Remember

Inverse operations "undo" each other. Multiplication and division are inverse operations.

Key Ideas

Multiplication Property of Equality

Words When you multiply each side of an equation by the same nonzero number, the two sides remain equal.

Numbers

$$\frac{8}{4} = 2$$

$$\frac{8}{4} \cdot 4 = 2 \cdot 4$$

$$8 = 8$$

Algebra

$$\frac{x}{4} = 2$$

$$\frac{x}{4} \cdot 4 = 2 \cdot 4$$

$$x = 8$$

Multiplicative Inverse Property

Words The product of a nonzero number n and its reciprocal, $\frac{1}{n}$, is 1.

Numbers $5 \cdot \frac{1}{5} = 1$

Algebra $n \cdot \frac{1}{n} = \frac{1}{n} \cdot n = 1, n \neq 0$

EXAMPLE 1 Solving Equations Using Multiplication

a. Solve $\frac{w}{4} = 12$.

$\frac{w}{4} = 12$ Write the equation.

Undo the division. → $\frac{w}{4} \cdot 4 = 12 \cdot 4$ Multiplication Property of Equality

$w = 48$ Simplify.

∴ The solution is $w = 48$.

Check

$\frac{w}{4} = 12$

$\frac{48}{4} \stackrel{?}{=} 12$

$12 = 12$ ✓

b. Solve $\frac{2}{7}x = 6$.

$\frac{2}{7}x = 6$ Write the equation.

Use the Multiplicative Inverse Property. → $\frac{7}{2} \cdot \left(\frac{2}{7}x\right) = \frac{7}{2} \cdot 6$ Multiplication Property of Equality

$x = 21$ Simplify.

∴ The solution is $x = 21$.

Key Idea

Division Property of Equality

Words When you divide each side of an equation by the same nonzero number, the two sides remain equal.

Numbers

$8 \cdot 4 = 32$

$8 \cdot 4 \div 4 = 32 \div 4$

$8 = 8$

Algebra

$4x = 32$

$\frac{4x}{4} = \frac{32}{4}$

$x = 8$

EXAMPLE 2 Solving an Equation Using Division

Solve $5b = 65$.

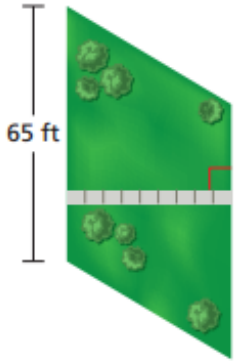
$5b = 65$	Write the equation.
Undo the multiplication. → $\frac{5b}{5} = \frac{65}{5}$	Division Property of Equality
$b = 13$	Simplify.

∴ The solution is $b = 13$.

Check

$$5b = 65$$
$$5(13) \stackrel{?}{=} 65$$
$$65 = 65 \checkmark$$

EXAMPLE 3 Real-Life Application



The area of the parallelogram-shaped courtyard is 2730 square feet. What is the length of the sidewalk?

The height of the parallelogram represents the length of the sidewalk.

$A = bh$	Use the formula for area of a parallelogram.
$2730 = 65h$	Substitute 2730 for A and 65 for b.
$\frac{2730}{65} = \frac{65h}{65}$	Division Property of Equality
$42 = h$	Simplify.

∴ So, the sidewalk is 42 feet long.

On Your Own

Solve the equation. Check your solution.

4. $p \cdot 3 = 18$ **5.** $12q = 60$ **6.** $81 = 9r$

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#8,10,12,14,16,18,20,22,24,26

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