Assessment Blueprint

Standard Code	Complete Standard Text	Item Count
A.2(B)	write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points;	3
A.2(C)	write linear equations in two variables given a table of values, a graph, and a verbal description;	3
A.3(B)	calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems;	3
A.5(A)	solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides;	3
A.5(B)	solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and	2
A.12(B)	evaluate functions, expressed in function notation, given one or more elements in their domains;	3
A.12(E)	solve mathematic and scientific formulas, and other literal equations, for a specified variable.	3
Total Number of Questions		**20**

Student Name: ____ Date: ____________________

Class / Period: ____________________ Teacher: _______________________________________

1. A line passes through $(-4,\ 6)$ and has a slope of $-\frac{3}{5}$. Which equation represents this line in point-slope form?

A. $y + 6 = -\frac{3}{5}(x + 4)$

B. $y - 6 = -\frac{3}{5}(x + 4)$

C. $y - 6 = -\frac{3}{5}(x - 4)$

D. $y - 6 = -\frac{5}{3}(x + 4)$

Standard:	**A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points;
Correct answer:	B. $y - 6 = -\frac{3}{5}(x + 4)$
Rationales:	A. Adding the given positive second coordinate can seem consistent with the plus sign inside the parentheses. Point-slope form subtracts that coordinate; substituting $(-4, 6)$ into this option gives $12 = 0$, which is false. C. Copying the negative first coordinate directly into the factor produces $x - 4$. The formula subtracts the coordinate, so subtracting -4 requires $x + 4$; the given point does not satisfy this option. D. Recalling that slope is a ratio but reversing its numerator and denominator produces this coefficient. Its vertical change is five units for every three horizontal units, which does not match the stated slope.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

2. A line passes through $(-2,\ 5)$ and $(4,\ 1)$. Which equation in standard form represents this line?

A. $2x + 3y = 19$

B. $3x + 2y = 4$

C. $2x - 3y = 5$

D. $2x + 3y = 11$

Standard:	**A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points;
Correct answer:	D. $2x + 3y = 11$
Rationales:	A. The coefficients preserve the correct slope, but adding rather than subtracting the slope-coordinate product when finding the intercept produces the constant 19. At $(-2,5)$, the left side equals 11, so this equation misses a given point. B. Dividing the horizontal change by the vertical change gives the reciprocal slope, and using $(-2,5)$ then produces this equation. The other point disproves it: at $(4,1)$, the left side is 14, not 4. C. Subtracting the two coordinates in opposite orders produces a positive slope; using $(4,1)$ then gives this equation. At $(-2,5)$, its left side equals -19, not 5.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

3. A line passes through the points $(-4,\ 7)$ and $(2,\ -2)$. Which equations represent this line?

Select **TWO** correct answers.

☐ **A.** $y = -\frac{2}{3}x - \frac{2}{3}$

☐ **B.** $3x + 2y = 2$

☐ **C.** $y - 7 = \frac{3}{2}(x + 4)$

☐ **D.** $y = -\frac{3}{2}x - 1$

☐ **E.** $y + 2 = -\frac{3}{2}(x - 2)$

Standard:	**A.2(B)** write linear equations in two variables in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$, given one point and the slope and given two points;
Correct answer:	B. $3x + 2y = 2$ E. $y + 2 = -\frac{3}{2}(x - 2)$
Rationales:	A. Reversing rise and run and using $(2, -2)$ produces this equation. The other point rules it out: when $x = -4$, the equation gives $y = 2$ rather than 7. C. Using the correct slope magnitude but losing its negative sign produces this point-slope equation. The outputs decrease between the given points; this equation instead gives $y = 16$ at $x = 2$. D. The slope is correct, making this option attractive after a sign error in the intercept. Substituting $x = 2$ gives $y = -4$, so it does not contain the stated point $(2, -2)$.
Scoring:	2 points: both correct answers and no others. 1 point: one correct answer with no more than two total selections. 0 points: no correct answer, blank response, or more than two selections.

4. The table shows a linear relationship between input x and output y.

Input, x	**Output,** y
2	1
5	7
8	13

Which equation represents the relationship shown in the table?

