

? Topic Essential Question

How can you solve algebraic equations and inequalities?

Vocabulary Review

Complete each definition and provide an example of each vocabulary word.

Vocabulary no solution infinitely many solutions

Definition	Example
1. When solving a one variable equation results in a true statement, such as $2 = 2$, the equation has _____.	
2. When solving a one variable equation results in a false statement, such as $2 = 3$, the equation has _____.	

Use Vocabulary in Writing

Explain how many solutions the equations $2x + 1 = 2(x + 1)$ and $2x + 2 = 2(x + 1)$ have. Use vocabulary words in your explanation.

Concepts and Skills Review

LESSON 3-1 Combine Like Terms to Solve Equations

Quick Review

You can use variables to represent unknown quantities. To solve an equation, collect like terms to get one variable on one side of the equation. Then use inverse operations and properties of equality to solve the equation.

Example

Solve $5x + 0.45x = 49.05$ for x .

$$5x + 0.45x = 49.05$$

$$5.45x = 49.05$$

$$\frac{5.45x}{5.45} = \frac{49.05}{5.45}$$

$$x = 9$$

Practice

Solve each equation for x .

1. $2x + 6x = 1,000$

2. $2\frac{1}{4}x + \frac{1}{2}x = 44$

3. $-2.3x - 4.2x = -66.3$

4. Javier bought a microwave for \$105. The cost was 30% off the original price. What was the price of the microwave before the sale?

LESSON 3-2 Solve Equations with Variables on Both Sides

Quick Review

If two quantities represent equal amounts and have the same variables, you can set the expressions equal to each other. Collect all the variables on one side of the equation and all the constants on the other side. Then use inverse operations and properties of equality to solve the equation.

Example

Solve $2x + 21 = 7x + 6$ for x .

$$2x + 21 = 7x + 6$$

$$21 = 5x + 6$$

$$15 = 5x$$

$$x = 3$$

Practice

Solve each equation for x .

1. $3x + 9x = 6x + 42$

2. $\frac{4}{3}x + \frac{2}{3}x = \frac{1}{3}x + 5$

3. $9x - 5x + 18 = 2x + 34$

4. Megan has \$50 and saves \$5.50 each week. Connor has \$18.50 and saves \$7.75 each week. After how many weeks will Megan and Connor have saved the same amount?

LESSON 3-3 Solve Multistep Equations**Quick Review**

When solving multistep equations, sometimes the **Distributive Property** is used before you collect like terms. Sometimes like terms are collected, and then you use the **Distributive Property**.

Example

Solve $8x + 2 = 2x + 4(x + 3)$ for x .

First, distribute the 4. Then, combine like terms. Finally, use properties of equality to solve for x .

$$8x + 2 = 2x + 4x + 12$$

$$8x + 2 = 6x + 12$$

$$8x = 6x + 10$$

$$2x = 10$$

$$x = 5$$

Practice

Solve each equation for x .

1. $4(x + 4) + 2x = 52$

2. $8(2x + 3x + 2) = -4x + 148$

3. Justin bought a calculator and a binder that were both 15% off the original price. The original price of the binder was \$6.20. Justin spent a total of \$107.27. What was the original price of the calculator?

LESSON 3-4 Equations with No Solutions or Infinitely Many Solutions**Quick Review**

When solving an equation results in a statement that is always true, there are **infinitely many solutions**. When solving an equation produces a false statement, there are **no solutions**. When solving an equation gives one value for a variable, there is **one solution**.

Example

How many solutions does the equation $6x + 9 = 2x + 4 + 4x + 5$ have?

First, solve the equation.

$$6x + 9 = 2x + 4 + 4x + 5$$

$$6x + 9 = 6x + 9$$

$$9 = 9$$

Because $9 = 9$ is always a true statement, the equation has infinitely many solutions.

Practice

How many solutions does each equation have?

1. $x + 5.5 + 8 = 5x - 13.5 - 4x$

2. $4\left(\frac{1}{2}x + 3\right) = 3x + 12 - x$

3. $2(6x + 9 - 3x) = 5x + 21$

4. The weight of Abe's dog can be found using the expression $2(x + 3)$, where x is the number of weeks. The weight of Karen's dog can be found using the expression $3(x + 1)$, where x is the number of weeks. Will the dogs ever be the same weight? Explain.

Quick Review

Inverse relationships and properties can be used to isolate the variable and solve two-step inequalities in the form $px \pm q > r$ or $p(x \pm q) > r$ in the same way that they are used to solve two-step equations.

Example

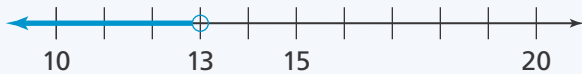
Write and solve the inequality. Then graph the solution.

7 times the sum of x and 8 is less than 147.

$$7(x + 8) < 147$$

$$x + 8 < 21$$

$$x < 13$$



Practice

1. Solve $-8n + 2 \leq 50$. Then graph the solution.



2. Solve $4.3(n + 6) > 47.3$. Then graph the solution.



3. The school band gets \$5 for each T-shirt they sell at a fundraiser. They have a goal of raising \$150. If \$45 has been raised so far, how many more T-shirts do they have to sell to reach or exceed the goal? Graph your solution.

