

Equations

Reporting Category	Patterns, Functions, and Algebra
Topic	Solving one and two step linear equations
Primary SOL	7.14 The student will a) solve one- and two-step linear equations in one variable; and b) solve practical problems requiring the solution of one- and two-step linear equations
Related SOL	7.13, 7.15, 7.16

Materials

- Manipulatives to represent equations
- Sample Graphic Organizers
- Balances to Equation Sample Sheets
- Equations to Balances Sample Sheets
- Sample Equation Word Problems (attached)
- Calculators

Vocabulary

expression, variable, equation, order of operations, properties (earlier grades)

one-step equation, inverse operations, two-step equation (7.14)

variable expression, numerical expression, verbal expression, verbal sentence, algebraic expression, algebraic equation (7.13)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Present students with the following scenario as a Think-Pair-Share activity: Joe and his friend Bob together have 17 games. If Joe has 6 games, how many does Bob 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 (see samples). Emphasize maintaining balance and using inverse operations. Make connections between the concrete, pictorial, and symbolic. Have students check the solution using substitution.
3. Continue the process above being sure to use examples including all operations.
4. Give students pictures of equations represented on balances, ask them to translate them into equations, then solve and check the solutions (see samples for one- and two-step equations).
5. Give students equations, and ask them to represent the equations on balances, then solve and check the solutions (see samples for one- and two-step equations).

Assessment

- **Questions**
 - When solving an equation, why is it important to perform identical operations on both sides of the equal sign?
 - What are the differences between solving one-step equations and solving two-step equations?
- **Journal/Writing Prompts**
 - Write a word problem whose solution can be found by solving the equation $x - 8 = 10$. Solve the problem.
 - Jack had \$25. He went to the grocery store and bought a few things. When he paid, he got \$8.00 change. He is trying to figure out how much money he spent. Jack thinks he should solve the equation $n - \$25 = \8 to see how much he spent. His friend, Jill, thinks he should solve the equation $\$25 - n = \8 to see how much he spent. Identify who you think is correct, and explain why.
 - Create a word problem that can be represented by a one- or two-step equation. Show the equation, then solve it.
- **Other**
 - Have students proofread equations to find and correct mistakes.
 - Have students create equation matching cards. One card has the equation, a second card has the solution, and a third card has a word problem that can be represented by the equation. Distribute cards and have students form groups by finding their matches.

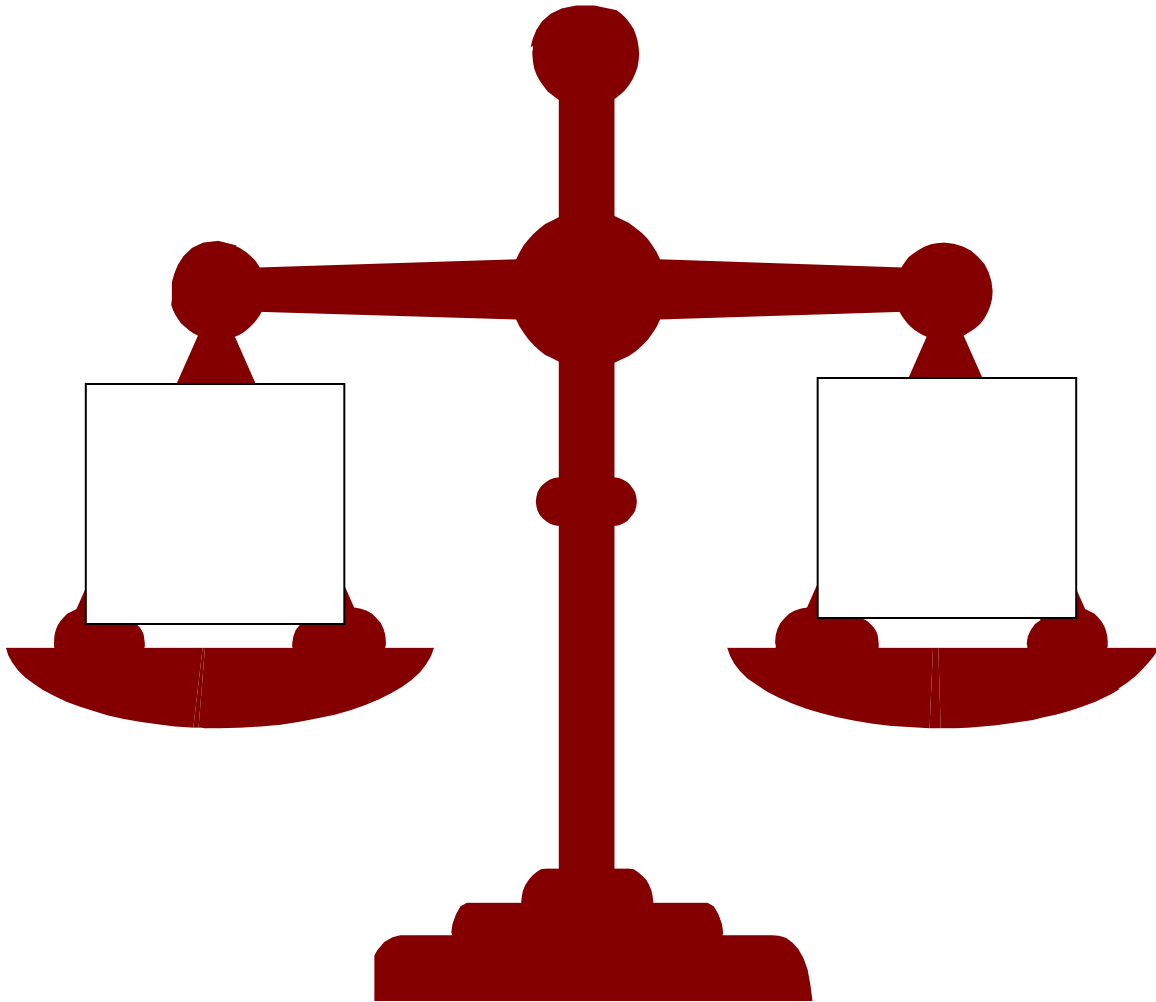
Extensions and Connections (for all students)

