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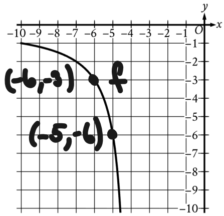
SAT Practice 4 - September 9, 2025

Math: Question 18



The rational function f is defined by an equation in the form $f(x) = \frac{a}{x+b}$, where a and b are constants. The partial graph of $y = f(x)$ is shown. If $g(x) = f(x+4)$, which equation could define function g?

Answer

A. $g(x) = \frac{6}{x}$
B. $g(x) = \frac{6}{x+4}$
C. $g(x) = \frac{6}{x+8}$
D. $g(x) = \frac{6(x+4)}{x+4}$

You selected answer D. The correct answer is C

Rationale

Choice C is correct. It's given that $f(x) = \frac{a}{x+b}$ and that the graph shown is a partial graph of $y = f(x)$. Substituting y for $f(x)$ in the equation $f(x) = \frac{a}{x+b}$ yields $y = \frac{a}{x+b}$. The graph passes through the point $(-7, -2)$. Substituting -7 for x and -2 for y in the equation $y = \frac{a}{x+b}$ yields $-2 = \frac{a}{-7+b}$. Multiplying each side of this equation by $-7+b$ yields $-2(-7+b) = a$, or $14 - 2b = a$. The graph also passes through the point $(-5, -6)$. Substituting -5 for x and -6 for y in the equation $y = \frac{a}{x+b}$ yields $-6 = \frac{a}{-5+b}$. Multiplying each side of this equation by $-5+b$ yields $-6(-5+b) = a$, or $30 - 6b = a$. Substituting $14 - 2b$ for a in this equation yields $30 - 6b = 14 - 2b$. Adding $6b$ to each side of this equation yields $30 = 14 + 4b$. Subtracting 14 from each side of this equation yields $16 = 4b$. Dividing each side of this equation by 4 yields $4 = b$. Substituting 4 for b in the equation $14 - 2b = a$ yields $14 - 2(4) = a$, or $6 = a$. Substituting 6 for a and 4 for b in the equation $f(x) = \frac{a}{x+b}$ yields $f(x) = \frac{6}{x+4}$. It's given that $g(x) = f(x+4)$. Substituting $x+4$ for x in the equation $f(x) = \frac{6}{x+4}$ yields $f(x+4) = \frac{6}{x+4+4}$, which is equivalent to $f(x+4) = \frac{6}{x+8}$. It follows that $g(x) = \frac{6}{x+8}$.

Choice A is incorrect. This could define function g if $g(x) = f(x-4)$.

Hide correct answer and explanation

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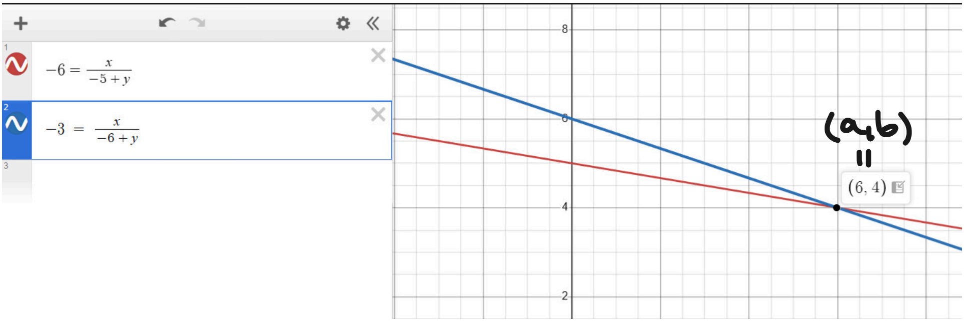
$$\underbrace{f(x)}_{y} = \frac{a}{x+b}$$

$(-5,-6), (-6,-3)$ both lie on f

$\Rightarrow$ they satisfy the eq. of f:

$$\left.\begin{array}{ll} \text{I.} & \left.\begin{array}{l} x=-5 \\ y=-6 \end{array}\right\} \; -6 = \dfrac{a}{-5+b} \\[2em] \text{II.} & \left.\begin{array}{l} x=-6 \\ y=-3 \end{array}\right\} \; -3 = \dfrac{a}{-6+b} \end{array}\right\} \text{system of 2 equations}$$

