Solving Two-Step and Multi-Step Equations

STRAND: Computation and Estimation

STRAND CONCEPT: Equality/Solving Equations

SOL 7.12, 8.17

Remediation Plan Summary

Students will solve two-step and multi-step equations.

Common Errors and Misconceptions

- Students may add versus subtract or multiply versus divide when applying a property of equality.
- Students may make a sign error when working with negative values.
- Students may fail to check their answer and the reasonableness of their solutions.

Materials

- Warm Up – Review One-Step Equations
- Sample Balance
- Balances to Two-Step Equations activity sheet (attached)
- Two-Step Equations to Balances activity sheet (attached)
- Additional Practice with Two-Step Equations activity sheet (attached)
- Sample Practical Problems activity sheet (attached)
- Error Analysis with Property Application activity sheet (attached)

Introductory Activity

Have students complete the "Warm-up" worksheet. Once they have completed the task, review the solutions, and answer any questions they may have. Engage students in a discussion of how they determined what property of equality to use to solve each equation.

Plan for Instruction

1. Present students with the following scenario as a think-pair-share activity: Jane and her friend, Suzie, together have 17 bracelets. If Jane has 6 bracelets, how many does Suzie have? Have students represent the scenario with an equation and solve it.

2. Discuss the scenario and students' equations as a class, incorporating vocabulary when possible. Use different manipulatives to represent variables and numbers and a balance scale with pictures to model and solve the equation. Emphasize maintaining balance by applying properties of equality. Make connections between the concrete, the pictorial, and the symbolic. Have students check the solution using substitution.

3. Give students pictures of equations represented on balances, ask them to translate them into equations, then solve and use a calculator to confirm that the solutions are correct. Reinforce that the students will continue to solve equations by isolating the variable through the inverse operation. Justify the properties of equality as the problems are solved.

4. Give students equations, and ask them to represent the equations on balances, then solve and check the solutions.

6. Ask the students to complete the additional practice problems. This can be completed independently or in thoughtfully paired groups.
7. Once the students have a good foundation, have them solve multistep equations.

Pulling It All Together (Reflection)

Exit Ticket: Error Analysis with Property Application activity.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Virginia Department of Education 2018

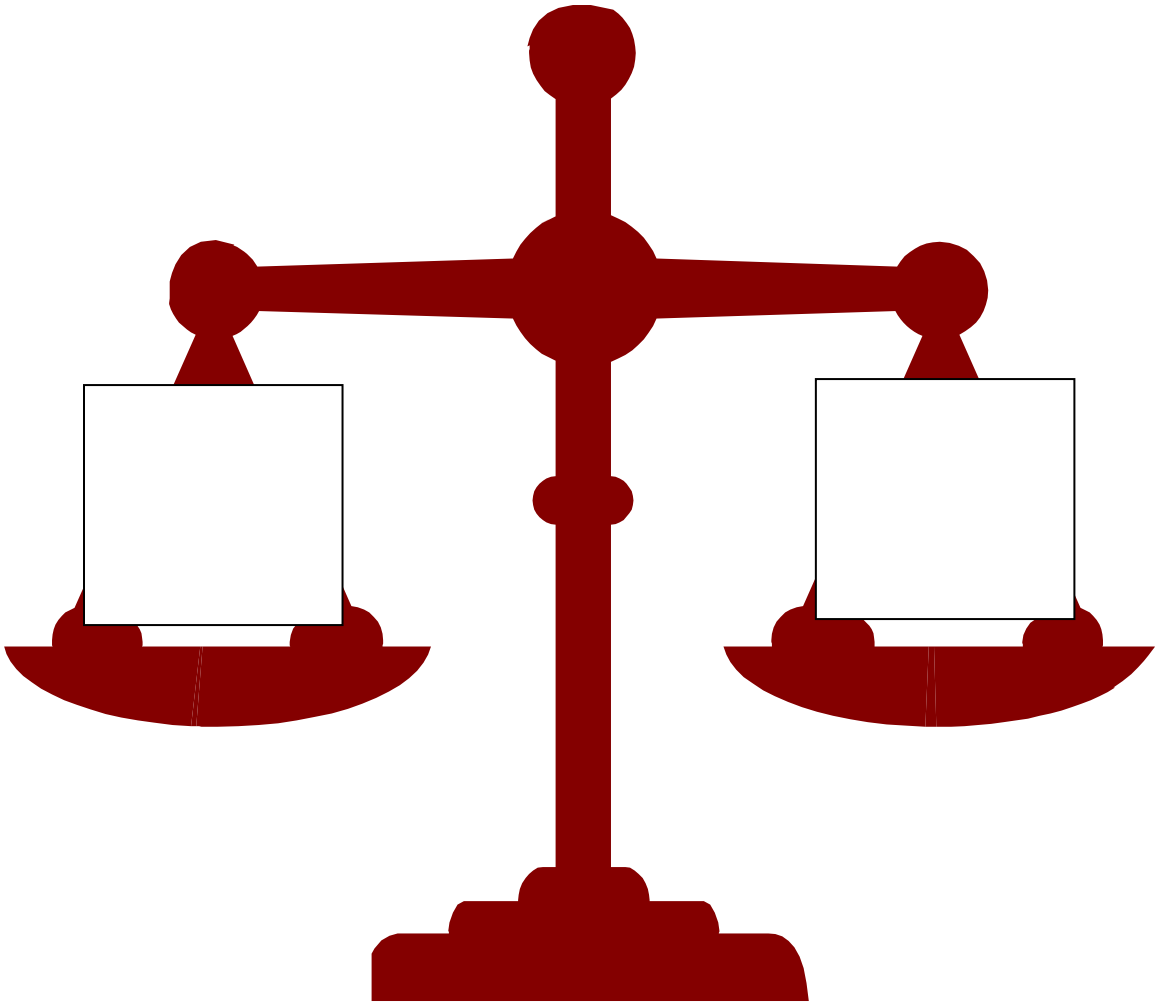
Name:

