# 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 a3f57d54

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: a3f57d54**

The equation $h = \frac{9(v-273.15)}{5} + 32$ gives the corresponding temperature $h$, in degrees Fahrenheit, of any substance that has a temperature of $v$ kelvins, where $v > 0$. If a substance has a temperature of $467.33$ degrees Fahrenheit, what is the corresponding temperature, in kelvins, of this substance?

**ID: a3f57d54 Answer**

Correct Answer: 515

Rationale

The correct answer is $515$. It's given that the equation $h = \frac{9(v-273.15)}{5} + 32$ gives the corresponding temperature $h$, in degrees Fahrenheit, of any substance that has a temperature of $v$ kelvins, where $v > 0$. Substituting $467.33$ for $h$ in the given equation yields $467.33 = \frac{9(v-273.15)}{5} + 32$. Subtracting $32$ from both sides of this equation yields $435.33 = \frac{9(v-273.15)}{5}$. Multiplying both sides of this equation by $5$ yields $2{,}176.65 = 9(v - 273.15)$. Dividing both sides of this equation by $9$ yields $241.85 = v - 273.15$. Adding $273.15$ to both sides of this equation yields $515 = v$. Therefore, if a substance has a temperature of $467.33$ degrees Fahrenheit, the corresponding temperature, in kelvins, of this substance is $515$.

Question Difficulty: Hard

# 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 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 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

# Question ID 10df349c

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

## ID: 10df349c

One gallon of stain will cover $170$ square feet of a surface. A yard has a total fence area of $w$ square feet. Which equation represents the total amount of stain $S$, in gallons, needed to stain the fence in this yard twice?

A. $S = \frac{w}{170}$

B. $S = 170w$

C. $S = 340w$

D. $S = \frac{w}{85}$

## ID: 10df349c Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that $w$ represents the total fence area, in square feet. Since the fence will be stained twice, the amount of stain, in gallons, will need to cover $2w$ square feet. It's also given that one gallon of stain will cover $170$ square feet. Dividing the total area, in square feet, of the surface to be stained by the number of square feet covered by one gallon of stain gives the number of gallons of stain that will be needed. Dividing $2w$ by $170$ yields $\frac{2w}{170}$, or $\frac{w}{85}$. Therefore, the equation that represents the total amount of stain $S$, in gallons, needed to stain the fence of the yard twice is $S = \frac{w}{85}$.

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 68e48b4c

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 68e48b4c**

For the function $f$, $f(cx) = x - 8$ for all values of $x$, where $c$ is a positive constant. If $f(2) = 35$, what is the value of $c$ ?

**ID: 68e48b4c Answer**

Correct Answer: .0465, 2/43

Rationale

The correct answer is $\frac{2}{43}$. It's given that $f(cx) = x - 8$ for all values of $x$, where $c$ is a positive constant, and $f(2) = 35$. Therefore, for the given function $f$, $cx = 2$. Dividing both sides of this equation by $c$ yields $x = \frac{2}{c}$. Substituting $\frac{2}{c}$ for $x$ in the equation $f(cx) = x - 8$ yields $f\left(\frac{2c}{c}\right) = \frac{2}{c} - 8$, or $f(2) = \frac{2}{c} - 8$. Since it's given that $f(2) = 35$, substituting $35$ for $f(2)$ yields $35 = \frac{2}{c} - 8$. Adding $8$ to both sides of this equation yields $43 = \frac{2}{c}$. Multiplying both sides of this equation by $c$ yields $43c = 2$. Dividing both sides of this equation by $43$ yields $c = \frac{2}{43}$. Note that 2/43, .0465, 0.046, and 0.047 are examples of ways to enter a correct answer.

Question Difficulty: Hard

# Question ID 7a83c8d8

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

## ID: 7a83c8d8

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: 7a83c8d8 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

# Question ID e1f59a4d

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: e1f59a4d**

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: e1f59a4d 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 652119ce

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 652119ce**

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: 652119ce Answer**

Correct Answer: -12

Rationale

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

Question Difficulty: Hard

# Question ID 4b0b4e54

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 4b0b4e54**

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

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: 4b0b4e54 Answer**

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Hard

# Question ID 9ecfa82d

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 9ecfa82d**

The linear function $g$ is defined by $g(x) = b - 15x$, where $b$ is a constant. If $g(c + 7) = \frac{c}{4}$, where $c$ is a constant, which of the following expressions represents the value of $b$?

