



Any equation represents a set of ordered pairs or a relation. For example, the equation $y = 3x - 4$ where x is an integer and $-3 < x < 5$ represents the relation $S = \{(-2, -10), (-1, -7), (0, -4), (1, -1), (2, 2), (3, 5), (4, 8)\}$. That is, each pair of S satisfies the given equation.

Having one of the elements of an ordered pair of an equation, we can find the second element. For example, let $x = 3$ be first element of an order pair that fits in the equation $y = -x + 7$. Replacing $x = 3$ in the equation gives us

$$\begin{aligned}y &= -(3) + 7. \\ &= 4.\end{aligned}$$

So, $(3, 4)$ is an ordered pair of the equation $y = -x + 7$.

The set of all the ordered pairs that fit in an equation is called the set of the solution. In linear equations, the set of the solutions usually have infinite numbers of ordered pairs. For example, the set of the solution of the equation $y = -3x + 12$ is a set of infinite ordered pairs.

Practice 7

In equation $y = -4x - 4$, x is an integer and $-4 < x < 1$. Find the set of the solution of the equation.

Solution

Replace $x = -3, -2, -1, 0$ in the equation to find the corresponding y 's.

$$\begin{aligned}x = -3 &\Rightarrow y = -4(-3) - 4 \\ &= 12 - 4 \\ &= 8\end{aligned}$$

$$\begin{aligned}x = -2 &\Rightarrow y = -4(-2) - 4 \\ &= 8 - 4 \\ &= 4\end{aligned}$$

$$x = -1 \Rightarrow y = -4(-1) - 4$$



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Algebra I Lesson 10
Number Relations (Grades 9-12)

Instruction 10-3
Equations as Relations

$$= 4 - 4$$

$$= 0$$

$$x = 0 \Rightarrow y = -4(0) - 4$$

$$= 0 - 4$$

$$= -4.$$

Thus, the set of the solutions of the equation is $\{(-3, 8), (-2, 4), (-1, 0), (0, -4)\}$.

Real Life Application 1

Equation $F = \frac{9}{5}C + 32$ represents the relation between Celsius degrees and

Fahrenheit degrees. Let (c, f) represents an ordered pair of this relation, where c is in Celsius degrees and f is in Fahrenheit degrees. Which of the following pairs belong to this relation?

$$(-5, 23), (-6, 25), (10, 50), (12, 42), (35, 95)$$

Solution

$$(-5, 23), (10, 50), (35, 95)$$