

Question ID 47cc6093

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 47cc6093

In the linear function h , $h(28) = 15$ and $h(26) = 22$. Which equation defines h ?

- A. $h(x) = -\frac{2}{7}x + 23$
- B. $h(x) = -\frac{2}{7}x + 113$
- C. $h(x) = -\frac{7}{2}x + 23$
- D. $h(x) = -\frac{7}{2}x + 113$

ID: 47cc6093 Answer

Correct Answer: D

Rationale

Choice D is correct. An equation defining h can be written in the form $y = mx + b$, where $y = hx$, m represents the slope of the graph of $y = hx$ in the xy -plane, and b represents the y -coordinate of the y -intercept of the graph. It's given that $h28 = 15$ and $h26 = 22$. It follows that the points 28, 15 and 26, 22 are on the graph of $y = hx$ in the xy -plane. The slope can be found by using any two points, x_1, y_1 and x_2, y_2 , and the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting 28, 15 and 26, 22 for x_1, y_1 and x_2, y_2 , respectively, in the slope formula yields $m = \frac{22 - 15}{26 - 28}$, or $m = -\frac{7}{2}$. Substituting $-\frac{7}{2}$ for m and 28, 15 for x, y in the equation $y = mx + b$ yields $15 = -\frac{7}{2}28 + b$, or $15 = -98 + b$. Adding 98 to both sides of this equation yields $113 = b$. Substituting $-\frac{7}{2}$ for m and 113 for b in the equation $y = mx + b$ yields $y = -\frac{7}{2}x + 113$. Since $y = hx$, it follows that the equation that defines h is $hx = -\frac{7}{2}x + 113$.

Choice A is incorrect. For this function, $h26 = \frac{109}{7}$, not $h26 = 22$.

Choice B is incorrect. For this function, $h28 = 105$, not $h28 = 15$, and $h26 = \frac{739}{7}$, not $h26 = 22$.

Choice C is incorrect. For this function, $h28 = -75$, not $h28 = 15$, and $h26 = -68$, not $h26 = 22$.

Question Difficulty: Hard

Question ID a08e1d3e

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: a08e1d3e

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: a08e1d3e 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 $hx = 4x + 28$. Therefore, the equation representing the graph of $y = hx$ 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 $y = hx$ in the xy -plane is $-7, 0$. It's given that the x -intercept of the graph of $y = hx$ 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 $y = hx$ in the xy -plane is $0, 28$. It's given that the y -intercept of the graph of $y = hx$ 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: Hard

Question ID 697c5748

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 697c5748

Number of cars	Maximum number of passengers and crew
3	174
5	284
10	559

The table shows the linear relationship between the number of cars, c , on a commuter train and the maximum number of passengers and crew, p , that the train can carry. Which equation represents the linear relationship between c and p ?

- A. $55c - p = -9$
- B. $55c - p = 9$
- C. $55p - c = -9$
- D. $55p - c = 9$

ID: 697c5748 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that there is a linear relationship between the number of cars, c , on a commuter train and the maximum number of passengers and crew, p , that the train can carry. It follows that this relationship can be represented by an equation of the form $p = mc + b$, where m is the rate of change of p in this relationship and b is a constant. The rate of change of p in this relationship can be calculated by dividing the difference in any two values of p by the difference in the corresponding values of c . Using two pairs of values given in the table, the rate of change of p in this relationship is $\frac{284 - 174}{5 - 3}$, or 55. Substituting 55 for m in the equation $p = mc + b$ yields $p = 55c + b$. The value of b can be found by substituting any value of c and its corresponding value of p for c and p , respectively, in this equation. Substituting 10 for c and 559 for p yields $559 = 55(10) + b$, or $559 = 550 + b$. Subtracting 550 from both sides of this equation yields $9 = b$. Substituting 9 for b in the equation $p = 55c + b$ yields $p = 55c + 9$. Subtracting 9 from both sides of this equation yields $p - 9 = 55c$. Subtracting p from both sides of this equation yields $-9 = 55c - p$, or $55c - p = -9$.

