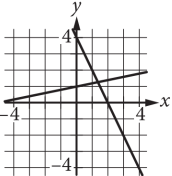
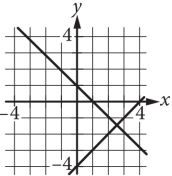
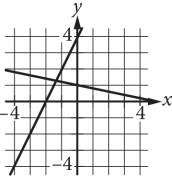
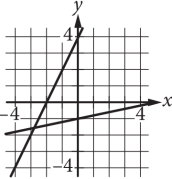
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 6e6a3241

$x + 5y = 5$

$2x - y = -4$

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

- A.
- B.
- C.
- D.

ID: 6e6a3241 Answer

Correct Answer: C

Rationale

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

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

Question Difficulty: Medium

Question ID e6cb2402

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: e6cb2402

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

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

ID: e6cb2402 Answer

Correct Answer: .9411, .9412, 16/17

Rationale

The correct answer is $\frac{16}{17}$. It's given that the equation $3(kx + 13) = \frac{48}{17}x + 36$ 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 e470e19d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 f7e39fe9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

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 aff28230

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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 f5929f7a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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 6c71f3ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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 7392dfc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 7392dfc1

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

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

ID: 7392dfc1 Answer

Correct Answer: D

Rationale

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

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

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

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

Question Difficulty: Easy

Question ID 93954cfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 93954cfa

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

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

ID: 93954cfa Answer

Correct Answer: A

Rationale

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

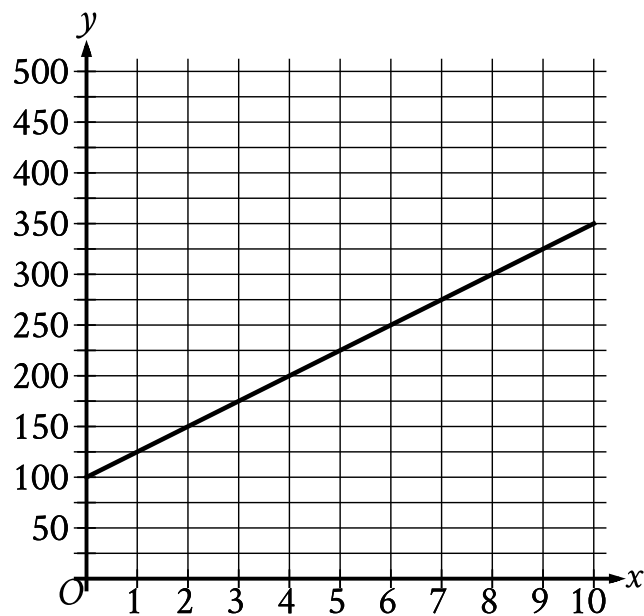
Choice B is incorrect and may result from incorrectly adding instead of multiplying. Choice C is incorrect and may result from assuming that c pounds cost \$2, and then finding the cost per pound. Choice D is incorrect and could result from incorrectly assuming that 2 pounds cost \$ c , and then finding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

Question Difficulty: Easy

Question ID 5cf1bbc9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 5cf1bbc9



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

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

ID: 5cf1bbc9 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 74c03c21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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 9c7741c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 9c7741c6

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

ID: 9c7741c6 Answer

Rationale

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

Question Difficulty: Medium

Question ID 68f2cbaf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div><div></div><div></div><div></div></div>

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 ≥ 24** represents the situation. Dividing both sides of this inequality by **4** gives **s ≥ 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 8abed0fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 8abed0fb

$y = 2x + 3$

$x = 1$

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

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

ID: 8abed0fb Answer

Correct Answer: B

Rationale

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

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

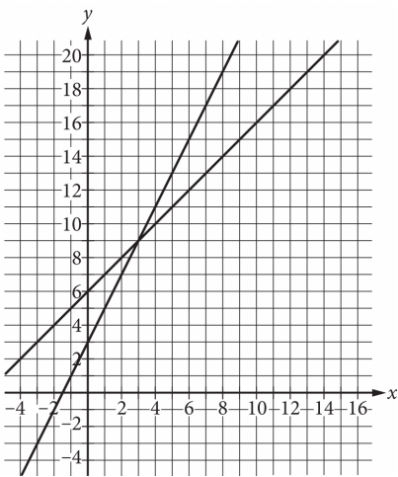
Question Difficulty: Easy

Question ID e1259a5a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: e1259a5a

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



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

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

ID: e1259a5a Answer

Correct Answer: A

Rationale

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

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

Question ID b988eeec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: b988eeec

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

ID: b988eeec Answer

Correct Answer: -12

Rationale

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

Question Difficulty: Hard

Question ID 3d04de9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 3d04de9c

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

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

ID: 3d04de9c Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Easy

Question ID 70feb725

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

ID: 70feb725

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

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

ID: 70feb725 Answer

Correct Answer: D

Rationale

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

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

Question Difficulty: Hard

Question ID 8a87c2c8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div><div></div><div></div><div></div></div>

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