1-12 Multiplication and Division Equations

Warm Up

Problem of the Day

Lesson Presentation

Warm Up

Solve.

1. $x + 5 = 9$ $x = 4$

2. $x - 34 = 72$ $x = 106$

3. $124 = x - 39$ $x = 163$

Problem of the Day

What 4-digit number am I?

- I am greater than 4,000 and less than 5,000.
- The sum of my hundreds digit and my ones digit is 9.
- Twice my tens number is 2 more than my thousands digit.
- The product of my hundreds digit and my ones digit is 0.
- I am not an even number.

4,039

1-12 Multiplication and Division Equations

Learn to solve one-step equations by using multiplication or division.

Vocabulary

Multiplication Property of Equality

Division Property of Equality

Like addition and subtraction, multiplication and division are inverse operations. They "undo" each other.

$$2 \cdot 5 = 10$$

$$10 \div 5 = 2$$

1-12 Multiplication and Division Equations

MULTIPLICATION PROPERTY OF EQUALITY		
Words	**Numbers**	**Algebra**
You can multiply both sides of an equation by the same number, and the statement will still be true.	$3 \cdot 4 = 12$ $2 \cdot 3 \cdot 4 = 2 \cdot 12$ $6 \cdot 4 = 24$	$x = y$ $zx = zy$

If a variable is divided by a number, you can often use multiplication to isolate the variable. Multiply both sides of the equation by the number.

Additional Example 1: Solving an Equation by Multiplication

Solve the equation $\frac{h}{2} = 13$. Check your answer.

$$\frac{h}{2} = 13$$

$$(2)\frac{h}{2} = 13(2)$$

$$h = 26$$

*Think: h is **divided** by 2, so **multiply** both sides by 2 to isolate h.*

Check

$$\frac{h}{2} = 13$$

$$\frac{26}{2} \stackrel{?}{=} 13$$

Substitute 26 for h.

$$13 \stackrel{?}{=} 13 \checkmark$$

26 is a solution.

Check It Out: Example 1

Solve the equation $\frac{x}{5} = 30$. Check your answer.

$$\frac{x}{5} = 30$$

$$(5)\frac{x}{5} = 30(5)$$

$$x = 150$$

*Think: x is **divided** by 5, so **multiply** both sides by 5 to isolate x.*

Check

$$\frac{x}{5} = 30$$

$$\frac{150}{5} \stackrel{?}{=} 30$$

Substitute 150 for x.

$$30 \stackrel{?}{=} 30 \checkmark$$

150 is a solution.

DIVISION PROPERTY OF EQUALITY		
Words	**Numbers**	**Algebra**
You can divide both sides of an equation by the same nonzero number, and the statement will still be true.	$5 \cdot 6 = 30$ $\frac{5 \cdot 6}{3} = \frac{30}{3}$ $5 \cdot \frac{6}{3} = 10$ $5 \cdot 2 = 10$	$x = y$ $\frac{x}{z} = \frac{y}{z}$ $z \neq 0$

Remember!

You cannot divide by 0.

1-12 Multiplication and Division Equations

If a variable is multiplied by a number, you can often use division to isolate the variable. Divide both sides of the equation by the number.

Additional Example 2: Solving an Equation by Division

Solve the equation 51 = 17*x*. Check your answer.

$51 = 17x$

$\frac{51}{17} = \frac{17x}{17}$

$3 = x$

*Think: x is **multiplied** by 17, so **divide** both sides by 17 to isolate x.*

Check

$51 = 17x$

$51 \stackrel{?}{=} 17(3)$ *Substitute 3 for x.*

$51 \stackrel{?}{=} 51$✓ *3 is a solution.*

Check It Out: Example 2

Solve the equation 76 = 19*y*. Check your answer.

$76 = 19y$

$\frac{76}{19} = \frac{19y}{19}$

$4 = y$

*Think: y is **multiplied** by 19, so **divide** both sides by 19 to isolate y.*

Check

$76 = 19y$

$76 \stackrel{?}{=} 19(4)$

Substitute 4 for y.

$76 \stackrel{?}{=} 76$✓

4 is a solution.

Additional Example 3: *Health Application*

Trevor's heart rate is 78 beats per minute. How many times does his heart beat in 10 seconds?

Use the given information to write an equation, where *b* is the number of heart beats in 10 seconds.

If you count your heart beats for 10 seconds and then multiply that by 6, you can find your heart rate in beats per minute.

Additional Example 3 Continued

Beats in 10s ***times 6*** ***= beats per minutes***

$b \cdot 6 = 78$

$6b = 78$

$\frac{6b}{6} = \frac{78}{6}$

$b = 13$

*Think: b is **multiplied** by 6, so **divide** both sides by 6 to isolate b.*

Trevor's heart beats 13 times 10 seconds.

Check It Out: Example 3

During a stock car race, one driver is able to complete 68 laps in 1 hour. How many laps would he finish in 15 minutes?

Use the given information to write an equation, where *n* is the number of laps completed in 15 minutes.

If you count the number of laps in 15 minutes and multiply by 4, you can find the number of laps completed in 1 hour.

Check It Out: Example 3 Continued

Laps in 15 min	*times 4*	=	*Laps in 1 hour*
n	$\cdot$ 4	=	68

$$4n = 68$$

$$\frac{4n}{4} = \frac{68}{4}$$

$$n = 17$$

*Think: L is **multiplied** by 4, so **divide** both sides by 4 to isolate n.*

The driver would complete 17 laps in 15 minutes.

Lesson Quiz: Part I

Solve the equation. Check your answer.

1. $12 = 4x$ $x = 3;\ 12 = 4 \cdot 3$

2. $18z = 90$ $z = 5;\ 18 \cdot 5 = 90$

3. $12 = \frac{x}{4}$ $x = 48;\ 12 = \frac{x}{4}$

4. $840 = 12y$ $y = 70;\ 840 = 12 \cdot 70$

5. $\frac{h}{22} = 9$ $h = 198;\ \frac{198}{22} = 9$

Lesson Quiz: Part II

6. The cost of each ticket at the carnival was $0.25.

Li bought $7.50 worth of tickets. How many tickets did she buy?

30