

Question ID ed18c4f7

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

ID: ed18c4f7

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

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

ID: ed18c4f7 Answer

Correct Answer: D

Rationale

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

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

Question Difficulty: Easy

Question ID c5479c1a

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

ID: c5479c1a

A shipment consists of **5**-pound boxes and **10**-pound boxes with a total weight of **220** pounds. There are **13** **10**-pound boxes in the shipment. How many **5**-pound boxes are in the shipment?

- A. 5
- B. 10
- C. 13
- D. 18

ID: c5479c1a Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the shipment consists of 5-pound boxes and 10-pound boxes with a total weight of 220 pounds. Let x represent the number of 5-pound boxes and y represent the number of 10-pound boxes in the shipment. Therefore, the equation $5x + 10y = 220$ represents this situation. It's given that there are 13 10-pound boxes in the shipment. Substituting 13 for y in the equation $5x + 10y = 220$ yields $5x + 10(13) = 220$, or $5x + 130 = 220$. Subtracting 130 from both sides of this equation yields $5x = 90$. Dividing both sides of this equation by 5 yields 18. Thus, there are 18 5-pound boxes in the shipment.

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

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

Choice C is incorrect. This is the number of 10-pound boxes in the shipment.

Question Difficulty: Easy

Question ID 2554b413

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

ID: 2554b413

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

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

ID: 2554b413 Answer

Correct Answer: A

Rationale

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

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

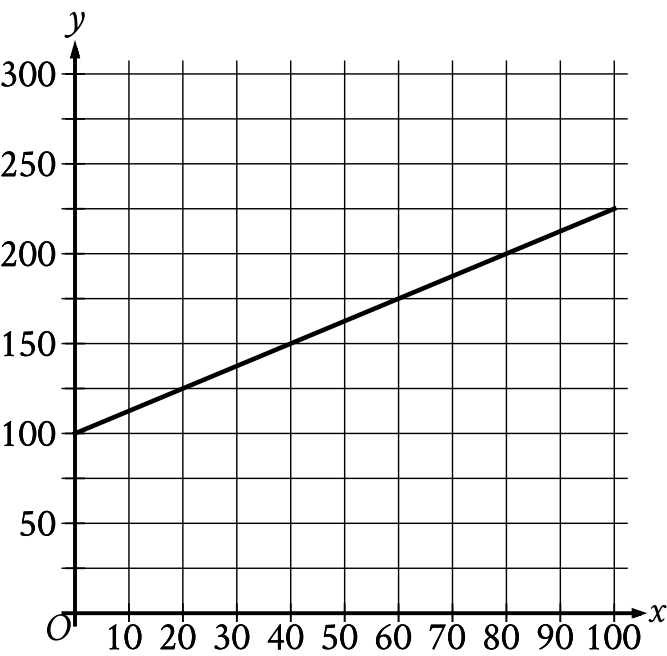
Question Difficulty: Easy

Question ID 720e51ac

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

ID: 720e51ac

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



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

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

ID: 720e51ac Answer

Correct Answer: C

Rationale

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

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

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 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.