- Use a graphing calculator to graph lines.

Strategies for Differentiation

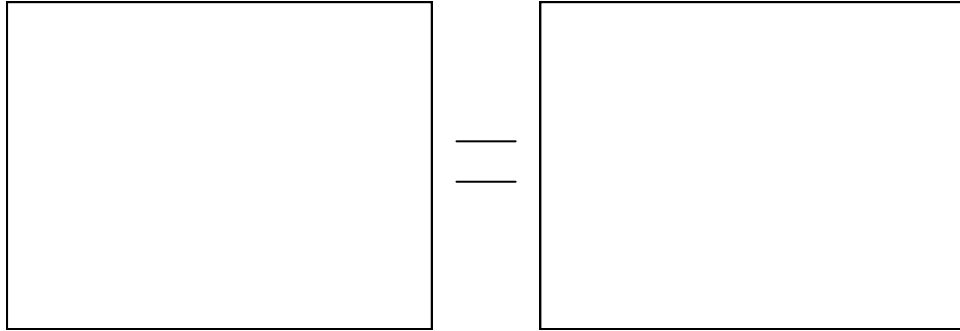
- Use graphic organizers to show the steps involved in solving an equation.
- Use different types of manipulatives and online resources to assist students with solving equations.
- Enlarge the sample balance mat to an entire page size.
- Have students model/draw each step of solving an equation on a separate balance mat.
- Write down the steps used to solve an equation. Begin with a simple example that has been solved for the student. Advance to more complex equations.

Sample Balance



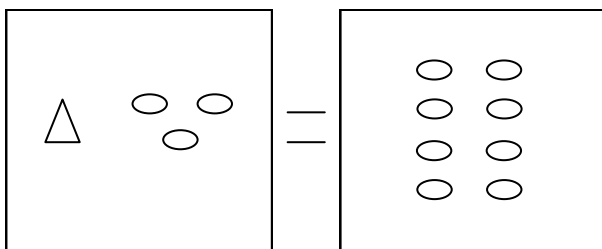
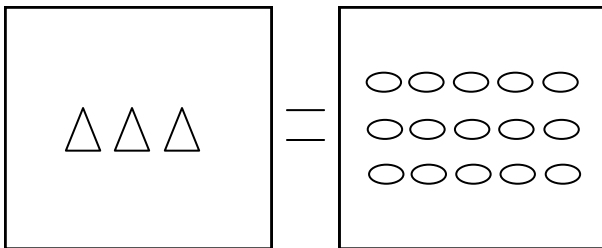
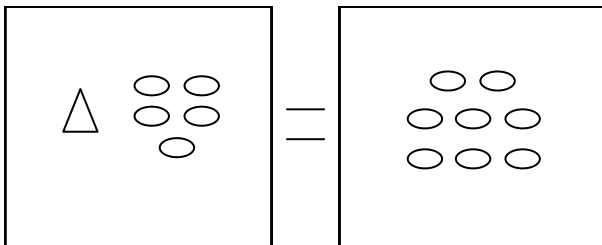
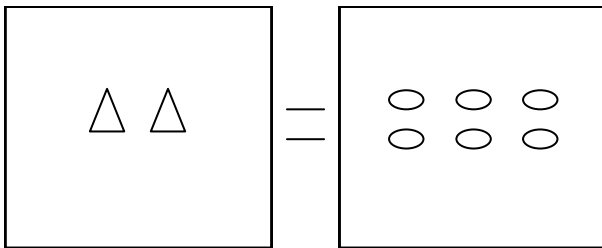
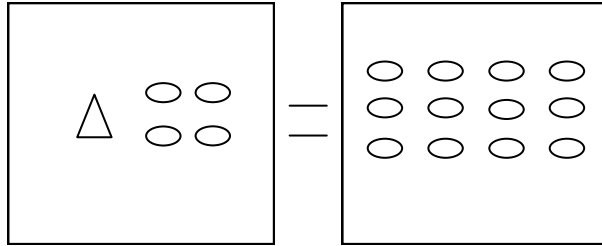
Sample Balance Mat