A. $y = 2x - 3$

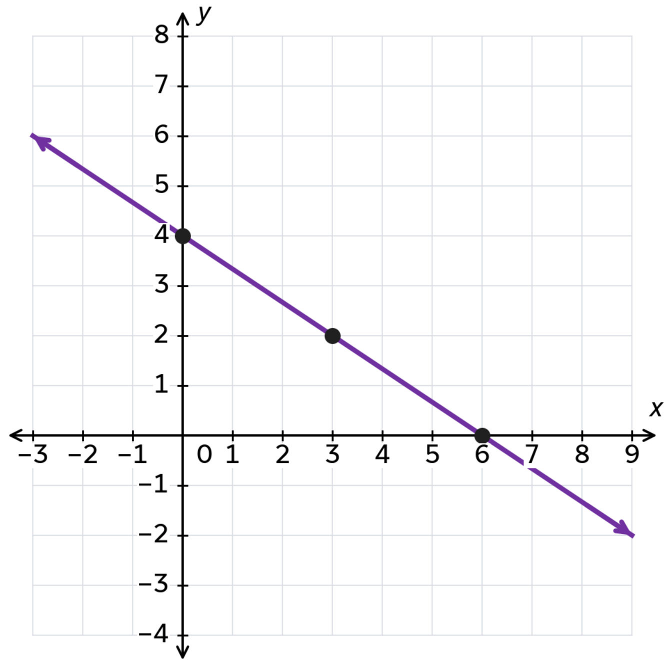
B. $y = 6x - 11$

C. $y = \frac{7}{5}x$

D. $y = \frac{1}{2}x + 9$

Standard:	**A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description;
Correct answer:	A. $y = 2x - 3$
Rationales:	B. The outputs increase by 6, so using that increase as the slope and fitting the first row produces this equation. Each increase occurs over 3 input units; the equation gives 19 rather than 7 at $x=5$. C. Dividing the output by the input in the row $(5, 7)$ treats the relationship as proportional. The table does not support that assumption: this equation does not give an output of 1 when the input is 2. D. Reversing the input and output changes gives a slope of one half, and fitting $(8, 13)$ gives the constant 9. At $x=2$, this equation predicts 10 rather than the listed output 1.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

5. The graph shows the linear relationship between the input x and the output y.



Which equation represents the line shown in the graph?

A. $y = -\frac{3}{2}x + 4$

B. $y = \frac{2}{3}x + 4$

C. $y = -\frac{2}{3}x + 4$

D. $y = -\frac{2}{3}x + 6$

Standard:	**A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description;
Correct answer:	C. $y = -\frac{2}{3}x + 4$
Rationales:	A. Counting the horizontal change as the rise and the vertical change as the run produces this negative slope with the ratio reversed. The plotted line falls 2 units while moving 3 units right, not 3 units while moving 2 right. B. The intercept and slope magnitude match visible graph features, but treating the downward change as positive produces this equation. The line decreases as x increases, so a positive slope contradicts the graph. D. The graph crosses an axis at 6, which can lead to using that value as the constant term. That crossing is on the horizontal axis; the output at $x = 0$ is 4, so the constant cannot be 6.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

6. A tank contains 72 liters of water when a drain is opened. Water then leaves the tank at a constant rate of 12 liters every 4 minutes. Let x represent the number of minutes since the drain opened, and let y represent the liters of water remaining. Complete the equation that models this situation while water remains in the tank.

Circle one choice for each blank.

$y = [Blank\ 1]x + [Blank\ 2]$

Blank 1

A. 3

B. -3

C. -12

Blank 2

A. 12

B. 60

C. 72

Standard:	**A.2(C)** write linear equations in two variables given a table of values, a graph, and a verbal description;
Correct answer:	Blank 1: B. -3 Blank 2: C. 72
Rationales:	Blank 1, A: Dividing 12 liters by 4 minutes gives the magnitude 3, but retaining a positive sign models water entering. The tank is draining, so its amount must decrease as time increases. Blank 1, C: Using the stated loss of 12 liters directly as the coefficient recognizes the decrease but overlooks the four-minute interval. A per-minute coefficient must divide that loss by 4. Blank 2, A: The 12 liters in the description can be mistaken for the starting amount. It is the loss during four minutes; the constant must represent the 72 liters present when the drain opens. Blank 2, B: Subtracting the first loss from the starting amount gives 60 liters. That is the amount after four minutes, while the constant represents the amount at zero minutes.
Scoring:	2 points: both blanks correct. 1 point: one blank correct. 0 points: neither blank correct. A blank with multiple choices marked earns no credit; the other blank is scored independently.