Warm-up
Review of One-Step Equations

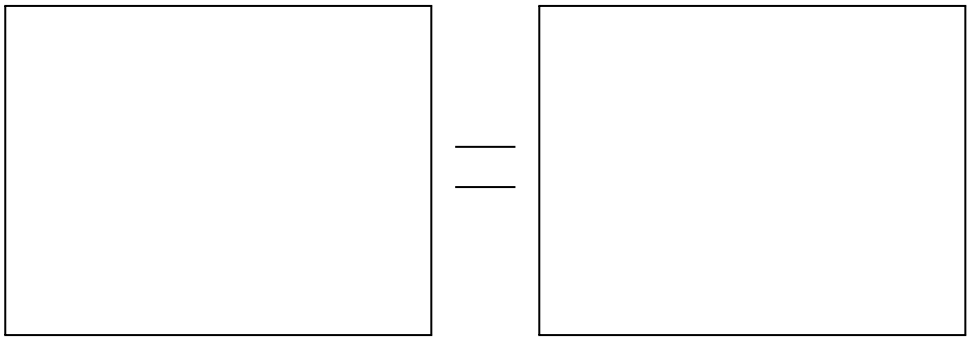
Solve the following equations. Check each solution.

$p + 4 = 11$	$-9p = 63$
$\frac{x}{12} = 48$	$29 = x - 5$

Sample Balance



Sample Balance Mat

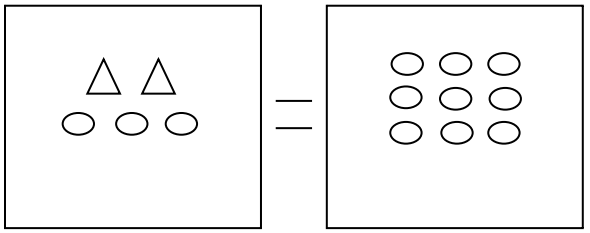


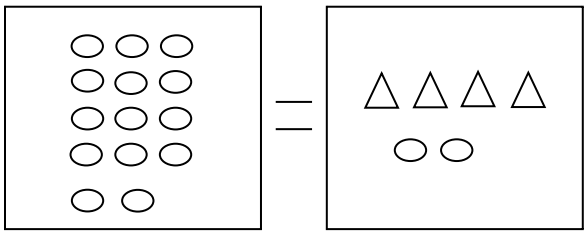
Balances to Two-Step Equations

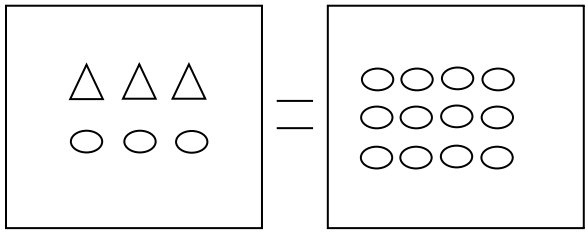
Directions: Write the equation based on the pictorial representation. Solve each equation using the inverse operation. Check your work.

