

# 2-1

## Solving One-Step Equations



### Vocabulary

#### Review

1. Circle the *multiplicative inverse* of  $\frac{1}{2}$ . Underline the *additive inverse* of  $\frac{1}{2}$ .

2      1       $\frac{1}{2}$        $-\frac{1}{2}$       -2

2. Circle the *multiplicative inverse* of -3. Underline the *additive inverse* of -3.

3      1       $\frac{1}{3}$        $-\frac{1}{3}$       -3

#### Vocabulary Builder

**isolate** (verb) EYE suh layt

**Main Idea:** To **isolate** a variable in an equation means you get the variable with a coefficient of 1 alone on one side of the equation.

**Other Word Forms:** isolation (noun), isolated (adjective)

variable *isolated*  
 $x = 12$

variable NOT  
*isolated*  
 $5x = 60$

#### Use Your Vocabulary

3. Choose the correct form of the word *isolate* to complete each statement.

isolate

isolation

isolated

A very ill patient was placed in ?, away from the other patients.

In order to ? a variable, you may need to perform mathematical operations.

A person living on a small island felt ? from the rest of the world.

4. Circle the equations that show the variable *isolated*.

$4x + 1 = 13$

$x = 12 - 7$

$\frac{x}{3} = 10$

$\frac{2}{5} = x$

take note

### Property Addition and Subtraction Properties of Equality

5. Complete the table.

Property	Algebra	Example
Addition Property of Equality	For any real numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a + c = b + \square$ .	$n - 7 = 12$ $n - 7 + 7 = 12 + \square$
Subtraction Property of Equality	For any real numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a - c = b - \square$ .	$n + 8 = 9$ $n + 8 - \square = 9 - \square$



### Problem 1 Solving an Equation Using Subtraction

**Got It?** What is the solution of  $y + 2 = -6$ ? Check your answer.

6. Underline the correct word to complete each sentence.

The equation  $y + 2 = -6$  shows addition / subtraction.

The inverse of that operation is addition / subtraction.

7. Use the justifications to solve the equation.

$$y + 2 = -6 \quad \text{Write the original equation.}$$

$$y + 2 - \square = \square - \square \quad \text{Subtract 2 from each side.}$$

$$y = \square \quad \text{Simplify.}$$

8. Check your answer by substituting it in the original equation for  $y$ . Then simplify.

Does  $\square + 2 = -6$ ? Yes / No

take note

### Property Multiplication and Division Properties of Equality

9. Complete the table.

Property	Algebra	Example
Multiplication Property of Equality	For any real numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a \cdot c = b \cdot \square$ .	$\frac{x}{5} = 10$ $\frac{x}{5} \cdot 5 = 10 \cdot \square$
Division Property of Equality	For any real numbers $a$ , $b$ , and $c$ , such that $c \neq 0$ , if $a = b$ , then $\frac{a}{c} = \frac{b}{\square}$ .	$6x = 30$ $\frac{6x}{6} = \frac{30}{\square}$



### Problem 3 Solving an Equation Using Division

**Got It?** What is the solution of  $10 = 15x$ ? Check your answer.

10. The equation is solved below. Write a justification for each step.

$$10 = 15x$$

$$\frac{10}{15} = \frac{15x}{15}$$

$$\frac{2}{3} = x$$

11. Check your answer.

$$10 \stackrel{?}{=} 15 \cdot \text{[ ]}$$

$$10 = \text{[ ]}$$



### Problem 4 Solving an Equation Using Multiplication

**Got It?** What is the solution of  $19 = \frac{r}{3}$ ?

12. Underline the correct word or number to complete the sentence.

To isolate the variable, you should multiply / divide each side of the equation by 3 / 19 .

13. When you isolate the variable, you obtain  $r = \text{[ ]}$ .



### Problem 5 Solving an Equation Using Reciprocals

**Got It?** What is the solution of  $12 = \frac{3}{4}x$ ? Check your answer.

14. To solve the equation, divide / multiply both sides of the equation by the reciprocal of  $\frac{3}{4}$ .

15. **Multiple Choice** Choose the reciprocal of  $\frac{3}{4}$ .

(A)  $\frac{3}{4}$

(B)  $\frac{1}{4}$

(C)  $\frac{4}{3}$

(D) 4

16. Use the reciprocal of  $\frac{3}{4}$  to solve  $12 = \frac{3}{4}x$  for  $x$ .

17. Now check your answer. Does  $12 = \frac{3}{4} \cdot \text{[ ]}$ ? Yes / No



## Problem 6 Using a One-Step Equation as a Model

**Got It?** An online DVD rental company offers gift certificates that you can use to purchase rental plans. You have a gift certificate for \$30. The plan you select costs \$5 per month. How many months can you purchase with the gift certificate?

18. Complete the model to solve the problem.

Relate cost per month times number of months is amount of the gift certificate

Define Let  $m =$

Write \$   $\cdot$    $=$  \$

19. Solve the equation to find the number of months you can purchase.



## Lesson Check • Do you UNDERSTAND?

**Vocabulary** Which property of equality would you use to solve  $31 \times 5 = 234$ ? Why?

20. What operation does the equation  $31 \times 5 = 234$  show?

addition      division      multiplication      subtraction

21. Which property of equality would you use to solve  $31 \times 5 = 234$ ? Explain.



## Math Success

Check off the vocabulary words that you understand.

- equivalent equations     
  isolate     
  inverse operations     
  Addition Property  
 Subtraction Property     
  Multiplication Property     
  Division Property

Rate how well you can use the properties of equality.