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

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

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

Question Difficulty: Hard

Question ID 4d170b67

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 4d170b67

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

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

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

ID: 4d170b67 Answer

Correct Answer: D

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 8edd9405

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 8edd9405

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: 8edd9405 Answer

Correct Answer: -12

Rationale

The correct answer is -12. It's given that the functions f and g are defined as $fx = \frac{1}{4}x - 9$ and $gx = \frac{3}{4}x + 21$. If the function h is defined as $hx = fx + gx$, then substituting $\frac{1}{4}x - 9$ for fx and $\frac{3}{4}x + 21$ for gx in this function yields $hx = \frac{1}{4}x - 9 + \frac{3}{4}x + 21$. This can be rewritten as $hx = \frac{4}{4}x + 12$, or $hx = x + 12$. 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 $y = hx$ 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 $y = hx$ in the xy -plane is -12.

Question Difficulty: Hard

Question ID 144e15c9

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 144e15c9

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

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

ID: 144e15c9 Answer

Correct Answer: C

Rationale

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

Choice A is incorrect. This is the value of a if $fa = 4$.

Choice B is incorrect. This is the value of a if $fa = 5$.

Choice D is incorrect. This is the value of a if $fa = 16$.

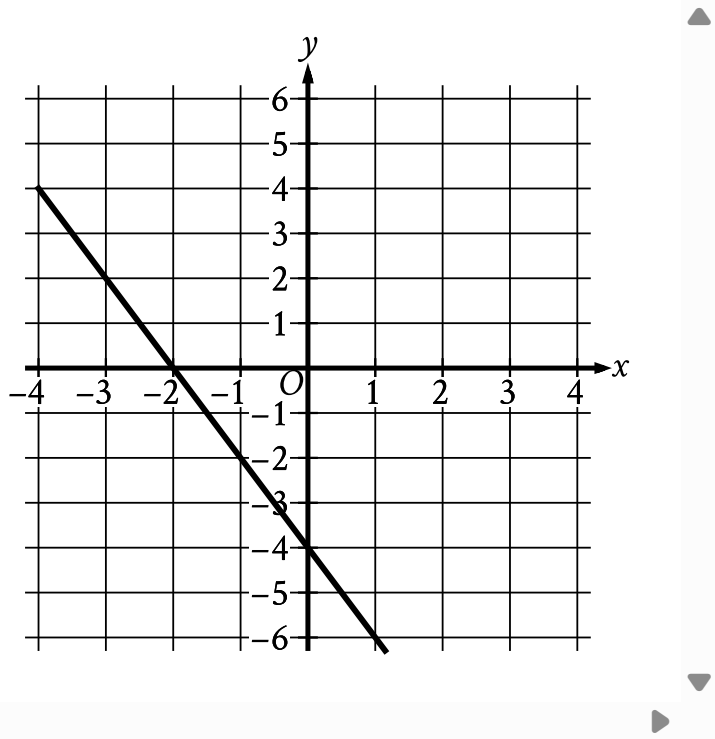
Question Difficulty: Hard

Question ID b9e821cb

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: b9e821cb

The graph of $y = f(x) - 11$ is shown.



Which equation defines the linear function f ?

- A. $f(x) = -13x - 11$
- B. $f(x) = -2x + 7$
- C. $f(x) = -13x + 7$
- D. $f(x) = -2x - 11$

ID: b9e821cb Answer

Correct Answer: B

Rationale

Choice B is correct. The graph of a line in the xy -plane can be represented by the equation $y = mx + b$, where m is the slope of the line and b is the y -intercept. The slope of a line that passes through the points x_1, y_1 and x_2, y_2 can be calculated using the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. The line shown passes through the points $-1, -2$ and $0, -4$. Substituting $-1, -2$ and $0, -4$ for x_1, y_1 and x_2, y_2 , respectively, in the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ yields $m = \frac{-4 - (-2)}{0 - (-1)}$, which is equivalent to $m = \frac{-2}{1}$, or $m = -2$. Since the line shown passes through the point $0, -4$, it follows that $b = -4$. Substituting -2 for m and -4 for b in the equation $y = mx + b$ yields $y = -2x - 4$. It's given that the graph shown is the graph of $y = f(x) - 11$. Substituting $-2x - 4$ for y in the equation $y = f(x) - 11$ yields $-2x - 4 = f(x) - 11$. Adding 11 to both sides of this equation yields $-2x + 7 = f(x)$. Therefore, the equation $f(x) = -2x + 7$ defines the linear function f .

