

### Lesson 1-3

#### Example 1 Use a Replacement Set to Solve an Equation

Find the solution set for each equation if the replacement set is {1, 3, 5, 7, 9}.

**a.  $5 + 2n = 19$**

Replace  $n$  in  $5 + 2n = 19$  with each value in the replacement set.

$n$	$5 + 2n = 19$	true or false
1	$5 + 2(1) = 19 \rightarrow 7 \neq 19$	false
3	$5 + 2(3) = 19 \rightarrow 11 \neq 19$	false
5	$5 + 2(5) = 19 \rightarrow 15 \neq 19$	false
7	$5 + 2(7) = 19 \rightarrow 19 = 19$	true ✓
9	$5 + 2(9) = 19 \rightarrow 23 \neq 19$	false

Since  $n = 7$  makes the equation true, the solution of  $5 + 2n = 19$  is 7.  
The solution set is {7}.

**b.  $4(y + 1) = 24$**

Replace  $y$  in  $4(y + 1) = 24$  with each value in the replacement set.

$y$	$4(y + 1) = 24$	true or false
1	$4(1 + 1) = 24 \rightarrow 8 \neq 24$	false
3	$4(3 + 1) = 24 \rightarrow 16 \neq 24$	false
5	$4(5 + 1) = 24 \rightarrow 24 = 24$	true ✓
7	$4(7 + 1) = 24 \rightarrow 32 \neq 24$	false
9	$4(9 + 1) = 24 \rightarrow 40 \neq 24$	false

#### Example 2 Use Order of Operations to Solve an Equation.

Solve  $\frac{10 + 3 \cdot 5}{5(7 - 6)} = x$ .

$$\frac{10 + 3 \cdot 5}{5(7 - 6)} = x \quad \text{Original equation}$$

$$\frac{10 + 15}{5(1)} = x \quad \begin{array}{l} \text{Multiply 3 and 5 in the numerator.} \\ \text{Subtract 7 and 6 in the denominator.} \end{array}$$

$$\frac{25}{5} = x \quad \text{Simplify.}$$

$$5 = x \quad \text{Divide.}$$

**Example 3 Find the Solution Set of an Inequality.**

Find the solution set for  $23 - x < 10$  if the replacement set is  $\{10, 11, 12, 13, 14, 15\}$ .

Replace  $x$  in  $23 - x < 10$  with each value in the replacement set.

$y$	$23 - x < 10$	true or false
10	$23 - 10 \stackrel{?}{\geq} 10 \rightarrow 13 \not< 10$	false
11	$23 - 11 \stackrel{?}{\geq} 10 \rightarrow 12 \not< 10$	false
12	$23 - 12 \stackrel{?}{\geq} 10 \rightarrow 11 \not< 10$	false
13	$23 - 13 \stackrel{?}{\geq} 10 \rightarrow 10 \not< 10$	false
14	$23 - 14 \stackrel{?}{\geq} 10 \rightarrow 9 < 10$	true ✓
15	$23 - 15 \stackrel{?}{\geq} 10 \rightarrow 8 < 10$	true ✓

The solution set for  $23 - x < 10$  is  $\{14, 15\}$ .

**Example 4 Solve an Inequality.**

Josh is getting training for a 10 kilometer running race. To be ready for the race, he must run at least 140 miles in the last 4 weeks of his training. If he runs 40 miles 1 week, 30 miles the next week, how many miles must he run in the third and fourth weeks if he wants to run the same number of miles each of those weeks?

**Explore** Josh must run at least 140 miles in the 4 weeks. So the situation can be represented by  $40 + 30 + 2m \geq 140$  or  $70 + 2m \geq 140$ .

**Plan** Since no replacement set is given, estimate to find reasonable values for the replacement set.

**Solve** Start by letting  $m = 25$  and then adjust values up and down as needed.

$70 + 2m \geq 140$  Original inequality

$70 + 2(25) \geq 140$   $m = 25$

$70 + 50 \geq 140$  Multiply 2 and 25.

$120 \geq 140$  Add 70 and 50.

The estimate is too low. Increase the value of  $m$ .

$m$	$70 + 2m \geq 140$	Reasonable?
30	$70 + 2(30) \stackrel{?}{\geq} 140 \rightarrow 130 \not\geq 140$	too low
40	$70 + 2(40) \stackrel{?}{\geq} 140 \rightarrow 150 \geq 140$	too high
38	$70 + 2(38) \stackrel{?}{\geq} 140 \rightarrow 146 \geq 140$	too high
37	$70 + 2(37) \stackrel{?}{\geq} 140 \rightarrow 144 \geq 140$	almost
36	$70 + 2(36) \stackrel{?}{\geq} 140 \rightarrow 142 \geq 140$	almost
35	$70 + 2(35) \stackrel{?}{\geq} 140 \rightarrow 140 \geq 140$	equal

**Examine** The solution set is  $\{35, 36, 37, \dots\}$ . He must run at least 35 miles each of the last 2 weeks.