Name _____ Date _____



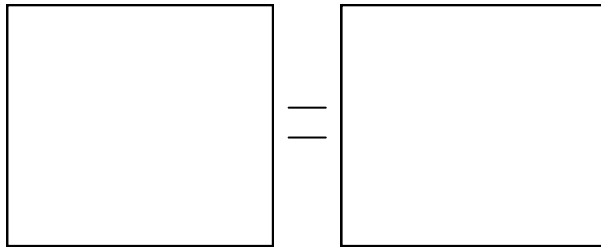
Balances to One-Step Equations

$\triangle = x$ $\circ = 1$

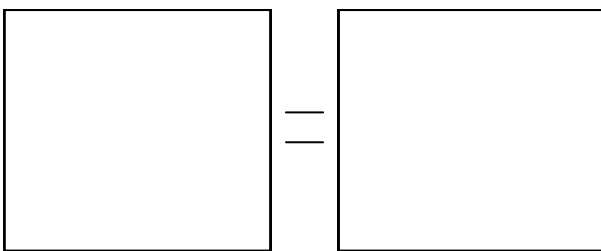


One-Step Equations to Balances

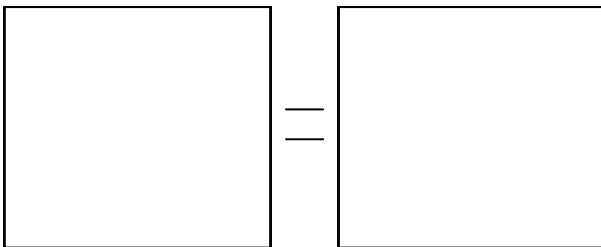
$$p + 5 = 13$$



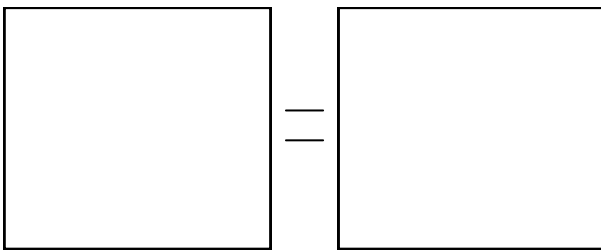
$$7p = 21$$



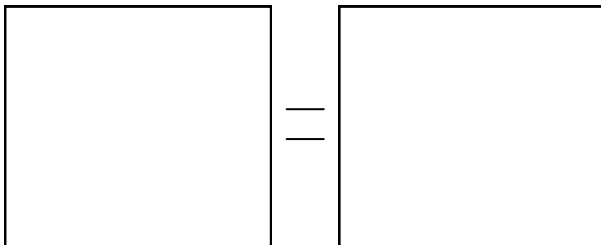
$$p + 2 = 8$$



$$5p = 30$$

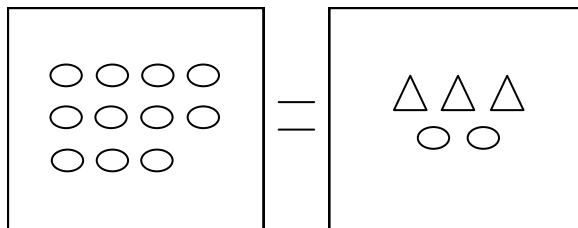
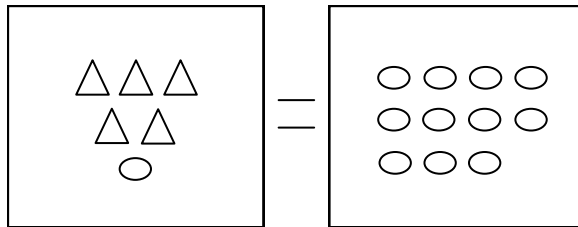
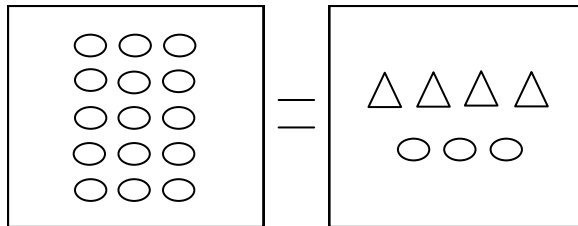
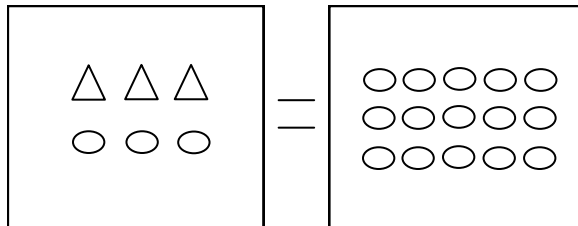
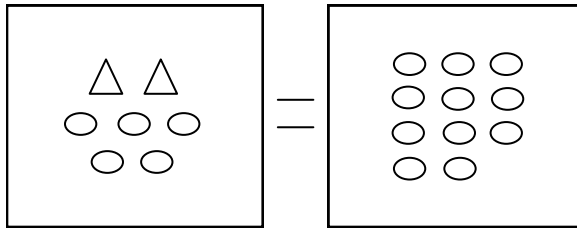


$$p + 6 = 9$$



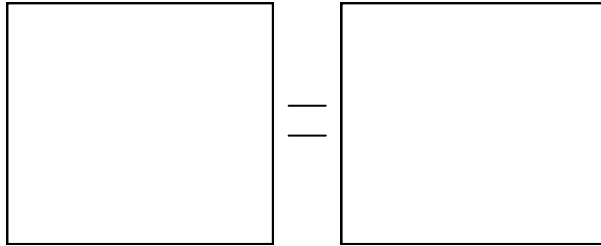
Balances to Two-Step Equations

$\triangle = x$ $\circ = 1$

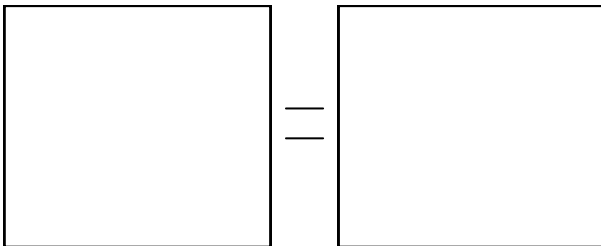


Two-Step Equations to Balances

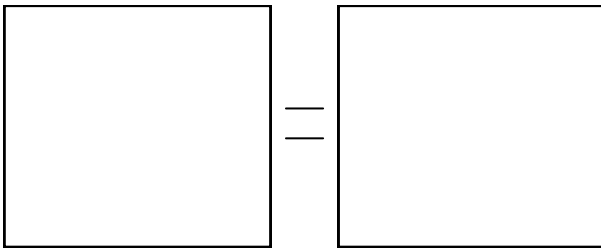
$$4p + 3 = 11$$



