Question ID dadfd136

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: dadfd136

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

A. $h(x) = -x + 41$

B. $h(x) = -x$

C. $h(x) = -41x$

D. $h(x) = -41$

ID: dadfd136 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Easy

Question ID 5c1751d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: 5c1751d6

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

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

ID: 5c1751d6 Answer

Correct Answer: 11

Rationale

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

Question Difficulty: Medium

Question ID c5526332

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: c5526332

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: c5526332 Answer

Correct Answer: D

Rationale

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

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

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

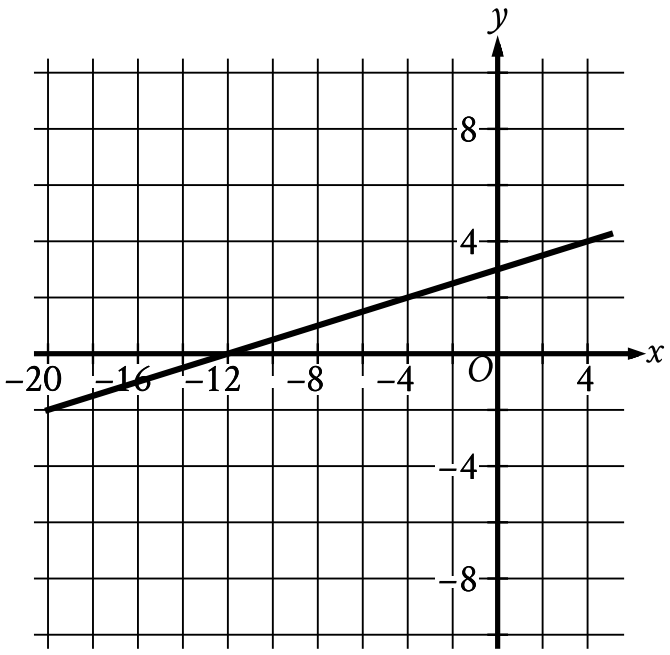
Choice C is incorrect. This is the value of $2a$, not $a - b$.

Question Difficulty: Hard

Question ID a54038fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: a54038fb



The graph of the linear function f is shown, where $y = f(x)$. What is the *x*-intercept of the graph of f?

A. $(-12, 0)$

B. $(0, 0)$

C. $(\frac{1}{4}, 0)$

D. $(12, 0)$

ID: a54038fb Answer

Correct Answer: A

Rationale

Choice A is correct. The *x*-intercept of a graph is the point where the graph intersects the *x*-axis. The graph of function f, where $y = f(x)$, intersects the *x*-axis at $(-12, 0)$. Therefore, the *x*-intercept of the graph of f is $(-12, 0)$.

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 4452450d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: 4452450d

$$f(x) = 45x + 600$$

The function f gives the monthly fee $f(x)$, in dollars, a facility charges to keep x crates in storage. What is the monthly fee, in dollars, the facility charges to keep 50 crates in storage?

ID: 4452450d Answer

Correct Answer: 2850

Rationale

The correct answer is $2{,}850$. It's given that the function $f(x) = 45x + 600$ gives the monthly fee, in dollars, a facility charges to keep x crates in storage. Substituting 50 for x in this function yields $f(50) = 45(50) + 600$, or $f(50) = 2{,}850$. Therefore, the monthly fee, in dollars, the facility charges to keep 50 crates in storage is $2{,}850$.

Question Difficulty: Medium

Question ID 43e69f94

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: 43e69f94

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: 43e69f94 Answer

Correct Answer: D

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 4c195508

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: 4c195508

$$d = 16t$$

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

A. The object moved a total of 16 inches.

B. The object moved a total of $16t$ inches.

C. The object is moving at a rate of 16 inches per second.

D. The object is moving at a rate of $\frac{1}{16}$ inches per second.

ID: 4c195508 Answer

Correct Answer: C

Rationale

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

Choice A is incorrect and may result from conceptual errors.

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

Choice D is incorrect and may result from conceptual errors.