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

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

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

Question Difficulty: Hard

Question ID 4d802587

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 4d802587

A linear model estimates the population of a city from **1991** to **2015**. The model estimates the population was **57** thousand in **1991**, **224** thousand in **2011**, and x thousand in **2015**. To the nearest whole number, what is the value of x ?

ID: 4d802587 Answer

Correct Answer: 257

Rationale

The correct answer is 257. It's given that a linear model estimates the population of a city from 1991 to 2015. Since the population can be estimated using a linear model, it follows that there is a constant rate of change for the model. It's also given that the model estimates the population was 57 thousand in 1991, 224 thousand in 2011, and x thousand in 2015. The change in the population between 2011 and 1991 is $224 - 57$, or 167, thousand. The change in the number of years between 2011 and 1991 is $2011 - 1991$, or 20, years. Dividing 167 by 20 gives $167 / 20$, or 8.35, thousand per year. Thus, the change in population per year from 1991 to 2015 estimated by the model is 8.35 thousand. The change in the number of years between 2015 and 2011 is $2015 - 2011$, or 4, years. Multiplying the change in population per year by the change in number of years yields the increase in population from 2011 to 2015 estimated by the model: 8.35×4 , or 33.4, thousand. Adding the change in population from 2011 to 2015 estimated by the model to the estimated population in 2011 yields the estimated population in 2015. Thus, the estimated population in 2015 is $33.4 + 224$, or 257.4, thousand. Therefore to the nearest whole number, the value of x is 257.

Question Difficulty: Hard

Question ID 8bf18c83

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 8bf18c83

$$j(x) = mx + 144$$

For the linear function j , m is a constant and $j(12) = 18$. What is the value of $j(10)$?

ID: 8bf18c83 Answer

Correct Answer: 39

Rationale

The correct answer is 39. It's given that for the linear function j , m is a constant and $j12 = 18$. Substituting 12 for x and 18 for jx in the given equation yields $18 = m12 + 144$. Subtracting 144 from both sides of this equation yields $-126 = m12$. Dividing both sides of this equation by 12 yields $-10.5 = m$. Substituting -10.5 for m in the given equation, $jx = mx + 144$, yields $jx = -10.5x + 144$. Substituting 10 for x in this equation yields $j10 = -10.510 + 144$, or $j10 = 39$. Therefore, the value of $j10$ is 39.

Question Difficulty: Hard

Question ID e348737d

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: e348737d

For groups of 25 or more people, a museum charges \$21 per person for the first 25 people and \$14 for each additional person. Which function f gives the total charge, in dollars, for a tour group with n people, where $n \geq 25$?

- A. $f(n) = 14n + 175$
- B. $f(n) = 14n + 525$
- C. $f(n) = 35n - 350$
- D. $f(n) = 14n + 21$

ID: e348737d Answer

Correct Answer: A

Rationale

Choice A is correct. A tour group with n people, where $n \geq 25$, can be split into two subgroups: the first 25 people and the additional $n - 25$ people. Since the museum charges \$ 21 per person for the first 25 people and \$ 14 for each additional person, the charge for the first 25 people is \$ 21 (25) and the charge for the additional $n - 25$ people is \$ 14 ($n - 25$). Therefore, the total charge, in dollars, is given by the function $f (n) = 21 (25) + 14 (n - 25)$, or $f (n) = 14n + 175$.

