



Solving One-Step and Two-Step Equations with Properties of Numbers

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Learning Objectives

- Apply properties of numbers (commutative, associative, distributive, identity, inverse) to simplify expressions
- Solve one-step linear equations using inverse operations
- Solve two-step linear equations
- Solve linear equations involving fractions

Solve each equation for the variable, showing your work and applying the appropriate properties of numbers.

1. Identify the property of numbers illustrated below.

$$a + b = b + a$$

Answer: _____

2. Use the distributive property to simplify.

$$3(x + 5)$$

Answer: _____

3. Solve the one-step equation for x.

$$x + 7 = 12$$

Answer: _____

4. Solve the one-step equation for y.

$$y - 9 = -4$$

Answer: _____

5. Solve the one-step equation for n.

$$6n = 42$$

Answer: _____

6. Solve the one-step equation for m.

$$\frac{m}{4} = 10$$

Answer: _____

7. Solve the two-step equation for x.

$$2x + 5 = 17$$

Answer: _____



8. Solve the two-step equation for x.

$$3x - 8 = -2$$

Answer: _____

9. Solve the equation with a fraction for x.

$$\frac{x}{3} + 2 = 7$$

Answer: _____

10. Use mental math to solve the equation for x.

$$x + 12 = 20$$

Answer: _____





This worksheet covers the topics from Week 4 of Elementary Algebra: warm-up review, math fundamentals, properties of numbers (commutative, associative, distributive, identity, inverse), one-step equations (addition, subtraction, multiplication, division), two-step equations, equations involving fractions, and mental math strategies for solving simple equations.

Solutions

1. Identify the property of numbers illustrated below.

$$a + b = b + a$$

→ The order of the two addends has been switched.

→ Switching the order of terms in addition without changing the sum is the Commutative Property of Addition.

Answer: Commutative Property of Addition

2. Use the distributive property to simplify.

$$3(x + 5)$$

→ Multiply 3 by each term inside the parentheses.

→ Three times x is $3x$ and three times 5 is 15.

→ Combine the results to get $3x$ plus 15.

Answer: $3x + 15$

3. Solve the one-step equation for x .

$$x + 7 = 12$$

→ To isolate x , subtract 7 from both sides of the equation.

→ On the left side, 7 minus 7 cancels out, leaving x .

→ On the right side, 12 minus 7 equals 5, so x equals 5.

Answer: $x = 5$

4. Solve the one-step equation for y .

$$y - 9 = -4$$

→ To isolate y , add 9 to both sides of the equation.

→ On the left side, negative 9 plus 9 cancels out, leaving y .

→ On the right side, negative 4 plus 9 equals 5, so y equals 5.

Answer: $y = 5$

5. Solve the one-step equation for n .

$$6n = 42$$

→ To isolate n , divide both sides of the equation by 6.

→ On the left side, 6 divided by 6 equals 1, leaving n .

→ On the right side, 42 divided by 6 equals 7, so n equals 7.

Answer: $n = 7$



6. Solve the one-step equation for m.

$$\frac{m}{4} = 10$$

→ To isolate m, multiply both sides of the equation by 4.

→ On the left side, the 4 in the denominator cancels with the multiplier, leaving m.

→ On the right side, 10 times 4 equals 40, so m equals 40.

Answer: $m = 40$

7. Solve the two-step equation for x.

$$2x + 5 = 17$$

→ First, subtract 5 from both sides to undo the addition, giving 2x equals 12.

→ Then divide both sides by 2 to undo the multiplication.

→ Twelve divided by 2 is 6, so x equals 6.

Answer: $x = 6$

8. Solve the two-step equation for x.

$$3x - 8 = -2$$

→ First, add 8 to both sides to undo the subtraction, giving 3x equals 6.

→ Then divide both sides by 3 to undo the multiplication.

→ Six divided by 3 is 2, so x equals 2.

Answer: $x = 2$

9. Solve the equation with a fraction for x.

$$\frac{x}{3} + 2 = 7$$

→ First, subtract 2 from both sides to isolate the fraction term, giving x over 3 equals 5.

→ Then multiply both sides by 3 to clear the denominator.

→ Five times 3 equals 15, so x equals 15.

Answer: $x = 15$

10. Use mental math to solve the equation for x.

$$x + 12 = 20$$

→ Ask yourself what number added to 12 gives 20.

→ Since 20 minus 12 equals 8, the answer is x equals 8.

Answer: $x = 8$