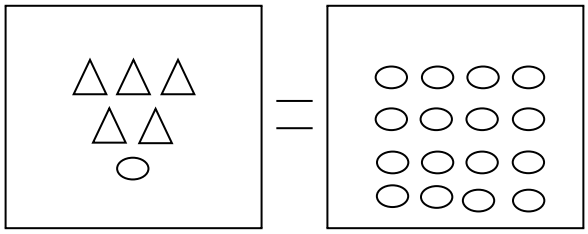
△ = x ○ = 1

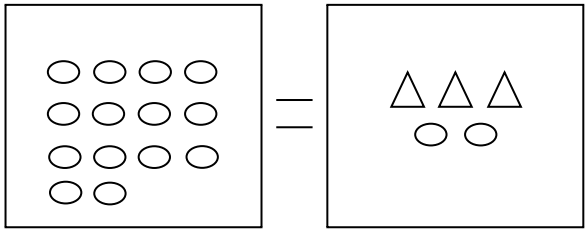
SOLVE | **CHECK**











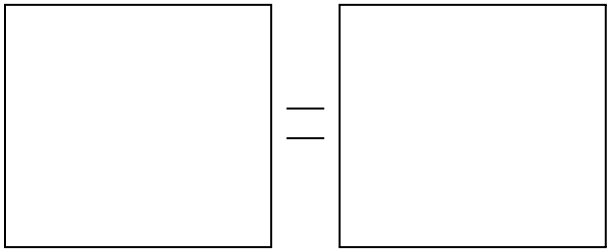
Two-Step Equations to Balances

Directions: Draw a pictorial representation for each equation. Solve and check each equation.

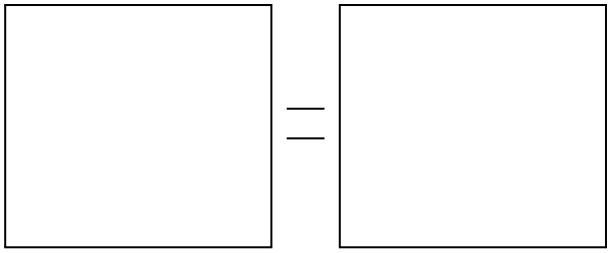
△ = x ⬭ = 1

SOLVE | **CHECK**

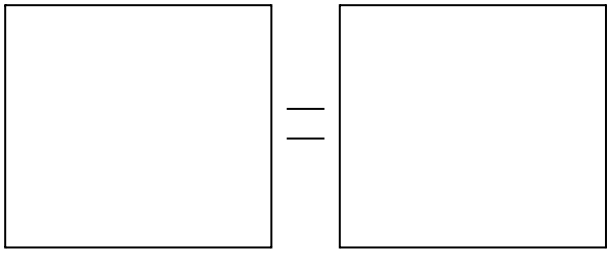
4*x* + 2 = 10



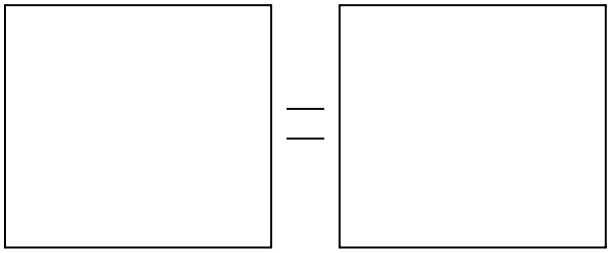
11 = 5x + 6



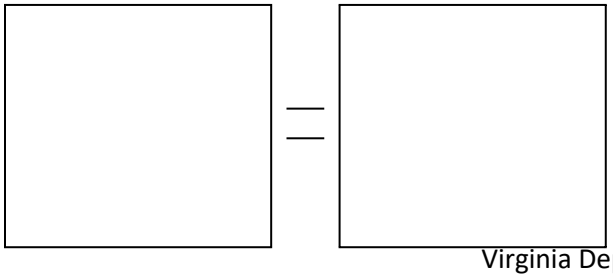
23 = 3 + 4x



3x + 9 = 18



4x + 2= 16



Additional Practice with Two-Step Equations

Directions: Show your work as you solve each equation. Check your solution for each equation.

$11 + 5x = 21$	$\frac{n}{4} + 2 = -6$
$18 = 7b + 4$	$-3 - 8n = -27$
$10 = 9.2 + 0.4x$	$3x + \frac{1}{2} = -8$
$\frac{x-4}{-6} = 3$	$\frac{1}{5}x - 6 = -7$

Practice with Multistep Equations

Directions: Show your work as you solve each equation. Check your solution for each equation.

$2x + 5x + 11 = 88$	$\frac{n}{3} + 2n = -6$
$2a + 3 - 8a = 8$	$4(y - 1) = 36$
$10 = 9.2 + 0.4x$	$3x + \frac{2}{3} = -8 + 2x$
$\frac{x+3}{2} + 2x = 10$	$\frac{2}{3}x - 2 = 4$

Error Analysis with Property Application

In which example has the student applied the properties of equality incorrectly to solve the equation?

$$3x + 4 = 25$$
$$3x + 4 + (-4) = 25 + (-4)$$
$$\frac{3x}{3} = \frac{21}{3}$$
$$x = 7$$

$$\frac{x}{4} - 5 = 7$$
$$\frac{x}{4} - 5 + (-5) = 7 + (-5)$$
$$4 \cdot \frac{x}{4} = 2 \cdot 4$$
$$x = 8$$

$$51 = -15z + 6$$
$$51 + (-6) = -15z + 6 + (-6)$$
$$\frac{45}{-15} = \frac{-15z}{-15}$$
$$z = -3$$