A. $\frac{15c}{4}$

B. $\frac{19c}{4} + 7$

C. $\frac{61c}{4} + 105$

D. $15c + 105$

**ID: 9ecfa82d Answer**

Correct Answer: C

Rationale

Choice C is correct. It's given that $g(c + 7) = \frac{c}{4}$. Therefore, for the given linear function $g$, when $x = c + 7$, $g(x) = \frac{c}{4}$. Substituting $c + 7$ for $x$ and $\frac{c}{4}$ for $g(x)$ in $g(x) = b - 15x$ yields $\frac{c}{4} = b - 15(c + 7)$. Applying the distributive property to the right-hand side of this equation yields $\frac{c}{4} = b - 15c - 105$. Adding $15c$ to both sides of this equation yields $\frac{c}{4} + 15c = b - 105$. Adding $105$ to both sides of this equation yields $\frac{c}{4} + 15c + 105 = b$, or $\frac{61c}{4} + 105 = b$. Therefore, the expression that represents the value of $b$ is $\frac{61c}{4} + 105$.

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

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

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

Question Difficulty: Hard

# Question ID 84877fd5

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 84877fd5**

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: 84877fd5 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 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.

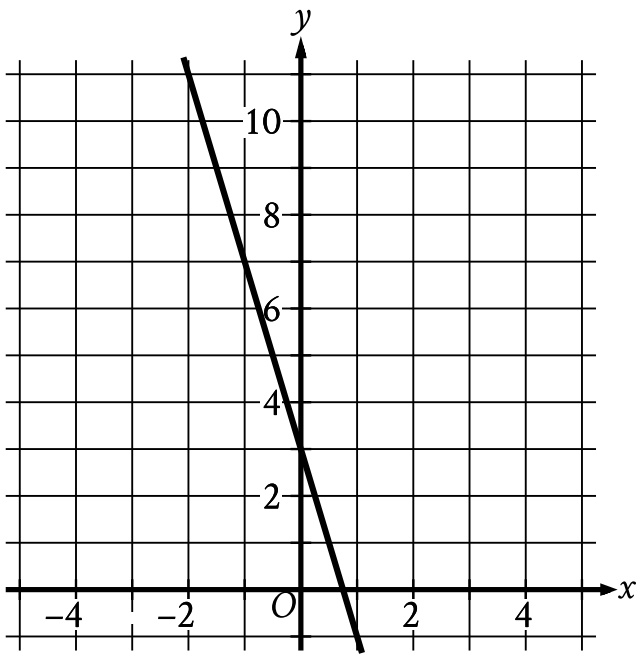
Choice D is incorrect. This function represents the total cost, in dollars, for $x$ hours of repair where the specialist charges $\$380$, rather than $\$220$, for the first two hours of repair, and an hourly fee of $\$80$, rather than $\$60$, after the first two hours.

Question Difficulty: Hard

# Question ID b2f892c3

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: b2f892c3**




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: b2f892c3 Answer**

Correct Answer: A

Rationale

Choice A is correct. It's given that the graph of the linear function $y = f(x) + 19$ is shown. This means that the graph of $y = f(x) + 19$ can be translated down $19$ units to create the graph of $y = f(x)$ and the $y$-coordinate of every point on the graph of $y = f(x) + 19$ can be decreased by $19$ to find the resulting point on the graph of $y = f(x)$. The $y$-intercept of the graph of $y = f(x) + 19$ is $(0, 3)$. Translating the graph of $y = f(x) + 19$ down $19$ units results in a $y$-intercept of the graph of $y = f(x)$ at the point $(0, 3 - 19)$, or $(0, -16)$. The graph of $y = f(x) + 19$ 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 $y = f(x)$ is also negative. The equation of a linear function $f$ can be written in the form $f(x) = b + mx$, where $b$ is the $y$-coordinate of the $y$-intercept and $m$ is the slope of the graph of $y = f(x)$. 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 $y = f(x)$ are both negative, it follows that $f(x) = -d - cx$ 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 c96a90a2

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

## ID: c96a90a2

The cost of renting a large canopy tent for up to $10$ days is $\$430$ for the first day and $\$215$ for each additional day. Which of the following equations gives the cost $y$, in dollars, of renting the tent for $x$ days, where $x$ is a positive integer and $x \leq 10$?

A. $y = 215x + 215$

B. $y = 430x - 215$

C. $y = 430x + 215$

D. $y = 215x + 430$

## ID: c96a90a2 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the cost of renting a large canopy tent is $\$430$ for the first day and $\$215$ for each additional day for up to $10$ days. For $x$ days of renting the tent, the cost includes $\$430$ for the first day and $\$215$ for each of the $(x - 1)$ additional days. It follows that the cost $y$, in dollars, of renting the tent can be expressed as $y = 430 + 215(x - 1)$, which is equivalent to $y = 430 + 215x - 215$, or $y = 215x + 215$. Therefore, the equation $y = 215x + 215$ gives the cost of renting the tent for $x$ days, where $x$ is a positive integer and $x \leq 10$.

Choice B is incorrect. This equation represents a situation where the cost of renting the tent for the first day is $\$215$, not $\$430$, and the cost for each additional day is $\$430$, not $\$215$.