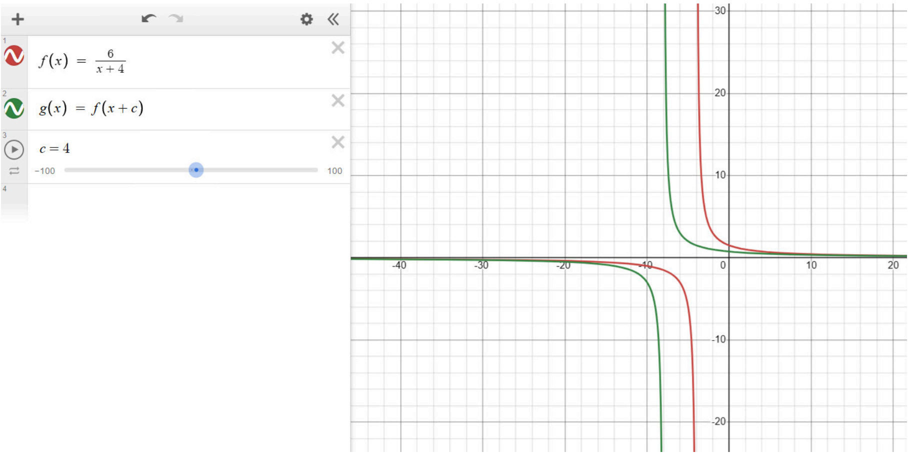


$$\boxed{\begin{matrix} a = 6 \\ b = 4 \end{matrix}}$$

$$\Rightarrow \quad f(x) = \frac{6}{x+4}$$

$$\Rightarrow \quad g(x) = f(\underbrace{x+4}) = \frac{6}{x+4+4} = \frac{6}{x+8}$$

we plug $x+4$ into f
instead of x



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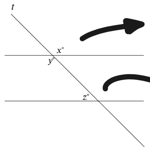
Math: Question 7



I. $x = y$

II. $180 - x = z$

Note: Figure not drawn to scale.

In the figure, lines m and n are parallel. If $x = 6k + 13$ and $y = 8k - 29$, what is the value of z?

I. $x = y$

$6k + 13 = 8k - 29$

$29 + 13 = 8k - 6k$

Answer

A. 3
B. 21
C. 41
D. 139

You selected answer B. The correct answer is C

Rationale

Choice C is correct. Vertical angles, which are angles that are opposite each other when two lines intersect, are congruent. The figure shows that lines t and m intersect. It follows that the angle with measure x° and the angle with measure y° are vertical angles, so $x = y$. It's given that $x = 6k + 13$ and $y = 8k - 29$. Substituting $6k + 13$ for x and $8k - 29$ for y in the equation $x = y$ yields $6k + 13 = 8k - 29$. Subtracting $6k$ from both sides of this equation yields $13 = 2k - 29$. Adding 29 to both sides of this equation yields $42 = 2k$, or $2k = 42$. Dividing both sides of this equation by 2 yields $k = 21$. It's given that lines m and n are parallel, and the figure shows that lines m and n are intersected by a transversal, line t. If two parallel lines are intersected by a transversal, then the same-side interior angles are supplementary. It follows that the same-side interior angles with measures y° and z° are supplementary, so $y + z = 180$. Substituting $8k - 29$ for y in this equation yields $8k - 29 + z = 180$. Substituting 21 for k in this equation yields $8(21) - 29 + z = 180$, or $139 + z = 180$. Subtracting 139 from both sides of this equation yields $z = 41$. Therefore, the value of z is 41.

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

Choice B is incorrect. This is the value of k, not z.

Hide correct answer and explanation

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$42 = 2k$

$\boxed{k = 21}$

II. $z = 180 - x = 180 - (6 \cdot 21 + 13) = 180 - 139 = 41$

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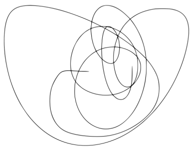
Math: Question 11

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?

slope!



Answer

11

You selected answer 5. The correct answer is 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.

Hide correct answer and explanation

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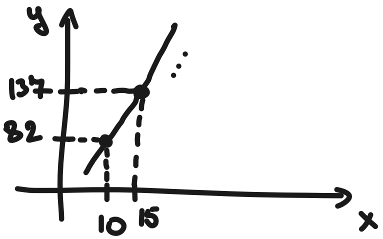

$$\left.\begin{array}{l} x = 10 \\ f(x) = 82 \end{array}\right\}$$

$$\overbrace{82}^{f(x)} = m \cdot \overbrace{10}^{x} - 28$$

$$110 = 10m \quad /:10$$

$$\boxed{m = 11}$$

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Math: Question 8

kolmý

Line p is defined by $2y + 18x = 9$. Line r is perpendicular to line p in the xy-plane. What is the slope of line r?