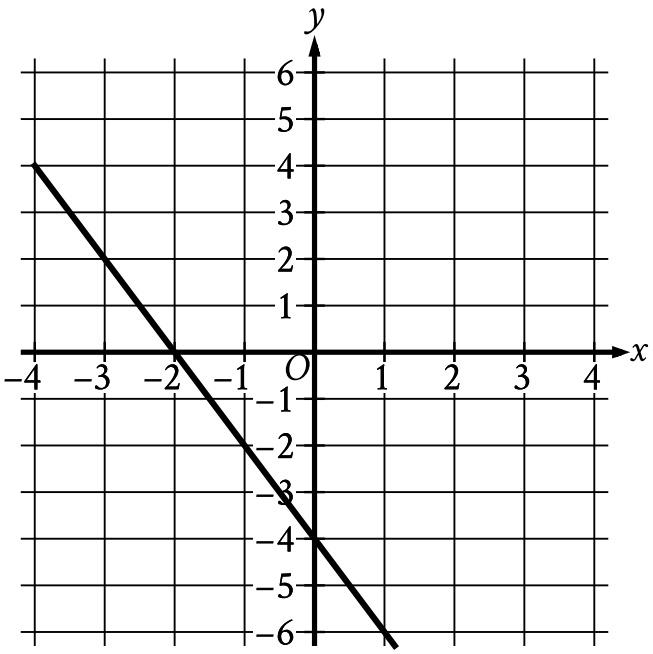
Question Difficulty: Easy

Question ID e35e5a7e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: e35e5a7e

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: e35e5a7e 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 $(0, b)$ 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: Medium

Question ID 83a38c31

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: 83a38c31

The function $f(x)$ is defined as 19 more than 4 times a number x. If $y = f(x)$ is graphed in the xy-plane, what is the best interpretation of the x-intercept?

A. When $f(x) = 0$, the number is $-\frac{19}{4}$.

B. When the number is 0, $f(x) = 19$.

C. The value of $f(x)$ increases by 1 for each increase of 4 in the value of the number.

D. For each increase of 1 in the value of the number, $f(x)$ increases by 4.

ID: 83a38c31 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the function $f(x)$ is defined as 19 more than 4 times a number x. This can be represented by the equation $f(x) = 4x + 19$. The *x*-intercept of the graph of $y = f(x)$ in the *xy*-plane is the point where the graph intersects the *x*-axis, or the point on the graph where the value of $f(x)$ is equal to 0. Substituting 0 for $f(x)$ in the equation $f(x) = 4x + 19$ yields $0 = 4x + 19$. Subtracting 19 from each side of this equation yields $-19 = 4x$. Dividing each side of this equation by 4 yields $x = -\frac{19}{4}$. Therefore, when $f(x) = 0$, the number is $-\frac{19}{4}$.

Choice B is incorrect. This is the best interpretation of the *y*-intercept, not the *x*-intercept, of the graph of the function.

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

Choice D is incorrect. This is the best interpretation of the slope, not the *x*-intercept, of the graph of the function.

Question Difficulty: Hard

Question ID c41e64a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: c41e64a3

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

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

ID: c41e64a3 Answer

Correct Answer: 50

Rationale

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

Question Difficulty: Easy

Question ID 8c6982c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: 8c6982c3

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: 8c6982c3 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 50821477

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: 50821477

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: 50821477 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID 493bd7fa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: 493bd7fa

The function f defined by $f(t) = 14t + 9$ gives the estimated length, in inches, of a vine plant t months after Tavon purchased it. Which of the following is the best interpretation of 9 in this context?

A. Tavon will keep the vine plant for 9 months.

B. The vine plant is expected to grow 9 inches each month.

C. The vine plant is expected to grow to a maximum length of 9 inches.

D. The estimated length of the vine plant was 9 inches when Tavon purchased it.

ID: 493bd7fa Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the function f defined by $f(t) = 14t + 9$ gives the estimated length, in inches, of a vine plant t months after Tavon purchased it. For a function defined by an equation of the form $f(t) = mt + b$, where m and b are constants, b represents the value of $f(0)$, or the value of $f(t)$ when the value of t is 0. Therefore, for the function defined by $f(t) = 14t + 9$, 9 represents the value of $f(t)$ when the value of t is 0. This means that 0 months after the vine plant was purchased, the estimated length of the vine plant was 9 inches. Therefore, the best interpretation of 9 in this context is the estimated length of the vine plant was 9 inches when Tavon purchased it.

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

Choice B is incorrect. The vine plant is expected to grow 14 inches, not 9 inches, each month.

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

Question Difficulty: Easy

Question ID 9760e424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: 9760e424

The relationship between two variables, x and y, is linear. For every increase in the value of x by 1, the value of y increases by 8. When the value of x is 2, the value of y is 18. Which equation represents this relationship?