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

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

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

Question Difficulty: Hard

Question ID 3ce8c43b

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 3ce8c43b

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

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: 3ce8c43b 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 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 b2d83661

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: b2d83661

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: b2d83661 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 $nx - 2$. Therefore, the total cost, in dollars, for x hours of repair is $fx = 220 + nx - 2$. It’s given that the total cost for 5 hours of repair is \$ 400. Substituting 5 for x and 400 for fx into the equation $fx = 220 + nx - 2$ yields $400 = 220 + n5 - 2$, 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 $fx = 220 + nx - 2$ yields $fx = 220 + 60x - 2$, which is equivalent to $fx = 220 + 60x - 120$, or $fx = 60x + 100$. Therefore, the total cost, in dollars, for x hours of repair is $fx = 60x + 100$.

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 5897227e

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 5897227e

$$f(x) = 2x + 244$$

The given function f represents the perimeter, in **centimeters (cm)**, of a rectangle with a length of x **cm** and a fixed width. What is the width, in **cm**, of the rectangle?

- A. 2
- B. 122
- C. 244
- D. 488

ID: 5897227e Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that $f(x) = 2x + 244$ represents the perimeter, in centimeters (cm), of a rectangle with a length of x cm and a fixed width. If w represents a fixed width, in cm, then the perimeter, in cm, of a rectangle with a length of x cm and a fixed width of w cm can be given by the function $f(x) = 2x + 2w$. Therefore, $2x + 2w = 2x + 244$. Subtracting $2x$ from both sides of this equation yields $2w = 244$. Dividing both sides of this equation by 2 yields $w = 122$. Therefore, the width, in cm, of the rectangle is 122.

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

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

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

Question Difficulty: Hard

Question ID 10898fb9

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 10898fb9

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: 10898fb9 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, \$ $135x - 1$. It follows that $y = 270 + 135x - 1$, 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 ae5abcba

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: ae5abcba

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

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: ae5abcba 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 73596e60

Assessment	Test	Domain	Skill	Difficulty
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ID: 73596e60

A linear function f gives a company’s profit, in dollars, for selling x items. The company’s profit is \$220 when it sells 8 items, and its profit is \$320 when it sells 10 items. Which equation defines f ?

- A. $f(x) = 150x - 320$
- B. $f(x) = 32x$
- C. $f(x) = 50x - 10x$
- D. $f(x) = 50x - 180$

ID: 73596e60 Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that the relationship between x and fx is linear. A linear function can be written in the form $fx = mx + b$, where m is the slope and b is the y -coordinate of the y -intercept of the graph of $y = fx$ in the xy -plane. Given two points on a line, x_1, y_1 and x_2, y_2 , the slope of the line can be found using the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. It’s given that the company’s profit is \$ 220 when it sells 8 items and the profit is \$ 320 when it sells 10 items. Since fx represents the company's profit, in dollars, for selling x items, the graph of $y = fx$ in the xy -plane passes through the points 8, 220 and 10, 320. Substituting 8, 220 and 10, 320 for x_1, y_1 and x_2, y_2 , respectively, in the slope formula yields $m = \frac{320 - 220}{10 - 8}$, which gives $m = \frac{100}{2}$, or $m = 50$. Substituting 50 for m , 8 for x , and 220 for fx in $fx = mx + b$ yields $220 = 50(8) + b$, or $220 = 400 + b$. Subtracting 400 from each side of this equation yields $-180 = b$. Substituting 50 for m and -180 for b in $fx = mx + b$ yields $fx = 50x - 180$. Therefore, the equation that defines f is $fx = 50x - 180$.

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

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

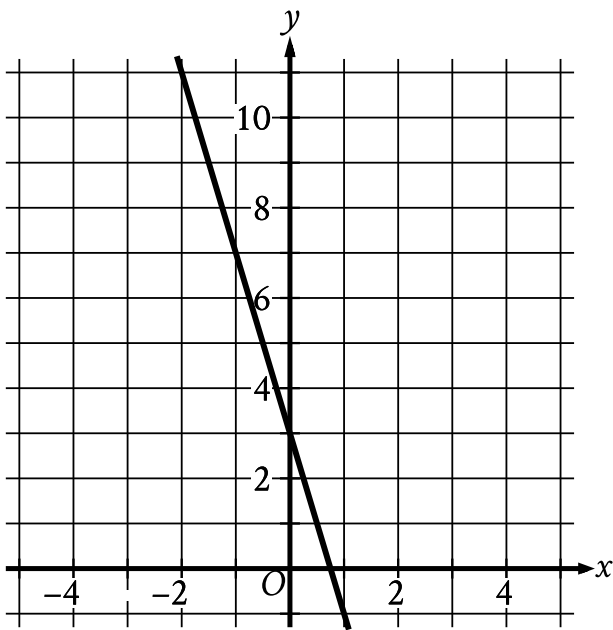
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 2f1a5f2a

