

4-4 Equations as Relations (Pages 212–217)

An **equation in two variables** has solutions that are ordered pairs in the form (x, y) . In an equation involving x and y , the set of x values is the domain of the relation.

Solutions of an Equation in Two Variables	If a true statement results when the numbers in an ordered pair are substituted into an equation in two variables, then the ordered pair is a solution of the equation.
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Examples

a. Solve $y = 2x - 1$ if the domain is $\{1, 0, -1\}$.

Make a table and substitute each value of x into the equation to determine the corresponding value of y .

domain x	$2x - 1$	range y	ordered pair (x, y)
1	$2(1) - 1$	1	(1, 1)
0	$2(0) - 1$	-1	(0, -1)
-1	$2(-1) - 1$	-3	(-1, -3)

solution set: $\{(1, 1), (0, -1), (-1, -3)\}$.

b. Which of the ordered pairs, (3, 5), (0, 1), or (-1, 1), is a solution of $y = 2x - 1$?

Substitute the values for x and y into the equation to see if they make a true statement.

Does $5 = 2(3) - 1$? Yes, $5 = 6 - 1$.

Does $1 = 2(0) - 1$? No, $1 \neq 0 - 1$.

Does $1 = 2(-1) - 1$? No, $1 \neq -2 - 1$.

(3, 5) is a solution of $y = 2x - 1$.

Practice

Which ordered pairs are solutions of the equation?

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|-------------------|------------|------------|-------------|-------------|
| 1. $y = 2x - 7$ | a. (4, 1) | b. (8, 9) | c. (-1, -5) | d. (0, 7) |
| 2. $y = 9x$ | a. (2, 11) | b. (-1, 9) | c. (-1, -9) | d. (3, 12) |
| 3. $2x + y = 18$ | a. (1, 15) | b. (0, 18) | c. (-2, 14) | d. (-1, 20) |
| 4. $y - 3x = 10$ | a. (7, 31) | b. (0, 0) | c. (0, 10) | d. (-2, 16) |
| 5. $5x + 3y = 24$ | a. (-1, 5) | b. (4, 2) | c. (3, -1) | d. (0, 8) |

Solve each equation if the domain is $\{-1, 0, 4, 5\}$.

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|-----------------|-------------------|---------------------|
| 6. $y = 5x + 1$ | 7. $y = -2x + 3$ | 8. $x + y = 10$ |
| 9. $4x + y = 7$ | 10. $3x - y = 16$ | 11. $-6x + 2y = -8$ |

12. Anatomy Alicia believes she's found an equation to describe her height at different ages in her life. The equation is $h = 5a$, where a is age and h is height in inches. Solve for the domain $a = \{5, 10, 12, 20, 25\}$. For which of these ages are the heights unrealistic?

13. Standardized Test Practice Which of the following is a solution of the equation $2x - y = 10$?

- A** (-2, -6) **B** (-2, 6) **C** (2, 6) **D** (2, -6)

Answers: 1. a, b, d 2. c 3. b, d 4. a, c 5. d 6. (-1, -4), (0, 1), (4, 21), (5, 26) 7. (-1, 5), (0, 3), (4, -5), (5, -7) 8. (-1, 11), (0, 10), (4, 6), (5, 5) 9. (-1, 11), (0, 7), (4, -9), (5, -13) 10. (-1, -19), (0, -16), (4, -4), (-1) 11. (-1, -7), (0, -4), (4, 8), (5, 11) 12. (5, 25), (10, 50), (12, 60), (20, 100), (25, 125) 13. D
