

TOPIC  
**7**

### Review What You Know!

**Vocabulary**  
Choose the best term from the box to complete each definition.

inverse operations  
like terms  
proportion  
variables

1. In an algebraic expression, \_\_\_\_\_ are terms that have the same variables raised to the same exponents.
2. Quantities that represent an unknown value are \_\_\_\_\_.
3. A \_\_\_\_\_ is a statement that two ratios are equal.
4. Operations that "undo" each other are \_\_\_\_\_.

#### Identify Like Terms

Complete the statements to identify the like terms in each expression.

5.  $4x + 7y - 6z + 6y - 9x$

$4x$  and  are like terms.

$7y$  and  are like terms.

6.  $\frac{1}{2}x - (6u - 9u) + \frac{1}{10}t + 2s$

$\frac{1}{2}x$  and  are like terms.

$6u$  and  are like terms.

#### Solve One-Step Equations

Simplify each equation.

7.  $2x = 10$

8.  $x + 3 = 12$

9.  $x - 7 = 1$

#### Simplify Fractions

10. Explain how to simplify the fraction  $\frac{12}{36}$ .

Go Online | PearsonRealize.com
Topic 7 Analyze and Solve Linear Equations 387

### Prepare for Reading Success


Before beginning each lesson, preview its content. Write what you already know about the lesson in the second column. In the third column, write a question that you want answered about the lesson. After the lesson, complete the fourth column with the answer to your question.

Lesson	What I Know	Questions I Have	Answer
7-1			
7-2			
7-3			
7-4			
7-5			
7-6			
7-7			
7-8			
7-9			

388 Topic 7 Analyze and Solve Linear Equations
Go Online | PearsonRealize.com

### Explore It!

A superintendent orders the new laptops shown below for two schools in her district. She receives a bill for \$7,500.



**A.** Draw a representation to show the relationship between the number of laptops and the total cost.

**B.** Use the representation to write an equation that can be used to determine the cost of one laptop.

#### Lesson 7-1

### Combine Like Terms to Solve Equations

Go Online | PearsonRealize.com

**I can...**  
solve equations that have like terms on one side.

#### Focus on math practices

**Reasoning** Why is it important to know that each laptop costs the same amount?

389

### Essential Question

How do you solve equations that contain like terms?

INTERACTIVE RESPONSE

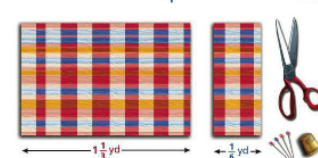
ACCESS

#### EXAMPLE 1

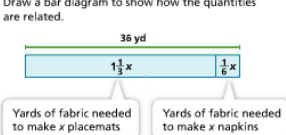
### Combine Like Terms to Solve Addition Equations

Gianna has 36 yards of fabric to make sets of matching placemats and napkins. How many matching sets can she make?

**Look for Relationships** Why can you use the same variable to represent the number of placemats and to represent the number of napkins?



Draw a bar diagram to show how the quantities are related.



Use the diagram to write and solve an equation.

$$\frac{1}{3}x + \frac{1}{6}x = 36$$

$$\frac{2}{6}x + \frac{1}{6}x = 36$$

$$\frac{3}{6}x = 36$$

$$\frac{1}{2}x = 36$$

$$x = 72$$

Combine like terms.

Gianna has enough fabric to make 24 matching sets of placemats and napkins.

**Try It!**

Selena spends \$53.94 to buy a necklace and bracelet set for each of her friends. Each necklace costs \$9.99, and each bracelet costs \$7.99. How many necklace and bracelet sets,  $s$ , did Selena buy?

Selena buys necklace and bracelet sets for  friends.

**Convince Me!** Suppose the equation is  $9.99s + 7.99s + 4.6 = 53.94$ . Can you combine the  $s$  terms and 4.6? Explain.

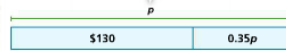
$s + \square s = 53.94$   
 $\square s = 53.94$   
 $s = \square$

**EXAMPLE 2** Combine Like Terms to Solve Subtraction Equations

Selene bought a computer screen on sale for 35% off the original price. What was the price of the computer screen before the sale?

Draw a bar diagram to represent the situation.

Let  $p$  be the price of the screen before the sale.



Use the bar diagram to write an equation. Then solve.

$$p - 0.35p = 130$$

$$0.65p = 130$$

$$\frac{0.65p}{0.65} = \frac{130}{0.65}$$

$$p = 200$$

Combine like terms.

**Look for Relationships** How do the original price and the sale price relate?

The price of the computer screen before the sale was \$200.

**Try It!**

Nat's grocery bill was \$150, which included a 5% club discount. What was Nat's bill before the discount? Write and solve an equation.

**EXAMPLE 3** Combine Like Terms with Negative Coefficients to Solve Equations

Solve the equation  $-3.5y - 6.2y = -87.3$ .

$$-3.5y - 6.2y = -87.3$$

$$-9.7y = -87.3$$

$$\frac{-9.7y}{-9.7} = \frac{-87.3}{-9.7}$$

$$y = 9$$

To combine like terms with negative coefficients, use the rules that you learned for adding and subtracting rational numbers.

**Try It!**

Solve for  $d$ .

a.  $-\frac{1}{4}d - \frac{2}{5}d = 39$

b.  $-9.76d - (-12.81d) = 8.54$

**KEY CONCEPT**

In an equation with variable terms on one side, you can combine like terms before using inverse operations and properties of equality to solve the equation.

$$0.8n + 0.6n = 42$$

$$1.4n = 42$$

$$\frac{1.4n}{1.4} = \frac{42}{1.4}$$

$$n = 30$$

Combine like terms.