7. Ribbon is unrolled from a spool at a constant rate. The table shows the length of ribbon remaining on the spool at different times.

Time (minutes)	Remaining ribbon (meters)
2	84
5	66
9	42

Which statement describes the rate of change of the length of ribbon remaining on the spool?

A. The remaining length increases by 6 meters per minute.

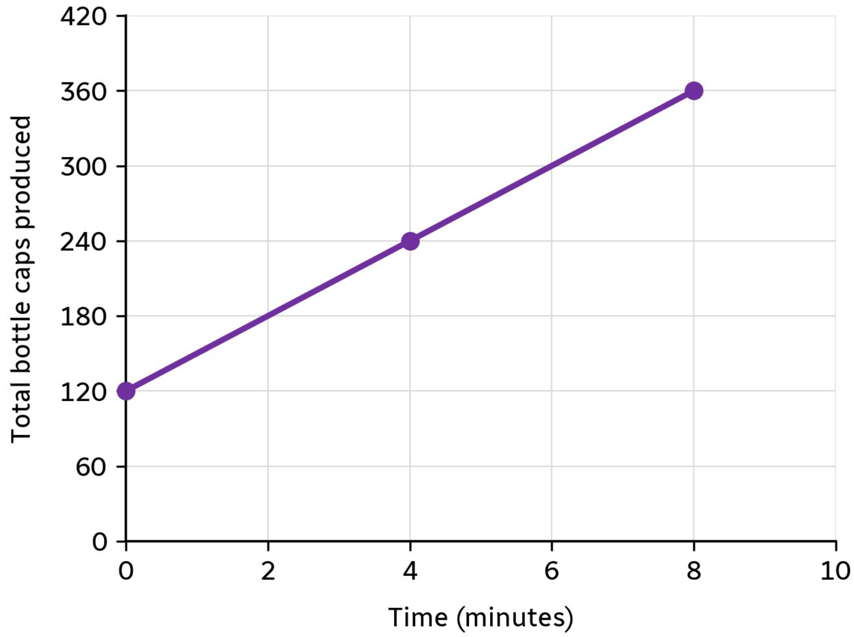
B. The remaining length decreases by 6 meters per minute.

C. The remaining length decreases by 18 meters per minute.

D. The remaining length decreases by 42 meters per minute.

Standard:	**A.3(B)** calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems;
Correct answer:	B. The remaining length decreases by 6 meters per minute.
Rationales:	A. The difference quotients have magnitude 6, so ignoring the direction of the change produces an increase of that size. The listed remaining lengths fall from 84 to 66 to 42, which rules out an increase. C. The first two rows show a loss of 18 meters, making that value a tempting rate. Those rows are three minutes apart, so the loss is not 18 meters in one minute. D. Dividing the first remaining length, 84, by its time, 2, gives 42. This treats the amount still on the spool as the amount unrolled; a rate of change must compare changes between rows.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

8. The graph models the total number of bottle caps a machine has produced. Time is measured from when an observer starts a timer during the run.



What is the machine’s rate of production?

A. 30 bottle caps per minute

B. 0.5 bottle caps per minute

C. 45 bottle caps per minute

D. 60 bottle caps per minute

Standard:	**A.3(B)** calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems;
Correct answer:	A. 30 bottle caps per minute
Rationales:	B. Counting the four vertical grid intervals between the first and last points as four bottle caps, then dividing by eight minutes, gives 0.5. Each vertical interval represents 60 caps, so this uses the grid count without its scale. C. Dividing the final total, 360, by 8 minutes gives 45. The graph already shows 120 caps at time zero, so those caps must be excluded from production during the measured interval. D. Dividing the increase of 240 caps by four horizontal grid intervals gives 60. Each horizontal interval represents two minutes, so the elapsed time is eight minutes rather than four.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

9. The equation represents a linear function with input x and output y.

$$6x + 4y = 20$$

What is the rate of change of y with respect to x?