$$2y = -18x + 9 \;/ :2$$

$$p: \; y = \underbrace{-9}_{\text{slope of } p}x + \frac{9}{2}$$

$$r: \; y = -\frac{1}{-9}x + \,?$$

!

$$\frac{1}{9}$$

Answer

A. -9

B. $-\frac{1}{9}$

C. $\frac{1}{9}$

D. 9

You selected answer A. The correct answer is C

Rationale

Choice C is correct. It's given that line r is perpendicular to line p in the xy-plane. This means that the slope of line r is the negative reciprocal of the slope of line p. If the equation for line p is rewritten in slope-intercept form $y = mx + b$, where m and b are constants, then m is the slope of the line and $(0, b)$ is its y-intercept. Subtracting $18x$ from both sides of the equation $2y + 18x = 9$ yields $2y = -18x + 9$. Dividing both sides of this equation by 2 yields $y = -9x + \frac{9}{2}$. It follows that the slope of line p is -9. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of -9 is $\frac{-1}{-9}$, or $\frac{1}{9}$. Thus, the slope of line r is $\frac{1}{9}$.

Choice A is incorrect. This is the slope of line p, not line r.

Choice B is incorrect. This is the reciprocal, not the negative reciprocal, of the slope of line p.

Choice D is incorrect. This is the negative, not the negative reciprocal, of the slope of line p.

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Math: Question 11

$$2(kx - n) = -\frac{28}{15}x - \frac{36}{19}$$

In the given equation, k and n are constants and $n > 1$. The equation has no solution. What is the value of k?

Ex. $0 \cdot x = 7$

↳ does not have a sol.

Answer

-.9333, -14/15

You selected answer 0.11. The correct answer is -.9333, -14/15

Rationale

The correct answer is $-\frac{14}{15}$. A linear equation in the form $ax + b = cx + d$ has no solution only when the coefficients of x on each side of the equation are equal and the constant terms are not equal. Dividing both sides of the given equation by 2 yields $kx - n = -\frac{28}{30}x - \frac{36}{38}$, or $kx - n = -\frac{14}{15}x - \frac{18}{19}$. Since it's given that the equation has no solution, the coefficient of x on both sides of this equation must be equal, and the constant terms on both sides of this equation must not be equal. Since $\frac{18}{19} < 1$, and it's given that $n > 1$, the second condition is true. Thus, k must be equal to $-\frac{14}{15}$. Note that -14/15, -.9333, and -0.933 are examples of ways to enter a correct answer.

Hide correct answer and explanation

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$$2(kx - n) = -\frac{28}{15}x - \frac{36}{19}$$

$$2kx - 2n = -\frac{28}{15}x - \frac{36}{19}$$

They are in the same form

$ax + b = cx + d$

$a \neq c$ — A. → x will not disappear

↳ solution

$x =$ number

$a = c$ — B. → x will disappear

$\cancel{ax} + b = \cancel{cx} + d$

$b = d$

B1. True — ∞-many sol.

B2. False — no sol.

A. $2x+1 = 3x-2$

$x = 3$

B1. $2x+1 = 2x+1$ — this is always true (for any $x \in \mathbb{R}$)

$0 = 0$

B2. $2x+1 = 2x+3 \quad / -2x$

$\ne$

$=$

$1 = 3$ ✗

no solution

$\ne$

$2kx - 2n = -\frac{28}{15}x - \frac{36}{19}$

$=$

We want no solution

$\Downarrow$

$2k = -\frac{28}{15} \quad /:2$

$k = -\frac{28}{15} : 2$

$k = -\frac{\cancel{28}^{14}}{15} \cdot \frac{1}{\cancel{2}_{1}}$

$k = -\frac{14}{15}$ //

SAT Practice 4 - September 9, 2025

Math: Question 13

$$y > 14$$

$$4x + y < 18$$

The point $(x, 53)$ is a solution to the system of inequalities in the xy-plane. Which of the following could be the value of x?

Answer

A. -9
B. -5
C. 5
D. 9

You selected answer D. The correct answer is A

Rationale

Choice A is correct. It's given that the point $(x, 53)$ is a solution to the given system of inequalities in the xy-plane. This means that the coordinates of the point, when substituted for the variables x and y, make both of the inequalities in the system true. Substituting 53 for y in the inequality $y > 14$ yields $53 > 14$, which is true. Substituting 53 for y in the inequality $4x + y < 18$ yields $4x + 53 < 18$. Subtracting 53 from both sides of this inequality yields $4x < -35$. Dividing both sides of this inequality by 4 yields $x < -8.75$. Therefore, x must be a value less than -8.75. Of the given choices, only -9 is less than -8.75.