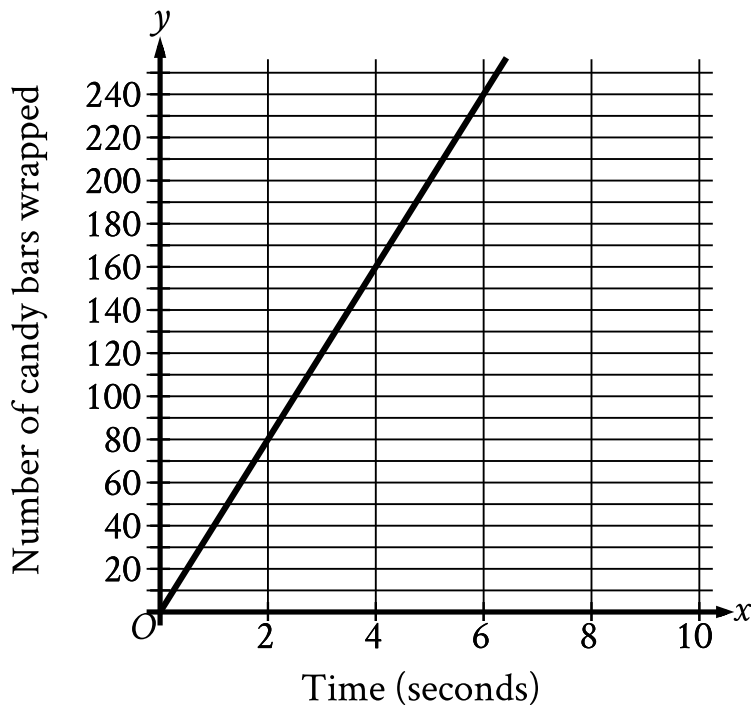
Question Difficulty: Easy

Question ID 13294295

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

ID: 13294295

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



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

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

ID: 13294295 Answer

Correct Answer: B

Rationale

Choice B is correct. For the graph shown, the x -axis represents time, in seconds, and the y -axis represents the number of candy bars wrapped. The slope of a line in the xy -plane is the change in y for each 1-unit increase in x . It follows that the slope of the graph shown represents the estimated number of candy bars the machine wraps with a label per second. The slope, m , of a line in the xy -plane can be found using any two points, x_1, y_1 and x_2, y_2 , on the line and the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. The graph shown passes through the points $0, 0$ and $2, 80$. Substituting these points for x_1, y_1 and x_2, y_2 , respectively, in the slope formula yields $m = \frac{80 - 0}{2 - 0}$, which is equivalent to $m = \frac{80}{2}$, or $m = 40$. Therefore, the estimated number of candy bars the machine wraps with a label per second is 40.

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 8b2a2a63

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

ID: 8b2a2a63

The y -intercept of the graph of $y = -6x - 32$ in the xy -plane is $(0, y)$. What is the value of y ?

ID: 8b2a2a63 Answer

Correct Answer: -32

Rationale

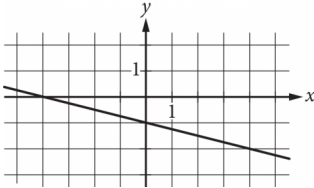
The correct answer is -32. It’s given that the y -intercept of the graph of $y = -6x - 32$ is $0, y$. Substituting 0 for x in this equation yields $y = -6(0) - 32$, or $y = -32$. Therefore, the value of y that corresponds to the y -intercept of the graph of $y = -6x - 32$ in the xy -plane is -32.

Question Difficulty: Easy

Question ID 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 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 2d0e13a6

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

ID: 2d0e13a6

Line k is defined by $y = \frac{1}{4}x + 1$. Line j is parallel to line k in the xy -plane. What is the slope of j ?

ID: 2d0e13a6 Answer

Correct Answer: .25, 1/4

Rationale

The correct answer is $\frac{1}{4}$. It's given that line k is defined by $y = \frac{1}{4}x + 1$. It's also given that line j is parallel to line k in the xy -plane. A line in the xy -plane represented by an equation in slope-intercept form $y = mx + b$ has a slope of m and a y -intercept of $0, b$. Therefore, the slope of line k is $\frac{1}{4}$. Since parallel lines have equal slopes, the slope of line j is $\frac{1}{4}$. Note that 1/4 and .25 are examples of ways to enter a correct answer.

Question Difficulty: Easy

Question ID 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 1efd8202

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

ID: 1efd8202

$y = 70x + 8$

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

A.

x	y
0	8
2	148
4	288

B.

x	y
0	70
2	78
4	86

C.

x	y
0	70
2	140
4	280

D.

x	y
0	8
2	132
4	272

ID: 1efd8202 Answer

Correct Answer: A

Rationale

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

Question ID 255996a6

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

ID: 255996a6

$T = 1,000 + 18h$

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

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

ID: 255996a6 Answer

Correct Answer: B

Rationale

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

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

Question Difficulty: Easy

Question ID 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 $fx = a + bx$, where fx 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 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 $2x + 16 = ax + 8$, where a is a constant. This equation can be rewritten as $2x + 8 = ax + 8$. If this equation has infinitely many solutions, then both sides of this equation are equal for any defined value of x . Both sides of this equation are equal for any defined value of x when $2 = a$. Therefore, if the equation has infinitely many solutions, the value of a is 2.

Alternate approach: If the given equation, $2x + 16 = ax + 8$, has infinitely many solutions, then both sides of this equation are equal for any value of x . If $x = 0$, then substituting 0 for x in $2x + 16 = ax + 8$ yields $20 + 16 = a0 + 8$, or $16 = 8a$. Dividing both sides of this equation by 8 yields $2 = a$.

