



Solve Multiplication and Division Equations

Objective Solve multiplication and division equations.

Learn About It

Winona rides a bus 12 miles a month to and from her guitar lessons. If she has 4 lessons each month, how can Winona write and solve an equation to find the number of miles she rides to and from each lesson?

Winona wrote the equation $4 \times x = 12$ to express *4 trips times a number of miles is 12 miles*.

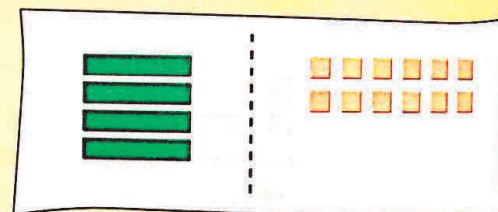
You can solve a multiplication equation by using division, the inverse of multiplication.

Use algebra tiles to solve the equation $4 \times x = 12$ for x .

Materials • algebra tiles (Learning Tool 38), workmat

STEP 1 Model the equation with algebra tiles.

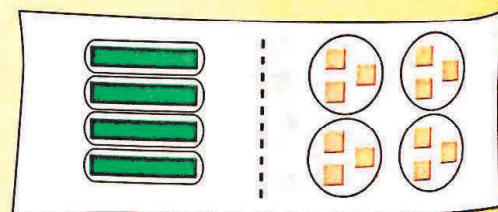
1



$$4 \times x = 12$$

STEP 2 Isolate the x -tile. Use the *inverse* of multiplication. Divide the tiles into 4 equal groups.

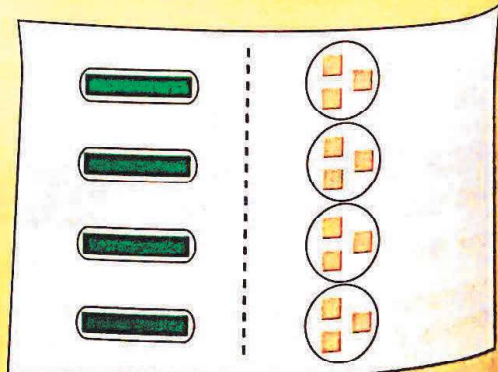
2



$$(4 \times x) \div 4 = 12 \div 4$$

STEP 3 Match each x -tile to a group of 1-tiles. Each x -tile is equivalent to 3 1-tiles.

3



$$x = 3$$

► When you multiply or divide each side of an equation by the same nonzero number, you are using a property of equality.



The Multiplication and Division Properties of Equality

Multiplying or dividing both sides of an equation by the same nonzero number results in a new equation, having the same solutions as the original.

Use properties to solve the equation $4 \times x = 12$.

Since the variable x is multiplied by a number, use the Division Property of Equality to isolate the variable.

$$\begin{aligned}4 \times x &= 12 \\4 \times x \div 4 &= 12 \div 4 \quad \leftarrow \text{Divide both sides by 4.} \\x &= 12 \div 4 \quad \leftarrow \text{Isolate the variable.} \\x &= 3 \quad \leftarrow \text{Solve for } x.\end{aligned}$$

Check: Check your work by substituting the solution into the original equation.

$$\begin{aligned}4 \times x &= 12 \\4 \times 3 &= 12 \\12 &= 12\end{aligned}$$

So the solution, 3, is correct.

Solution: Winona rides 3 miles to and from each lesson.

Another Example

Use Multiplication to Solve

$$\begin{aligned}\frac{a}{1.5} &= 22 \\\frac{a}{1.5} \times 1.5 &= 22 \times 1.5 \quad \leftarrow \text{Multiply both sides by 1.5.} \\&\quad \text{(Multiplication Property of Equality)} \\a &= 22 \times 1.5 \quad \leftarrow \text{Isolate the variable.} \\a &= 33\end{aligned}$$

Check:

$$\begin{aligned}\frac{a}{1.5} &= 22 \\\frac{33}{1.5} &= 22 \\22 &= 22 \quad \text{It checks.}\end{aligned}$$

Guided Practice

Solve. State the inverse operation you used.

1. $4.5 \times c = 18$

2. $a \times 4 = 24$

3. $n \div 7 = 8$

4. $m \div 7 = 30$

Ask Yourself

- Did I perform the same operation on both sides of the equals sign?
- Did I check my work?

Explain Your Thinking ▶ Why is it helpful to isolate the variable when solving an equation?

Practice and Problem Solving

Solve. State the inverse operation you used.

5. $d \div 9 = 2$

6. $c \div 3 = 9$

7. $2 \times e = 14$

8. $f \div 5 = 3$

9. $y \times 8 = 64$

10. $j \div 7 = 49$

11. $k \times 4 = 36$

12. $m \div 45 = 3$

13. $120 \times u = 240$

14. $m \div 12 = 36$

15. $p \times 18 = 18$

16. $t \div 15 = 10$

Go On 

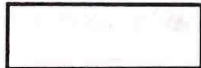
Solve Multiplication and Division Equations

Solve. State the inverse operation you used.


1. $m \times 8 = 56$ _____
2. $t \div 4 = 15$ _____
3. $c \div 18 = 14$ _____
4. $k \times 9 = 108$ _____
5. $15 \times j = 225$ _____
6. $m \div 6 = 8$ _____
7. $y \div 18 = 26$ _____
8. $b \times 8 = 104$ _____
9. $z \times 14 = 126$ _____
10. $s \div 19 = 17$ _____
11. $n \div 9 = 9$ _____
12. $x \times 8 = 72$ _____

Remember that the area, A , of a rectangle is $l \times w$.
Write and solve an equation to find each missing length or width.

13. $A = 12 \text{ cm}^2$
 $l = 6 \text{ cm}$



14. $A = 30 \text{ cm}^2$
 $w = 5 \text{ cm}$



Algebra • Functions Write a function rule to show how the input (m) is changed to the output (n).

15.

| Input (m) | Output (n) |
|---------------|----------------|
| 10 | 30 |
| 5 | 15 |
| m | ? |

16.

| Input (m) | Output (n) |
|---------------|----------------|
| 30 | 10 |
| 27 | 9 |
| m | ? |

Test Prep

17. What is the solution for $4 \times c = 64$?

- A 256 C 60
B 68 D 16

18. Pedro bought 4 boxes of cereal for \$12. What is the cost per box? Explain how you found your answer.

Solve Multiplication and Division Equations

Ask Yourself

- Did I perform the same operation on both sides of the equals sign?
- Did I check my work?

Solve. State the inverse operation you used.

1. $n \times 7 = 126$

2. $p \times 8 = 32$

3. $42 \times p = 252$

4. $90 \times a = 360$

5. $n \div 22 = 7$

6. $32 \times t = 192$

7. $w \div 234 = 6$

8. $t \times 5 = 85$

9. $q \times 10 = 20$

10. $p \times 15 = 195$

11. $m \div 25 = 168$

12. $j \div 17 = 3$

Problem Solving

Show Your Work

13. Donya spent \$240 on tickets to a play. If she bought tickets for 16 people, how much did each ticket cost?