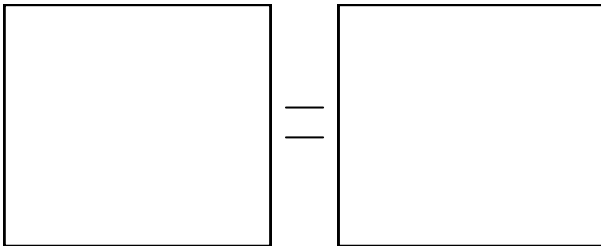
$$21 = 5p + 6$$



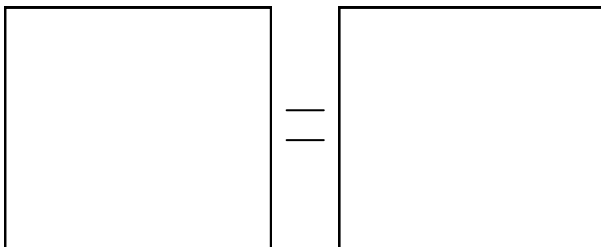
$$17 = 2p + 3$$



$$3p + 7 = 22$$



$$4p + 2 = 14$$



Sample Equation Word Problems

Name _____ Date _____

1. The sum of 5 and x is 20. What is x ?
2. The product of x and three is 27. What is x ?
3. Jim's three fish tanks contain an equal amount of fish. If Jim has a total of 27 fish, how many fish are in each tank?
4. Steven went to the store and bought 5 sweatshirts. He spent a total of \$45. What was the price of each shirt?
5. How many boxes of envelopes can you buy with \$12, if one box costs \$3?
6. At a restaurant, Bill and his 4 friends decided to divide the bill evenly. If each person paid \$12, what was the total bill?
7. Last Saturday, Allyson had \$38. For her birthday she received more money. She now has \$90. How much money did she receive?