Question Difficulty: Medium

Question ID c22b5f25

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

ID: c22b5f25

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

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

ID: c22b5f25 Answer

Correct Answer: C

Rationale

Choice C is correct. A linear function can be written in the form $f(x) = mx + b$, where m is the slope and b is the y -coordinate of the y -intercept of the line. The slope of the graph can be found using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the values of the given points into this formula yields $m = \frac{-5 - 3}{4 - (-2)}$ or $m = \frac{-8}{6}$, which simplifies to $m = -\frac{4}{3}$. Only choice C shows an equation with this slope.

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

Question Difficulty: Medium

Question ID c651cc56

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

ID: c651cc56

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

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

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

ID: c651cc56 Answer

Correct Answer: B

Rationale

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

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

Question Difficulty: Medium

Question ID 868fc236

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

ID: 868fc236

Energy per Gram of Typical Macronutrients

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

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

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

ID: 868fc236 Answer

Correct Answer: B

Rationale

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

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

Question 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 ce314070

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

ID: ce314070

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

- A. 2
- B. $-\frac{9}{8}$
- C. $-\frac{5}{2}$
- D. -10

ID: ce314070 Answer

Correct Answer: D

Rationale

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

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

Question Difficulty: Medium

Question ID 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 , fx 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 fx for the given linear function f .

Choice A is incorrect and may result from conceptual errors.

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 36ab4122

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

ID: 36ab4122

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

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

ID: 36ab4122 Answer

Rationale

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

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

Question Difficulty: Medium

Question ID 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 8a6de407

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

ID: 8a6de407

The function f is defined by $f(x) = mx + b$, where m and b are constants. If $f(0) = 18$ and $f(1) = 20$, what is the value of m ?

ID: 8a6de407 Answer

Rationale

The correct answer is 2. The slope-intercept form of an equation for a line is $y = mx + b$, where m is the slope and b is the y -coordinate of the y -intercept. Two ordered pairs, (x_1, y_1) and (x_2, y_2) , can be used to compute the slope using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. It's given that $f(0) = 18$ and $f(1) = 20$; therefore, the two ordered pairs for this line are $(0, 18)$ and $(1, 20)$. Substituting these values for (x_1, y_1) and (x_2, y_2) gives $\frac{20 - 18}{1 - 0} = \frac{2}{1}$, or 2.

Question Difficulty: Medium

Question ID 948087f2

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

ID: 948087f2

$y \leq 3x + 1$

$x - y > 1$

Which of the following ordered pairs (x, y) satisfies the system of inequalities above?

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

ID: 948087f2 Answer

Correct Answer: D

Rationale

Choice D is correct. Any point (x, y) that is a solution to the given system of inequalities must satisfy both inequalities in the system. The second inequality in the system can be rewritten as $x > y + 1$. Of the given answer choices, only choice D satisfies this inequality, because inequality $2 > -1 + 1$ is a true statement. The point (2, −1) also satisfies the first inequality.

Alternate approach: Substituting (2, −1) into the first inequality gives $-1 \leq 3(2) + 1$, or $-1 \leq 7$, which is a true statement. Substituting (2, −1) into the second inequality gives $2 - (-1) > 1$, or $3 > 1$, which is a true statement. Therefore, since (2, −1) satisfies both inequalities, it is a solution to the system.

Choice A is incorrect because substituting −2 for x and −1 for y in the first inequality gives $-1 \leq 3(-2) + 1$, or $-1 \leq -5$, which is false. Choice B is incorrect because substituting −1 for x and 3 for y in the first inequality gives $3 \leq 3(-1) + 1$, or $3 \leq -2$, which is false. Choice C is incorrect because substituting 1 for x and 5 for y in the first inequality gives $5 \leq 3(1) + 1$, or $5 \leq 4$, which is false.

Question 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 $fx = mx + b$, where m represents the slope and $0, b$ represents the y -intercept of the graph of $y = fx$. It's given that the graph of the linear function f , where $y = fx$, in the xy -plane contains the point $0, 3$. Thus, $b = 3$. The slope of the graph of a line containing any two points x_1, y_1 and x_2, y_2 can be found using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Since it's given that the graph of the linear function f contains the points $0, 3$ and $7, 31$, it follows that the slope of the graph of the line containing these points is $m = \frac{31 - 3}{7 - 0}$, or $m = 4$. Substituting 4 for m and 3 for b in $fx = mx + b$ yields $fx = 4x + 3$.