**Do You Understand?**

- Essential Question** How do you solve equations that contain like terms?
- Look for Relationships** How do you recognize when an equation has like terms?
- Make Sense and Persevere** In the equation  $0.75s - \frac{2}{5}s = 44$ , how do you combine the like terms?

**Do You Know How?**

- Henry is following the recipe card to make a cake. He has 95 cups of flour. How many cakes can Henry make?



- A city has a population of 350,000. The population has decreased by 30% in the past ten years. What was the population of the city ten years ago?
- Solve the equation  $-12.2z - 13.4z = -179.2$ .

Name: \_\_\_\_\_

**Practice & Problem Solving**

Leveled Practice In 7 and 8, complete the steps to solve for x.

7.  $\frac{5}{2}x - \frac{1}{4}x = 11$

8.  $-0.65x + 0.45x = 5.4$

In 9-12, solve for x.

9.  $\frac{2}{3}x - \frac{1}{2}x = 87$

10.  $-3.8x - 5.9x = 223.1$


11.  $x + 0.15x = 3.45$

12.  $-\frac{1}{3}x - \frac{1}{10}x + \frac{1}{2}x = -56$

13. A contractor buys 8.2 square feet of sheet metal. She used 2.1 square feet so far and has \$183 worth of sheet metal remaining. Write and solve an equation to find out how much sheet metal costs per square foot.

14. **Make Sense and Persevere** Clint prepares and sells trail mixes at his store. This week, he uses  $\frac{1}{6}$  of his supply of raisins to make regular trail mix and  $\frac{2}{3}$  of his supply to make spicy trail mix. If Clint uses 20 pounds of raisins this week, how many pounds of raisins did he have at the beginning of the week?

15. **Make Sense and Persevere** A submarine descends to  $\frac{1}{6}$  of its maximum depth. Then it descends another  $\frac{2}{3}$  of its maximum depth. If it is now at 650 feet below sea level, what is its maximum depth?



see notes

$d =$  maximum depth?

$\frac{1}{6}$  of  $d$      $\frac{2}{3}$  of  $d$

$\left\{ \begin{array}{l} \downarrow \frac{1}{6}d \\ \downarrow \frac{2}{3}d \end{array} \right. +$

$$-\frac{1}{6}d + \frac{2}{3}d = -650$$

$$-\frac{1}{6}d + \frac{4}{6}d = -650$$

$$\frac{3}{6}d = \frac{-650 \cdot 6}{3} \quad \frac{6}{3} \div 3$$

$$d = +780$$

The maximum depth of the submarine is 780 ft below sea level.

12)

$$-\frac{3}{5}x + \frac{7}{10}x + \frac{1}{2}x = -56$$

$$-\frac{6}{10}x + \frac{7}{10}x + \frac{5}{10}x = -56$$

$$\frac{-6+7+5}{10}x$$

$$= (-56) \cdot \frac{-10}{8}$$

$$= \frac{-56 \cdot -10}{8} = \frac{560}{8}$$

$$\frac{+70}{1}$$

$$x = 70$$

16. Model with Math Write an equation that can be represented by the bar diagram, then solve.



17. Higher Order Thinking Solve  $\frac{2}{3}h - 156 = 3\frac{13}{24}$   
see notes

18. Model with Math Nathan bought one notebook and one binder for each of his college classes. The total cost of the notebooks and binders was \$27.08. Draw a bar diagram to represent the situation. How many classes is Nathan taking?

$$\begin{array}{r} 0.95 \\ + 5.82 \\ \hline 6.77 \end{array}$$

$$0.95c + 5.82c = 27.08$$

$$\begin{array}{r} 6.77c = 27.08 \\ \underline{6.77} \phantom{c} \\ 6.77 \end{array}$$

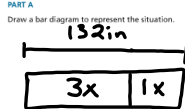
Assessment Practice  $c = 4$

Nathan is taking 4 classes in college.

19. Construct Arguments Your friend incorrectly says the solution to the equation  $-3y - 910 = y - 676$  is  $y = 676$ . What error did your friend make?

- Ⓐ Added  $-\frac{1}{3}$  to  $-\frac{1}{3}$
- Ⓑ Subtracted  $\frac{1}{3}$  from  $-\frac{1}{3}$
- Ⓒ Multiplied 910 by  $\frac{26}{26}$
- Ⓓ Multiplied 910 by  $\frac{26}{26}$

20. A 132-inch board is cut into two pieces. One piece is three times the length of the other. Find the length of the shorter piece.



PART B

Write and solve an equation to find the length of the shorter piece.

$$3x + 1x = 132$$

$$\begin{array}{r} 4x = 132 \\ \underline{4} \phantom{=} \\ 4 \end{array}$$

$$x = 33$$

The length of the shorter piece is 33 inches.

17)

Start  $\uparrow$  3 STEPS

$$\begin{array}{r} \frac{2}{3}h + 156 = 3\frac{13}{24} \\ \underline{+ 156} \phantom{=} \\ \frac{2}{3}h = 3\frac{13}{24} + 156 \\ \frac{2}{3}h = 159\frac{13}{24} \\ \frac{2}{3}h = \frac{3829}{8} \\ \frac{2}{3}h = \frac{3829}{16} \\ \frac{2}{3}h = 239\frac{5}{16} \\ \frac{2}{3}h \times \frac{3}{2} \\ \frac{2 \times 3}{3 \times 2} h = 239\frac{5}{16} \times \frac{3}{2} \\ h = 239\frac{5}{16} \end{array}$$

