

# Key

## LESSON 13 Solving Equations

### Review It!

When you solve equations, remember this:

inverse operation an operation that undoes a given operation

Addition and subtraction are inverse operations. Multiplication and division are inverse operations.

To solve an equation, remove the numbers from the side with the variable until the variable is alone.

Solve:  $7x + 17 = 38$

Step 1 Identify the operations on the same side as  $x$ .  
 $+ 17$  means \_\_\_\_\_  
 $7x$  means \_\_\_\_\_  $7$  and  $x$ .

Step 2 Get the  $x$  term alone on one side.  
 $7x + 17 = 38$   
 $7x + 17 - 17 = 38 - 17$   
 $7x = 21$

REMEMBER Subtract the same number from both sides.

Step 3 Get  $x$  alone on one side.  
 $7x = 21$   
 $7x \div 7 = 21 \div 7$   
 $x = 3$

REMEMBER Divide both sides by the same number.

So, the solution is  $x = 3$

### Try It!

Get the variable alone on one side.

### Ask Yourself

- $\frac{2x}{2} = \frac{2}{2}$   
 $x = 1$
- $\frac{3d}{3} = \frac{6}{3}$   
 $d = 2$
- $\frac{4n}{4} = \frac{4}{4}$   
 $n = 1$
- $3\frac{x}{3} = 2 \times 3$   
 $x = 6$
- $z + 7 = -1$   
 $-7 -7$   
 $z = -8$
- $d - 13 = -3$   
 $+13 +13$   
 $d = 10$

1. How can you undo multiplication? subtract, or divide?

5. What is  $-1 - 7$ ?  $-6$ , or  $-8$ ?

Write the solution.

- $3x + 11 = 17$   $x = 2$
- $5x - 2 = 23$   $x = 5$
- $10c + 6 = 46$   $c = 4$
- $-7x - 25 = 10$   $x = -5$
- $9x + 13 = 85$   $x = 8$
- $6b - 12 = 60$   $b = 12$
- $\frac{x}{-3} + 2 = 4$   $x = -6$
- $-5z + 3 = 28$   $z = -5$

7.  $x$  is multiplied by what?  $3$ , or  $11$ ?

Solve.

15. Pedro found the length of a rectangular pen by solving the equation  $7l + 9 = 37$ , where  $l$  is the length of the pen. What is the length of the pen, in yards?  $l = 4$

15. What do you subtract first from both sides?  $7$ , or  $9$ ?

16. A balloon ride over Savannah costs \$315. The equation  $75h + 15 = 315$  can be used to find the number of hours,  $h$ , for the ride. How many hours was the ride?  $h = 4$

$$\begin{array}{r} 75h + 15 = 315 \\ 75h = 300 \\ \frac{75h}{75} = \frac{300}{75} \\ h = 4 \end{array}$$

Algebra

Algebra

13. It costs \$1,280 to build a fence around a peach orchard. The equation  $8f + 80 = 1,280$  can be used to find the number of feet,  $f$ , of fencing.


Part A How many feet of fencing are needed for the orchard?

$$8f + 80 = 1280 \Rightarrow 8f = 1200$$

$$\frac{8f}{8} = \frac{1200}{8} \Rightarrow f = \frac{1200}{8} = 150$$

Part B Use what you know about solving equations to explain why your answer is correct. Use words and/or numbers to support your explanation.

$8 =$  # Cost per ft of fence  
 $80 =$  fixed cost



**On Your Own!**

Circle the best answer for each solution.

1. Solve:  $4x = 12$   $\frac{4x}{4} = \frac{12}{4}$   
 A. 3 C. 16  
 B. 8 D. 48
2. Solve:  $5x = -45$   $\frac{5x}{5} = \frac{-45}{5} \Rightarrow x = -9$   
 A. -45 C. -9  
 B. -40 D. 9
3. Solve:  $8x = 56$   $\frac{8x}{8} = \frac{56}{8} \Rightarrow x = 7$   
 A. 448 C. 64  
 B. 48 D. 7
4. Solve:  $\frac{x}{4} = 2$   $\frac{x}{4} = 2 \Rightarrow x = 2 \cdot 4 = 8$   
 A. -8 C. 2  
 B. -2 D. 8
5. Solve:  $x - 6 = -3$   $x = -3 + 6 \Rightarrow x = 3$   
 A. -18 C. -2  
 B. -3 D. 3
6. Solve:  $\frac{x}{6} + 1 = 0$   $\frac{x}{6} + 1 = 0 \Rightarrow \frac{x}{6} = -1 \Rightarrow x = -6$   
 A. 6 C.  $-\frac{1}{6}$   
 B.  $\frac{1}{6}$  D. -6
7. Solve:  $3x + 14 = 50$   $3x = 36 \Rightarrow x = 12$   
 A. 8 C.  $21\frac{1}{3}$   
 B. 12 D. 63
8. Solve:  $15x - 6 = 39$   $15x = 45$   
 A.  $\frac{13}{45}$  C.  $3\frac{13}{45}$   
 B. 4 D. 3
9. Solve:  $\frac{x}{2} - 9 = 16$   $\frac{x}{2} = 25 \Rightarrow x = 50$   
 A. -4 C. 32  
 B. 8 D. 34
10. Solve:  $\frac{x}{14} + 1 = 1$   $\frac{x}{14} = 0 \Rightarrow x = 0$   
 A. -14 C. 1  
 B. 0 D. 2
11. Maria spent \$45 at an amusement park in Atlanta. The equation  $5r + 15 = 45$  can be used to find the number of Maria's rides,  $r$ . How many rides did Maria take?  
 $5r = 30 \Rightarrow r = 6$   
 A. 3 C. 9  
 B. 6 D. 12
12. Joe said you can find the width of a frame by solving the equation  $8w + 3 = 9$ , where  $w$  is the width in feet. What is the width of the frame?  
 $8w = 6 \Rightarrow w = \frac{6}{8} = \frac{3}{4}$   
 A.  $\frac{3}{4}$  foot C.  $1\frac{1}{2}$  feet  
 B.  $1\frac{1}{3}$  feet D. 48 feet

**Math Words**

Fill in the blanks.

14. To solve the equation  $3x + 15 = 7$ , first subtract 15 from both sides of the equation.
15. Multiplication is the inverse operation of division.
16. A(n) equation is a math sentence that uses an equal sign.
17. Subtraction is the inverse operation of addition.