Choice A is incorrect. This function represents a graph with a slope of 28 and a y -intercept of $0, 34$.

Choice B is incorrect. This function represents a graph with a slope of 3 and a y -intercept of $0, 38$.

Choice D is incorrect. This function represents a graph with a slope of 7 and a y -intercept of $0, 3$.

Question Difficulty: Medium

Question ID 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

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

Question Difficulty: Medium

Question ID eafdbbbd

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

ID: eafdbbbd

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

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

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

ID: eafdbbbd Answer

Correct Answer: C

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 2e1a7f66

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

ID: 2e1a7f66

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

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

ID: 2e1a7f66 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 4fe4fd7c

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

ID: 4fe4fd7c

$c(x) = mx + 500$

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

ID: 4fe4fd7c Answer

Rationale

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

Question Difficulty: Medium

Question ID bf5f80c6

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

ID: bf5f80c6

$$y < -4x + 4$$

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

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

ID: bf5f80c6 Answer

Correct Answer: A

Rationale

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

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

Question Difficulty: Medium

Question ID 113b938e

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

ID: 113b938e

$y = 18 - 5x$

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

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

ID: 113b938e Answer

Correct Answer: C

Rationale

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

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

Question Difficulty: Medium

Question ID 042aa429

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

ID: 042aa429

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

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

ID: 042aa429 Answer

Correct Answer: C

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 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 f81a0503

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

ID: f81a0503

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

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

ID: f81a0503 Answer

Correct Answer: D

Rationale

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

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

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

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

Question Difficulty: Medium

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 c17d9ba9

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

ID: c17d9ba9

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

ID: c17d9ba9 Answer

Correct Answer: -2

Rationale

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

Question Difficulty: Medium

Question ID 74c98c82

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

ID: 74c98c82

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

ID: 74c98c82 Answer

Correct Answer: 16

Rationale

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

Question Difficulty: Medium

Question ID 9ed4c1a2

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

ID: 9ed4c1a2

What is the slope of the graph of $y = \frac{1}{4}(27x + 15) + 7x$ in the xy -plane?

ID: 9ed4c1a2 Answer

Correct Answer: 13.75, 55/4

Rationale

The correct answer is $\frac{55}{4}$. In the xy -plane, the graph of an equation in the form $y = mx + b$, where m and b are constants, has a slope of m and a y -intercept of $0, b$. Applying the distributive property to the right-hand side of the given equation yields $y = \frac{27}{4}x + \frac{15}{4} + 7x$. Combining like terms yields $y = \frac{55}{4}x + \frac{15}{4}$. This equation is in the form $y = mx + b$, where $m = \frac{55}{4}$ and $b = \frac{15}{4}$. It follows that the slope of the graph of $y = \frac{1}{4}27x + 15 + 7x$ in the xy -plane is $\frac{55}{4}$. Note that 55/4 and 13.75 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question 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 16889ef3

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

ID: 16889ef3

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

- A. $f(t) = \frac{21}{130}t + 4$
- B. $f(t) = \frac{19}{130}t + 4$
- C. $f(t) = -\frac{21}{130}t + 4$
- D. $f(t) = -\frac{19}{130}t + 4$

ID: 16889ef3 Answer

Correct Answer: C

Rationale

Choice C is correct. It is assumed that the oil and gas production decreased at a constant rate. Therefore, the function f that best models the production t years after the year 2000 can be written as a linear function, $f(t) = mt + b$, where m is the rate of change of the oil and gas production and b is the oil and gas production, in millions of barrels, in the year 2000. Since there were 4 million barrels of oil and gas produced in 2000, $b = 4$. The rate of change, m , can be calculated as

$\frac{4 - 1.9}{0 - 13} = -\frac{2.1}{13}$, which is equivalent to $-\frac{21}{130}$, the rate of change in choice C.

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

Question Difficulty: Hard

Question ID ae2287e2

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

ID: ae2287e2

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

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

ID: ae2287e2 Answer

Correct Answer: A

Rationale

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

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

Question Difficulty: Hard

Question ID 023c0a8d

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

ID: 023c0a8d

For the function f , if $f(3x) = x - 6$ for all values of x , what is the value of $f(6)$?

