

## Lesson 7-2

### Example 1 Solve Equations with Parentheses

a. Solve  $-4(a + 3) = 2a$ . Check your solution.

$$\begin{aligned} -4(a + 3) &= 2a \\ -4(a) + (-4)(3) &= 2a \\ -4a - 12 &= 2a \\ -4a + 4a - 12 &= 2a + 4a \\ -12 &= 6a \\ \frac{-12}{6} &= \frac{6a}{6} \end{aligned}$$

**Check**

$$\begin{aligned} -4(a + 3) &= 2a \\ -4(-2 + 3) &= 2(-2) \\ -4 &= -4 \quad \checkmark \end{aligned}$$

Write the equation.  
Use the Distributive Property.  
Simplify.  
Add  $4a$  to each side.  
Simplify.

Divide each side by 6.  
Simplify.  
Write the equation.  
Replace  $a$  with  $-2$ .  
The solution checks.

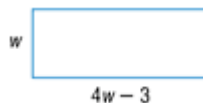
The solution is  $-2$ .

b. Solve  $6(y - 3) = 4(6.5 + y)$ .

$$\begin{aligned} 6(y - 3) &= 4(6.5 + y) \\ 6y - 18 &= 26 + 4y \\ 6y - 4y - 18 &= 26 + 4y - 4y \\ 2y - 18 &= 26 \\ 2y - 18 + 18 &= 26 + 18 \\ 2y &= 44 \\ \frac{2y}{2} &= \frac{44}{2} \\ y &= 22 \end{aligned}$$

Write the equation.  
Use the Distributive Property.  
Subtract  $4y$  from each side.  
Simplify.  
Add 18 to each side.  
Simplify.  
Divide each side by 2.  
Simplify.

The solution is 22. Check your solution.

**Example 2 Use an Equation to Solve a Problem****GEOMETRY** The perimeter of a rectangle is 34 inches. Find the dimensions if the length is 3 inches less than four times the width.**Words** The length is 3 inches less than four times the width. The perimeter is 34 inches.**Variables** Let  $w$  = the width.  
Let  $4w - 3$  = the length.

<u>2 times length</u>	plus	<u>2 times width</u>	equals	<u>perimeter.</u>
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<b>Equation</b>	$2(4w - 3)$	+	$2w$	=	$34$
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Solve  $2(4w - 3) + 2w = 34$ .

$$2(4w - 3) + 2w = 34$$

$$8w - 6 + 2w = 34$$

$$10w - 6 = 34$$

$$10w - 6 + 6 = 34 + 6$$

$$10w = 40$$

$$w = 4$$

Write the equation.

Use the Distributive Property.

Simplify.

Add 6 to each side.

Simplify.

Mentally divide each side by 10.

Evaluate  $4w - 3$  to find the length.

$$4(4) - 3 = 16 - 3 \text{ or } 13$$

Replace  $w$  with 4.**CHECK** Add the lengths of the four sides.

$$4 + 13 + 4 + 13 = 34 \checkmark$$

The width is 4 inches. The length is 13 inches.

**Example 3 No Solution****Solve  $4x - 9 = 4x + 2$** 

$$4x - 9 = 4x + 2$$

$$4x - 4x - 9 = 4x - 4x + 2$$

$$-9 = 2$$

Write the equation.

Subtract  $4x$  from each side.

Simplify.

The sentence  $-9 = 2$  is *never* true. So, the solution is  $\emptyset$ .

**Example 4 All Numbers as Solutions**

**Solve  $12x - 8 = 3(4x - 3) + 1$ .**

$$\begin{aligned}12x - 8 &= 3(4x - 3) + 1 \\12x - 8 &= 12x - 9 + 1 \\12x - 8 &= 12x - 8 \\12x - 8 + 8 &= 12x - 8 + 8 \\12x &= 12x \\x &= x\end{aligned}$$

Write the equation.

Use the Distributive Property.

Simplify,

Add 8 to each side.

Simplify.

Mentally divide each side by 12.

The sentence  $x = x$  is *always* true. The solution set is all numbers.