LESSON 2.3
Study Guide

GOAL
Solve two-step equations.

EXAMPLE 1
Solve a two-step equation

Solve $3x - 7 = 8$.

Solution

$3x - 7 = 8$	Write original equation.
$3x - 7 - 7 = 8 + 7$	Add 7 to each side.
$3x = 15$	Simplify.
$\dfrac{3x}{3} = \dfrac{15}{3}$	Divide each side by 3.
$x = 5$	Simplify.

The solution is 5. Check by substituting 5 for x in the original equation.

CHECK

$3x - 7 = 8$	Write original equation.
$3(5) - 7 = 8$	Substitute 5 for x.
$15 - 7 = 8$	Multiply 3 and 5.
$8 = 8$ ✔	Simplify. Solution checks.

Exercises for Example 1

Solve the equation. Check your solution.

1. $\dfrac{x}{4} - 3 = 5$

2. $9y + 2 = 29$

3. $10 = -3z - 8$

EXAMPLE 2
Solve a two-step equation by combining like terms

Solve 11x – 9x = 14.

Solution

$$11x - 9x = 14 \qquad \text{Write original equation.}$$
$$2x = 14 \qquad \text{Combine like terms.}$$
$$\frac{2x}{2} = \frac{14}{2} \qquad \text{Divide each side by 2.}$$
$$x = 7 \qquad \text{Simplify.}$$

Exercises for Example 2

Solve the equation. Check your solution.
5. $3x + 11x = 28$
6. $7y - 9y = 12$
7. $-21 = 15w - 12w$
8. $36 - 4p + 5p$

EXAMPLE 3
Find an input of a function

The output of a function is 7 more than twice the input. Find the input when the output is 13.

Solution

STEP 1 Write an equation for the function. Let x be the input and y be the output

$$y = 2x + 7 \qquad\qquad y \text{ is 7 more than}$$
$$\text{twice } x.$$

STEP 2 Solve the equation for x when $y = 13$.

$$y = 2x + 7$$ Write original equation.

$$13 = 2x + 7$$ Substitute 13 for y.

$$13 - 7 = 2x + 7 - 7$$ Subtract 7 from each side.

$$6 = 2x$$ Simplify

$$\frac{6}{2} = \frac{2x}{2}$$ Divide each side by 2.

$$3 = x$$ Simplify.

An input of 3 produces an output of 13.

Exercises for Example 3

9. The output of a function is 8 less than –3 times the input. Find the input when the output is –23.
10. The output of a function is 12 more than 5 times the input. Find the input when the output is –8.
11. The output of a function is 7 more than –2 times the input. Find the input when the output is 29.
12. The output of a function is 4 less than 9 times the input. Find the input when the output is 68.

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1. $x = 32$
2. $y = 3$
3. $z = -6$
4. $m = -24$
5. $x = 2$
6. $y = -6$
7. $w = -7$
8. $p = 4$
9. 5
10. -4
11. -11
12. 8