Choice C is incorrect. This equation represents a situation where the cost of renting the tent for the first day is $\$645$, not $\$430$, and the cost for each additional day is $\$430$, not $\$215$.

Choice D is incorrect. This equation represents a situation where the cost of renting the tent for the first day is $\$645$, not $\$430$.

Question Difficulty: Hard

# 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 60199720

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: 60199720**

| $x$ | $f(x)$ |
|---|---|
| $-4$ | $0$ |
| $-\frac{19}{5}$ | $1$ |
| $-\frac{18}{5}$ | $2$ |

For the linear function $f$, the table shows three values of $x$ and their corresponding values of $f(x)$. If $h(x) = f(x) - 13$, which equation defines $h$?

A. $h(x) = 5x - 4$

B. $h(x) = 5x + 7$

C. $h(x) = 5x + 9$

D. $h(x) = 5x + 20$

**ID: 60199720 Answer**

Correct Answer: B

Rationale

Choice B is correct. An equation that defines a linear function $f$ can be written in the form $f(x) = mx + b$, where $m$ and $b$ are constants. It's given in the table that when $x = -4$, $f(x) = 0$. Substituting $-4$ for $x$ and $0$ for $f(x)$ in the equation $f(x) = mx + b$ yields $0 = m(-4) + b$, or $0 = -4m + b$. Adding $4m$ to both sides of this equation yields $4m = b$. Substituting $4m$ for $b$ in the equation $f(x) = mx + b$ yields $f(x) = mx + 4m$. It's also given in the table that when $x = -\frac{19}{5}$, $f(x) = 1$. Substituting $-\frac{19}{5}$ for $x$ and $1$ for $f(x)$ in the equation $f(x) = mx + 4m$ yields $1 = m\left(-\frac{19}{5}\right) + 4m$, or $1 = \frac{1}{5}m$. Multiplying both sides of this equation by $5$ yields $m = 5$. Substituting $5$ for $m$ in the equation $f(x) = mx + 4m$ yields $f(x) = 5x + 4(5)$, or $f(x) = 5x + 20$. If $h(x) = f(x) - 13$, substituting $5x + 20$ for $f(x)$ in this equation yields $h(x) = (5x + 20) - 13$, or $h(x) = 5x + 7$.

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

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

Choice D is incorrect. This is an equation that defines the linear function $f$, not $h$.

Question Difficulty: Hard

# Question ID e6ec10f1

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Algebra | Linear functions | Hard |

**ID: e6ec10f1**

| $x$ | $y$ |
|---|---|
| $-12$ | $-45$ |
| $6$ | $45$ |

The table shows two values of $x$ and their corresponding values of $y$. The graph of the linear equation representing this relationship passes through the point $\left(\frac{1}{4},\ a\right)$. What is the value of $a$?

**ID: e6ec10f1 Answer**

Correct Answer: 16.25, 65/4

Rationale

The correct answer is $\frac{65}{4}$. The linear relationship between $x$ and $y$ can be represented by the equation $y = mx + b$, where $m$ and $b$ are constants. It's given in the table that when $x = -12$, $y = -45$. Substituting $-12$ for $x$ and $-45$ for $y$ in the equation $y = mx + b$ yields $-45 = -12m + b$, which can be rewritten as $-45 + 12m = b$. It's also given in the table that when $x = 6$, $y = 45$. Substituting $6$ for $x$ and $45$ for $y$ in the equation $y = mx + b$ yields $45 = 6m + b$, which can be rewritten as $45 - 6m = b$. Substituting $-45 + 12m$ for $b$ in this equation yields $45 - 6m = -45 + 12m$. Adding $6m$ to both sides of this equation yields $45 = -45 + 18m$. Adding $45$ to both sides of this equation yields $90 = 18m$. Dividing both sides of this equation by $18$ yields $5 = m$, or $m = 5$. Substituting $5$ for $m$, $-12$ for $x$, and $-45$ for $y$ in the equation $y = mx + b$ yields $-45 = 5(-12) + b$, or $-45 = -60 + b$. Adding $60$ to both sides of this equation yields $15 = b$. Therefore, $m = 5$ and $b = 15$. Substituting $5$ for $m$ and $15$ for $b$ in the equation $y = mx + b$ yields $y = 5x + 15$. Thus, the equation $y = 5x + 15$ represents the linear relationship between $x$ and $y$. It's also given that the graph of the linear equation representing this relationship passes through the point $\left(\frac{1}{4}, a\right)$. Substituting $\frac{1}{4}$ for $x$ and $a$ for $y$ in the equation $y = 5x + 15$ yields $a = 5\left(\frac{1}{4}\right) + 15$, which is equivalent to $a = \frac{5}{4} + 15$, or $a = \frac{65}{4}$. Note that 65/4 and 16.25 are examples of ways to enter a correct answer.

Question Difficulty: Hard