A. -6

B. $\frac{3}{2}$

C. $-\frac{2}{3}$

D. $-\frac{3}{2}$

Standard:	**A.3(B)** calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems;
Correct answer:	D. $-\frac{3}{2}$
Rationales:	A. Moving the input term gives $4y = -6x + 20$, where -6 looks like a slope coefficient. The output is still multiplied by 4; isolating it requires dividing every term by 4. B. Simplifying the ratio of the coefficient magnitudes gives positive three halves. Moving $6x$ to the other side changes its sign, so the coefficient of the isolated output must be negative. C. Reversing the coefficient ratio can result from solving for the input instead of the output. The requested rate is the change in y with respect to x, so the output coefficient 4 must be the divisor.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

10. The equation sets a sum involving x equal to a difference involving x.

$$-2(3x - 4) + 5x = 3(x + 2) - 10$$

What is the solution to the equation?

A. $x = -1$

B. $x = 0$

C. $x = 3$

D. $x = 6$

Standard:	**A.5(A)** solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides;
Correct answer:	C. $x = 3$
Rationales:	A. Distributing the negative factor as $-6x-8$ leads to this value. The product of -2 and -4 is positive; substituting this proposed solution into the original equation gives $9 \neq -7$. B. Multiplying only the variable term inside the left parentheses leaves the constant as -4 and leads to zero. The factor must multiply both terms; at zero the original sides are 8 and -4. D. After distribution, subtracting coefficient magnitudes as though moving $-x$ produced $2x$ can give this value. Adding x to both sides produces $4x$; substitution of 6 gives unequal sides, 2 and 14.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

11. The linear equation equates two expressions in x.

$$\frac{2}{3}(x - 4) = \frac{1}{2}x + \frac{1}{4}$$

What value of x is the solution?

A. $x = \frac{35}{2}$

B. $x = \frac{7}{2}$

C. $x = \frac{33}{2}$

D. $x = -\frac{29}{2}$

Standard:	**A.5(A)** solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides;
Correct answer:	A. $x = \frac{35}{2}$
Rationales:	B. Clearing denominators correctly but distributing $8(x-4)$ as $8x-4$ gives seven halves. The multiplier also applies to the constant, so the expanded constant must be -32. C. Clearing the other denominators while treating the quarter as 1 gives thirty-three halves. Multiplying the entire equation by 12 makes that constant 3, not 1. D. Subtracting 32 from both sides of $2x-32=3$ while treating the left side as $2x$ produces this negative value. Removing the negative constant requires adding 32, so the resulting right side is positive.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

12. Which value is the solution of each equation in the grid?

Mark one box in each row. A solution may be used more than once.

Equation	**Solution** $x = -2$	**Solution** $x = 2$	**Solution** $x = 4$
$3(x+2) = x+10$	☐	☐	☐
$5-x = 3x-3$	☐	☐	☐
$-3(x+6) = 3x-6$	☐	☐	☐

Standard:	**A.5(A)** solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides;
Correct answer:	Row 1: Solution $x = 2$ Row 2: Solution $x = 2$ Row 3: Solution $x = -2$
Rationales:	Row 1, Solution $x=-2$: Reversing the constant subtraction gives $2x=6-10$. Substitution into the original equation gives $0\neq 8$, so this value cannot satisfy the row. Row 1, Solution $x=4$: Stopping at $2x=4$ and reporting the right side leaves the coefficient unresolved. Substituting 4 gives $18\neq 14$. Row 2, Solution $x=-2$: From $-4x=-8$, dividing by positive 4 but dropping the remaining negative on the variable produces this value. The proposed value gives $7\neq -9$ in the original equation. Row 2, Solution $x=4$: Combining $-x$ and $3x$ by subtracting their magnitudes can produce $8=2x$. Moving the left variable requires adding x, giving $4x$; the proposed value yields $1\neq 9$. Row 3, Solution $x=2$: Using $18-6$ to combine the constants loses the sign of the distributed -18. Adding 6 to that constant gives -12; substituting the positive value yields $-24\neq 0$. Row 3, Solution $x=4$: Treating the product of -3 and 6 as positive gives $-3x+18=3x-6$ and leads to this value. The product is negative; substitution into the original equation gives $-30\neq 6$.
Scoring:	2 points: all three rows correct. 1 point: exactly two rows correct. 0 points: zero or one row correct. A blank row or a row with multiple boxes marked counts as incorrect; other rows remain eligible.

