



Name: _____

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Learning Objectives

- Solve multi-step linear equations using inverse operations
- Transform literal equations and formulas to isolate a specified variable
- Set up and solve ratio and proportion problems
- Translate verbal phrases into algebraic expressions and equations

Solve each problem completely, showing all algebraic steps, and box your final answer.

1. Solve the multi-step equation for x.

$$3(x - 4) + 5 = 2x + 1$$

Answer: _____

2. Solve the equation with variables on both sides.

$$5x - 7 = 2x + 11$$

Answer: _____

3. Solve the equation containing fractions.

$$\frac{x}{3} + \frac{x}{4} = 14$$

Answer: _____

4. Solve the equation by distributing and combining like terms.

$$2(3x - 1) - 4(x + 2) = 6$$

Answer: _____

5. Solve the literal equation for y.

$$2x + 3y = 12$$

Answer: _____

6. Transform the formula for the area of a triangle to solve for the height h.

$$A = \frac{1}{2}bh$$

Answer: _____



7. Solve the temperature conversion formula for C.

$$F = \frac{9}{5}C + 32$$

Answer: _____

8. Solve the proportion for x.

$$\frac{x}{8} = \frac{15}{20}$$

Answer: _____

9. Translate the verbal phrase into an algebraic equation, then solve: Five less than three times a number is twenty-two.

$$3x - 5 = 22$$

Answer: _____

10. Translate and solve: The ratio of boys to girls in a class is 3 to 5. If there are 15 boys, how many girls are there?

$$\frac{3}{5} = \frac{15}{x}$$

Answer: _____





This worksheet covers all topics from the lesson: review of solving one-step and two-step equations, solving multi-step linear equations (variables on both sides, distribution, fractions), solving literal equations, transforming formulas for a specific variable, ratio and proportion, and translating verbal expressions into algebraic form.

Solutions

1. Solve the multi-step equation for x .

$$3(x - 4) + 5 = 2x + 1$$

→ Distribute the 3 on the left side to get 3x minus 12 plus 5 equals 2x plus 1.

→ Combine like terms on the left to get 3x minus 7 equals 2x plus 1.

→ Subtract 2x from both sides to get x minus 7 equals 1.

→ Add 7 to both sides to obtain x equals 8.

Answer: $x = 8$

2. Solve the equation with variables on both sides.

$$5x - 7 = 2x + 11$$

→ Subtract 2x from both sides to get 3x minus 7 equals 11.

→ Add 7 to both sides to get 3x equals 18.

→ Divide both sides by 3 to obtain x equals 6.

Answer: $x = 6$

3. Solve the equation containing fractions.

$$\frac{x}{3} + \frac{x}{4} = 14$$

→ Multiply both sides by the least common denominator 12 to clear the fractions.

→ The equation becomes 4x plus 3x equals 168.

→ Combine like terms to get 7x equals 168.

→ Divide both sides by 7 to obtain x equals 24.

Answer: $x = 24$

4. Solve the equation by distributing and combining like terms.

$$2(3x - 1) - 4(x + 2) = 6$$

→ Distribute to get 6x minus 2 minus 4x minus 8 equals 6.

→ Combine like terms to get 2x minus 10 equals 6.

→ Add 10 to both sides to get 2x equals 16.

→ Divide both sides by 2 to obtain x equals 8.

Answer: $x = 8$



5. Solve the literal equation for y .

$$2x + 3y = 12$$

- Subtract $2x$ from both sides to get $3y$ equals 12 minus $2x$.
- Divide both sides by 3 to isolate y .
- The result is y equals the quantity 12 minus $2x$ divided by 3.

Answer: $y = \frac{12 - 2x}{3}$

6. Transform the formula for the area of a triangle to solve for the height h .

$$A = \frac{1}{2}bh$$

- Multiply both sides by 2 to eliminate the fraction, giving $2A$ equals b times h .
- Divide both sides by b to isolate h .
- The result is h equals $2A$ divided by b .

Answer: $h = \frac{2A}{b}$

7. Solve the temperature conversion formula for C .

$$F = \frac{9}{5}C + 32$$

- Subtract 32 from both sides to get F minus 32 equals nine-fifths C .
- Multiply both sides by five-ninths to isolate C .
- The result is C equals five times the quantity F minus 32 divided by 9.

Answer: $C = \frac{5(F - 32)}{9}$

8. Solve the proportion for x .

$$\frac{x}{8} = \frac{15}{20}$$

- Cross multiply to get $20x$ equals 8 times 15.
- Simplify the right side to obtain $20x$ equals 120.
- Divide both sides by 20 to obtain x equals 6.

Answer: $x = 6$

9. Translate the verbal phrase into an algebraic equation, then solve: Five less than three times a number is twenty-two.

$$3x - 5 = 22$$

- Let x represent the unknown number.
- Three times a number is $3x$, and five less than that is $3x$ minus 5.
- Set the expression equal to 22 to get $3x$ minus 5 equals 22.
- Add 5 to both sides to get $3x$ equals 27, then divide by 3 to obtain x equals 9.

Answer: $x = 9$



10. Translate and solve: The ratio of boys to girls in a class is 3 to 5. If there are 15 boys, how many girls are there?

$$\frac{3}{5} = \frac{15}{x}$$

→ Set up the proportion with boys over girls equal on both sides.

→ Cross multiply to get $3x$ equals 5 times 15, which is 75.

→ Divide both sides by 3 to obtain x equals 25.

→ There are 25 girls in the class.

Answer: $x = 25$