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 2f1a5f2a



The graph of the linear function $y = f(x) + 19$ is shown. If c and d are positive constants, which equation could define f ?

- A. $f(x) = -d - cx$
- B. $f(x) = d - cx$
- C. $f(x) = -d + cx$
- D. $f(x) = d + cx$

ID: 2f1a5f2a Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the graph of the linear function $y = fx + 19$ is shown. This means that the graph of $y = fx + 19$ can be translated down 19 units to create the graph of $y = fx$ and the y -coordinate of every point on the graph of $y = fx + 19$ can be decreased by 19 to find the resulting point on the graph of $y = fx$. The y -intercept of the graph of $y = fx + 19$ is 0, 3. Translating the graph of $y = fx + 19$ down 19 units results in a y -intercept of the graph of $y = fx$ at the point 0, 3 - 19, or 0, - 16. The graph of $y = fx + 19$ slants down from left to right, so the slope of the graph is negative. The translation of a linear graph changes its position, but does not change its slope. It follows that the slope of the graph of $y = fx$ is also negative. The equation of a linear function f can be written in the form $fx = b + mx$, where b is the y -coordinate of the y -intercept and m is the slope of the graph of $y = fx$. It's given that c and d are positive constants. Since the y -coordinate of the y -intercept and the slope of the graph of $y = fx$ are both negative, it follows that $fx = -d - cx$ could define f .

Choice B is incorrect. This could define a linear function where its graph has a positive, not negative, y -intercept.

Choice C is incorrect. This could define a linear function where its graph has a positive, not negative, slope.

Choice D is incorrect. This could define a linear function where its graph has a positive, not negative, y -intercept and a positive, not negative, slope.

Question Difficulty: Hard

Question ID bd6a65aa

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: bd6a65aa

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

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

ID: bd6a65aa Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 36f22674

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Algebra	Linear functions	<div><div></div><div></div><div></div></div>

ID: 36f22674

Kaylani used fabric measuring 5 yards in length to make each suit for a men's choir. The relationship between the number of suits that Kaylani made, x , and the total length of fabric that she purchased y , in yards, is represented by the equation $y - 5x = 6$. What is the best interpretation of 6 in this context?

- A. Kaylani made 6 suits.
- B. Kaylani purchased a total of 6 yards of fabric.
- C. Kaylani used a total of 6 yards of fabric to make the suits.
- D. Kaylani purchased 6 yards more fabric than she used to make the suits.

ID: 36f22674 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the equation $y - 5x = 6$ represents the relationship between the number of suits that Kaylani made, x , and the total length of fabric she purchased, y , in yards. Adding $5x$ to both sides of the given equation yields $y = 5x + 6$. Since Kaylani made x suits and used 5 yards of fabric to make each suit, the expression $5x$ represents the total amount of fabric she used to make the suits. Since y represents the total length of fabric Kaylani purchased, in yards, it follows from the equation $y = 5x + 6$ that Kaylani purchased $5x$ yards of fabric to make the suits, plus an additional 6 yards of fabric. Therefore, the best interpretation of 6 in this context is that Kaylani purchased 6 yards more fabric than she used to make the suits.

Choice A is incorrect. Kaylani made a total of x suits, not 6 suits.

Choice B is incorrect. Kaylani purchased a total of y yards of fabric, not a total of 6 yards of fabric.

Choice C is incorrect. Kaylani used a total of $5x$ yards of fabric to make the suits, not a total of 6 yards of fabric.

Question Difficulty: Hard