

5-3

NAME _____ DATE _____

Equations as Relations (Pages 271–277)

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.

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?

- | | | | | |
|-------------------|--------------|--------------|---------------|---------------|
| 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 $\{-1, 0, 4, 5\}$.

- | | | |
|-----------------|-------------------|---------------------|
| 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. $(-1, -19)$, $(0, -16)$, $(4, 5)$, $(5, -1)$ 11. $(-1, -25)$, $(25, 125)$; ages 5, 20, and 25 13. D