- A. -6
- B. -4
- C. 0
- D. 2

ID: 023c0a8d Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that $f(3x) = x - 6$ for all values of x . If $3x = 6$, then $f(3x)$ will equal $f(6)$. Dividing both sides of $3x = 6$ by 3 gives $x = 2$. Therefore, substituting 2 for x in the given equation yields $f(3 \times 2) = 2 - 6$, which can be rewritten as $f(6) = -4$.

Choice A is incorrect. This is the value of the constant in the given equation for f . Choice C is incorrect and may result from substituting $x = 6$, rather than $x = 2$, into the given equation. Choice D is incorrect. This is the value of x that yields $f(6)$ for the left-hand side of the given equation; it's not the value of $f(6)$.

Question Difficulty: Hard

Question ID 963da34c

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

ID: 963da34c

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

- A. $0 < x \leq 10$
- B. $0 < x \leq 11\frac{2}{3}$
- C. $0 < x \leq 17\frac{1}{2}$
- D. $0 < x \leq 20$

ID: 963da34c Answer

Correct Answer: A

Rationale

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

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

Question Difficulty: Hard

Question 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 ID 6989c80a

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

ID: 6989c80a

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

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

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

ID: 6989c80a Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 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

yields $10(16) + 20(0) = 128$, or $160 = 128$, which is false. Therefore, $(16, 0)$ doesn't satisfy the equation, and so the value of s can't be 128. Similarly, if $s = 200$ (choice C) or $s = 320$ (choice D), then substituting 16 for a and 0 for b yields $160 = 200$ and $160 = 320$, respectively, which are both false.

Question Difficulty: Hard

Question ID 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 b8e73b5b

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

ID: b8e73b5b

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

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

ID: b8e73b5b Answer

Correct Answer: C

Rationale

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

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

Question Difficulty: Hard

Question ID 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 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 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 a35c7164

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

ID: a35c7164

$5x + 7y = 1$

$ax + by = 1$

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

- A. $10x + 7y = 1$
 $ax - 2by = 1$
- B. $10x + 7y = 1$
 $ax + 2by = 1$
- C. $10x + 7y = 1$
 $2ax + by = 1$
- D. $5x - 7y = 1$
 $ax + by = 1$

ID: a35c7164 Answer

Correct Answer: B

Rationale

Choice B is correct. Two lines are perpendicular if their slopes are negative reciprocals, meaning that the slope of the first line is equal to -1 divided by the slope of the second line. Each equation in the given pair of equations can be written in slope-intercept form, $y = mx + b$, where m is the slope of the graph of the equation in the xy -plane and $0, b$ is the y -intercept. For the first equation, $5x + 7y = 1$, subtracting $5x$ from both sides gives $7y = -5x + 1$, and dividing both sides of this equation by 7 gives $y = -\frac{5}{7}x + \frac{1}{7}$. Therefore, the slope of the graph of this equation is $-\frac{5}{7}$. For the second equation, $ax + by = 1$, subtracting ax from both sides gives $by = -ax + 1$, and dividing both sides of this equation by b gives $y = -\frac{a}{b}x + \frac{1}{b}$. Therefore, the slope of the graph of this equation is $-\frac{a}{b}$. Since the graph of the given pair of equations is a pair of perpendicular lines, the slope of the graph of the second equation, $-\frac{a}{b}$, must be the negative reciprocal of the slope of the graph of the first equation, $-\frac{5}{7}$. The negative reciprocal of $-\frac{5}{7}$ is $\frac{7}{5}$, or $\frac{a}{b} = \frac{7}{5}$. Similarly, rewriting the equations in choice B in slope-intercept form yields $y = -\frac{10}{7}x + \frac{1}{7}$ and $y = -\frac{a}{2b}x + \frac{1}{2b}$. It follows that the slope of the graph of the first equation in choice B is $-\frac{10}{7}$ and the slope of the graph of the second equation in choice B is $-\frac{a}{2b}$. Since $\frac{a}{b} = \frac{7}{5}$, $-\frac{a}{2b}$ is equal to $-\frac{1}{2} \cdot \frac{7}{5}$, or $\frac{7}{10}$. Since $\frac{7}{10}$ is the negative reciprocal of $-\frac{10}{7}$, the pair of equations in choice B represents a pair of perpendicular lines.

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

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