13. A linear inequality in x is shown.

$$-2(3x - 4) + 5 \le 2x - 11$$

Which inequality represents the complete solution set?

A. $x \le 3$

B. $x \ge 1$

C. $x > 3$

D. $x \ge 3$

Standard:	**A.5(B)** solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and
Correct answer:	D. $x \ge 3$
Rationales:	A. Keeping the correct boundary but preserving the inequality direction when dividing by -8 produces this set. Division by a negative reverses the order; for example, zero belongs to this option but does not satisfy the original inequality. B. Distributing the negative factor with a constant of -8 instead of 8 produces a boundary of 1. The double negative makes the constant positive; the proposed endpoint 1 fails the original inequality. C. Retaining the correct direction and boundary but using a strict inequality excludes equality. At $x = 3$, both original sides equal -5, so that endpoint must be included.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

14. Which two inequalities each have the complete solution set $x \le 4$?

Select **TWO** correct answers.

☐ **A.** $3(2x-5) \le 4x-7$

☐ **B.** $2(x+5) > 3x+6$

☐ **C.** $4(x-1)-2 \ge 2x+2$

☐ **D.** $5-2(x+3) \ge x-13$

☐ **E.** $2(x-1)+x \le 2x+3$

Standard:	**A.5(B)** solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and
Correct answer:	A. $3(2x-5) \le 4x-7$ D. $5-2(x+3) \ge x-13$
Rationales:	B. The boundary is 4 and the solutions lie below it, which resembles the target set. The strict sign excludes 4, while the requested set includes that endpoint. C. The boundary is 4, so overlooking the direction can make this look equivalent. Simplifying gives $2x \ge 8$, and dividing by a positive number preserves the direction; it selects values at or above the boundary. E. Leaving the constant unchanged when distributing $2(x-1)$ can produce a boundary of 4. Correct distribution makes the constant -2; this inequality includes $x=5$, which the target excludes.
Scoring:	2 points: both correct answers and no others. 1 point: one correct answer with no more than two total selections. 0 points: no correct answer, blank response, or more than two selections.

15. The equation gives the output of function f for each input x.

$$f(x) = -3(x + 4) + 7$$

What is the value of $f(-6)$?

A. 1

B. 13

C. 29

D. -23

Standard:	**A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains;
Correct answer:	B. 13
Rationales:	A. Finding the grouped value -2 correctly but treating the product of two negatives as negative gives $-6+7=1$. That product must be positive, so this sign error invalidates the output. C. Distributing the coefficient only to the variable gives $-3x+4+7$, which produces 29 at the stated input. The coefficient also multiplies 4, so that constant contribution is -12, not 4. D. Using positive 6 in place of the stated input -6 produces -23. Function evaluation requires the specified signed input; the grouped expression must be -2, not 10.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

16. The quadratic function f has input x and output $f(x)$. Its domain is all real numbers.

$$f(x) = 2x^2 - 3x + 1$$

Complete the statement with the value of the function at each input.

Circle one choice for each blank.

$f(-2) = [\mathit{Blank}\ 1]$, and $f(3) = [\mathit{Blank}\ 2]$.

Blank 1

A. 15

B. -1

C. 3

Blank 2

A. -2

B. 10

C. 28

Standard:	**A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains;
Correct answer:	Blank 1: A. 15 Blank 2: B. 10
Rationales:	Blank 1, B: Squaring the magnitude of -2 but keeping a negative sign on the result produces -1 after the remaining operations. The square of a negative number is positive, so the first term must contribute 8. Blank 1, C: Computing the squared term correctly but treating the product of -3 and -2 as -6 gives 3. That product is positive, so the linear term adds 6. Blank 2, A: Replacing the squared input by the input itself gives $2 \times 3 - 9 + 1 = -2$. The exponent requires squaring 3 before multiplying by 2. Blank 2, C: Squaring correctly but adding the linear contribution gives $18 + 9 + 1 = 28$. The coefficient of the input is negative, so that contribution must be -9.
Scoring:	2 points: both blanks correct. 1 point: one blank correct. 0 points: neither blank correct. A blank with multiple choices marked earns no credit; the other blank is scored independently.