A. $y = 2x + 18$

B. $y = 2x + 8$

C. $y = 8x + 2$

D. $y = 3x + 26$

ID: 9760e424 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the relationship between x and y is linear. An equation representing a linear relationship can be written in the form $y = mx + b$, where m is the slope and b is the *y*-coordinate of the *y*-intercept of the graph of the relationship in the *xy*-plane. It's given that for every increase in the value of x by 1, the value of y increases by 8. The slope of a line can be expressed as the change in y over the change in x. Thus, the slope, m, of the line representing this relationship can be expressed as $\frac{8}{1}$, or 8. Substituting 8 for m in the equation $y = mx + b$ yields $y = 8x + b$. It's also given that when the value of x is 2, the value of y is 18. Substituting 2 for x and 18 for y in the equation $y = 8x + b$ yields $18 = 8(2) + b$, or $18 = 16 + b$. Subtracting 16 from each side of this equation yields $2 = b$. Substituting 2 for b in the equation $y = 8x + b$ yields $y = 8x + 2$. Therefore, the equation $y = 8x + 2$ represents this relationship.

Choice A is incorrect. This equation represents a relationship where for every increase in the value of x by 1, the value of y increases by 2, not 8, and when the value of x is 2, the value of y is 22, not 18.

Choice B is incorrect. This equation represents a relationship where for every increase in the value of x by 1, the value of y increases by 2, not 8, and when the value of x is 2, the value of y is 12, not 18.

Choice D is incorrect. This equation represents a relationship where for every increase in the value of x by 1, the value of y increases by 3, not 8, and when the value of x is 2, the value of y is 32, not 18.

Question Difficulty: Medium

Question ID 6285cfe8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: 6285cfe8

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

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: 6285cfe8 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

Question ID fadca26a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Easy

ID: fadca26a

To repair a refrigerator, a technician charges $\$60$ per hour for labor plus $\$120$ for parts. Which function f represents the total amount, in dollars, the technician will charge for this job if it takes x hours?

A. $f(x) = x + 120$

B. $f(x) = 60x$

C. $f(x) = 60x + 120$

D. $f(x) = 60x - 120$

ID: fadca26a Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the technician charges $\$60$ per hour for labor. Therefore, if the job takes x hours, the technician will charge $\left(\frac{\$60}{1 \text{ hour}}\right)(x \text{ hours})$, or $\$60x$, for labor. It's also given that the technician charges $\$120$ for parts. Therefore, $f(x) = 60x + 120$ represents the total amount, in dollars, the technician will charge for this job if it takes x hours.

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

Choice B is incorrect. This function represents the total amount, in dollars, the technician charges for labor only, not the total amount charged for labor and parts.

Choice D is incorrect. This function represents the total amount, in dollars, the technician would charge if the charge for parts were subtracted from, rather than added to, the charge for labor.

Question Difficulty: Easy

Question ID 59f935b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Medium

ID: 59f935b5

The function f is defined by $f(x) = \frac{9}{7}x + \frac{8}{7}$. For what value of x does $f(x) = 5$?

ID: 59f935b5 Answer

Correct Answer: 3

Rationale

The correct answer is 3. Substituting 5 for $f(x)$ in the given function yields $5 = \frac{9}{7}x + \frac{8}{7}$. Multiplying each side of this equation by 7 yields $7(5) = 7\left(\frac{9}{7}x + \frac{8}{7}\right)$, or $35 = 9x + 8$. Subtracting 8 from each side of this equation yields $27 = 9x$. Dividing each side of this equation by 9 yields $3 = x$. Therefore, $f(x) = 5$ when the value of x is 3.

Question Difficulty: Medium

Question ID 5cd676da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	Hard

ID: 5cd676da

The cost of renting a carpet cleaner is $\$52$ for the first day and $\$26$ for each additional day. Which of the following functions gives the cost $C(d)$, in dollars, of renting the carpet cleaner for d days, where d is a positive integer?

A. $C(d) = 26d + 26$

B. $C(d) = 26d + 52$

C. $C(d) = 52d - 26$

D. $C(d) = 52d + 78$

ID: 5cd676da Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the cost of renting a carpet cleaner is $\$52$ for the first day and $\$26$ for each additional day. Therefore, the cost $C(d)$, in dollars, of renting the carpet cleaner for d days is the sum of the cost for the first day, $\$52$, and the cost for the additional $d - 1$ days, $\$26(d - 1)$. It follows that $C(d) = 52 + 26(d - 1)$, which is equivalent to $C(d) = 52 + 26d - 26$, or $C(d) = 26d + 26$.

Choice B is incorrect. This function gives the cost of renting a carpet cleaner for d days if the cost is $\$78$, not $\$52$, for the first day and $\$26$ for each additional day.

Choice C is incorrect. This function gives the cost of renting a carpet cleaner for d days if the cost is $\$26$, not $\$52$, for the first day and $\$52$, not $\$26$, for each additional day.

Choice D is incorrect. This function gives the cost of renting a carpet cleaner for d days if the cost is $\$130$, not $\$52$, for the first day and $\$52$, not $\$26$, for each additional day.

Question Difficulty: Hard