Choice B is incorrect. Substituting -5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(-5) + 53 < 18$, or $33 < 18$, which is not true.

Choice C is incorrect. Substituting 5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(5) + 53 < 18$, or $73 < 18$, which is not true.

Choice D is incorrect. Substituting 9 for x and 53 for y in the inequality $4x + y < 18$ yields $4(9) + 53 < 18$, or $89 < 18$, which is not true.

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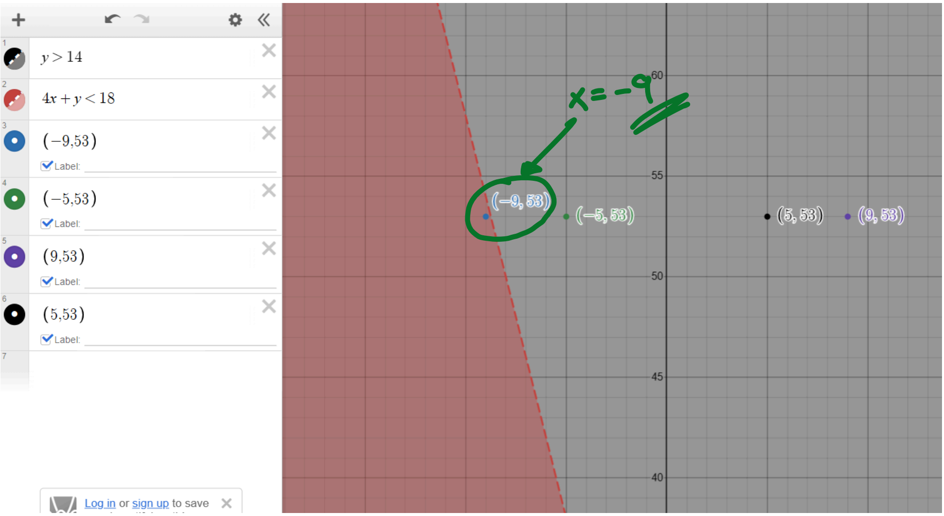

SAT Practice 4 - September 9, 2025

Math: Question 15

The expression $4x^2 + bx - 45$, where b is a constant, can be rewritten as $(hx + k)(x + j)$, where h, k, and j are integer constants. Which of the following must be an integer?

celé číslo!

Answer

A. $\frac{b}{h}$
B. $\frac{b}{k}$
C. $\frac{45}{h}$
D. $\frac{45}{k}$

You selected answer C. The correct answer is D

Rationale

Choice D is correct. It's given that $4x^2 + bx - 45$ can be rewritten as $(hx + k)(x + j)$. The expression $(hx + k)(x + j)$ can be rewritten as $hx^2 + jhx + kx + kj$, or $hx^2 + (jh + k)x + kj$. Therefore, $hx^2 + (jh + k)x + kj$ is equivalent to $4x^2 + bx - 45$. It follows that $kj = -45$. Dividing each side of this equation by k yields $j = \frac{-45}{k}$. Since j is an integer, $-\frac{45}{k}$ must be an integer. Therefore, $\frac{45}{k}$ must also be an integer.

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.

Hide correct answer and explanation

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$$4x^2 + bx - 45 = (hx + k)(x + j)$$

$$4x^2 + bx - 45 = hx^2 + hjx + kx + kj$$

$$4x^2 + bx - 45 = hx^2 + (hj + k)x + kj$$

From here

I. $h = 4$

II. $b = hj + k = 4j + k$

III. $kj = -45$

$b, j, k \ldots$ integers

A. $\frac{b}{h} = \frac{4j + k}{4}$ does not have to be an integer

$\left.\begin{matrix} j = 0 \\ k = 1 \end{matrix}\right\}$ $\frac{4 \cdot 0 + 1}{4} = \frac{1}{4}$

D. $\frac{45}{k} = \frac{45}{-\frac{45}{j}} = 45 : \left(-\frac{45}{j}\right) = \cancel{45} \cdot \left(-\frac{j}{\cancel{45}}\right) = -j$

III. $k \cdot j = -45$ $\rightarrow$ $k = -\frac{45}{j}$ must be an integer

k, j are divisors (dělitelé) of 45

$:k$

$-\frac{45}{k} = j \rightsquigarrow \frac{45}{k} = -j$