17. The function f assigns each valid input x an output using a quotient of two linear expressions.

$$f(x) = \frac{3x - 4}{x + 2}$$

What is $f(4)$?

A. 4

B. 2

C. $\frac{4}{3}$

D. $\frac{3}{4}$

Standard:	**A.12(B)** evaluate functions, expressed in function notation, given one or more elements in their domains;
Correct answer:	C. $\frac{4}{3}$
Rationales:	A. Evaluating the numerator as 8 but dividing by only the denominator constant 2 gives 4. The denominator also contains the input, so its full value is 6. B. Omitting the subtraction of 4 in the numerator gives $12 \div 6 = 2$. The rule includes that subtraction, so the numerator is 8, not 12. D. Reversing the evaluated numerator and denominator gives three fourths. The function places 8 above 6; its value must exceed 1, whereas this option is less than 1.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

18. The formula below gives the perimeter P of a rectangle with length l and width w.

$$P = 2l + 2w$$

Which equation is equivalent to the formula when solved for l?

A. $l = \frac{P}{2} - w$

B. $l = \frac{P}{2} - 2w$

C. $l = \frac{P - w}{2}$

D. $l = \frac{P}{2} + w$

Standard:	**A.12(E)** solve mathematic and scientific formulas, and other literal equations, for a specified variable.
Correct answer:	A. $l = \frac{P}{2} - w$
Rationales:	B. Dividing the perimeter and length terms by two while leaving the width term unchanged produces this expression. The same division applies to every term, so the width coefficient also changes from two to one. C. Recognizing that width must be removed, but subtracting only one width, produces this numerator. The original perimeter includes two widths, so the complete term $2w$ must be removed before division. D. Dividing by two correctly and then adding width produces this expression. Width is added to length in the halved perimeter, so isolating length requires subtracting width.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

19. The value of x depends on a, b, c, and d, where $a \neq c$.

$$ax + b = cx + d$$

Which equation expresses x in terms of the other variables?

A. $x = \dfrac{d + b}{a - c}$

B. $x = \dfrac{d - b}{a - c}$

C. $x = \dfrac{d - b}{a + c}$

D. $x = \dfrac{b - d}{a - c}$

Standard:	**A.12(E)** solve mathematic and scientific formulas, and other literal equations, for a specified variable.
Correct answer:	B. $x = \dfrac{d - b}{a - c}$
Rationales:	A. Collecting the variable terms correctly but adding the left constant to the right gives the numerator $d+b$. Removing b from the left requires subtracting it from both sides. C. Combining the variable coefficients by addition gives the denominator $a+c$. Moving cx to the left requires subtraction, so the combined coefficient is $a-c$. D. Reversing the constant subtraction while leaving the coefficient difference unchanged changes the sign of the result. With the variable terms collected on the left, the right side is $d-b$, not $b-d$.
Scoring:	1 point: correct answer only. 0 points: incorrect answer, blank response, or more than one marked answer.

20. The formula relates P to the variables a, b, c, and d, where $a \neq 0$ and $b \neq c$.

$$P = a(b - c) + d$$

Which two equations correctly isolate their indicated variables?

Select **TWO** correct answers.

☐ **A.** $b = \dfrac{P + d}{a} + c$

☐ **B.** $d = P - ab - ac$

☐ **C.** $a = \dfrac{P - d}{b - c}$

☐ **D.** $a = P - \dfrac{d}{b - c}$

☐ **E.** $c = \dfrac{ab + d - P}{a}$

Standard:	**A.12(E)** solve mathematic and scientific formulas, and other literal equations, for a specified variable.
Correct answer:	C. $a = \dfrac{P - d}{b - c}$ E. $c = \dfrac{ab + d - P}{a}$
Rationales:	A. Adding the external constant d before dividing produces this expression for b. That constant is added in the original formula, so isolating the grouped product requires subtracting it. B. Treating both product terms as positive when expanding leads to subtracting both from P. The term involving c is $-ac$, so removing it requires adding ac. D. Recognizing that division by $b - c$ is needed but applying it only to d leaves P undivided. The entire difference $P - d$ equals the grouped product and must share that divisor.
Scoring:	2 points: both correct answers and no others. 1 point: one correct answer with no more than two total selections. 0 points: no correct answer, blank response, or more than two selections.