

LESSON 7

Objective

Solve addition and subtraction equations.

Common Core State Standards

- **6.EE.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- **6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- **6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Expressions and Equations

Addition and Subtraction Equations

Students who first solve simple, intuitive equations, such as $x + 1 = 4$, and analyze how they find the solution, tend to understand the concepts (for example, inverse operations) used in solving equations. Applying these methods to slightly more difficult equations helps students to expand and generalize their understanding.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** How does subtraction help you solve the problem?
- **Say:** Choose a number. Add 6 to the number; then subtract 6 from the sum.
Ask: What number is left? Explain that adding 6 and subtracting 6 are inverse operations since one action undoes the other. Have students give other examples.

Solve It

Reread the problem with students. Have them explain how to use inverse operations to solve the equation. Then have students write the solution to the addition equation in the proper form.

More Ideas

For other ways to teach about solving addition and subtraction equations—

- Use Two-Color Counters to model the problem. Have students fold a sheet of paper in half with each half representing one side of the equation. Have them add or subtract counters on one side to make the two sides equal. Discuss how to use inverse relationships to find the solution.
- Have each student make up two addition and two subtraction equations that each contain one variable. Students then use Snap Cubes® to model each equation. Have them write one related subtraction equation for each addition equation and one related addition equation for each subtraction equation.

Formative Assessment

Have students try the following problem.

Which equation expresses the solution to $k - 8 = 16$?

- | | |
|------------------|----------------------|
| A. $16 - 8 = 8$ | C. $16 \div 2 = 8$ |
| B. $16 + 8 = 24$ | D. $2 \times 8 = 16$ |

Try It! 20 minutes | Groups of 4

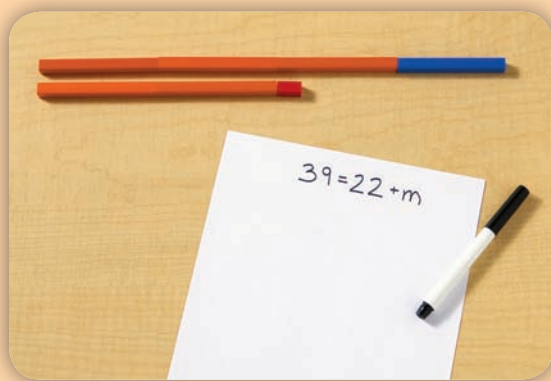
Here is a problem about solving addition and subtraction equations.

Randy spent 39 minutes on his computer. He spent the first 22 minutes downloading music and the remaining time messaging friends. Write and solve an addition equation to determine how many minutes Randy spent messaging his friends.

Introduce the problem. Then have students do the activity to solve the problem. Distribute Cuisenaire Rods, paper, and pencils to students. Suggest that m represents the number of minutes that Randy spent messaging his friends.

Materials

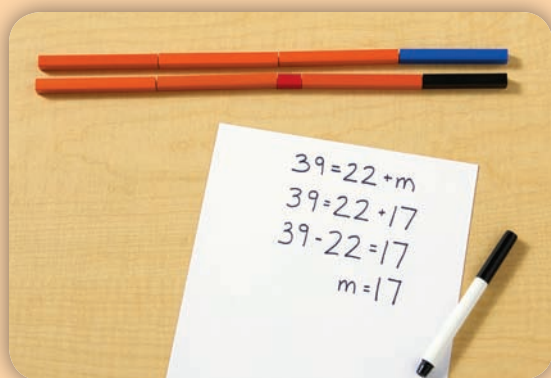
- Cuisenaire® Rods (2 sets per group)
- paper (1 sheet per group)
- pencils (1 per group)



1. Write $39 = 22 + m$ on the board. **Ask:** How does this equation represent the situation? Have students use Cuisenaire Rods to model the equation.



2. Say: To solve this equation, you can think "39 equals 22 plus what number?" Have students complete the model and write the equation that represents the model.



3. Have students refer to the model to visualize the inverse relationship between addition and subtraction. Elicit that students can subtract 22 from 39 to solve for m .

Say: Write a subtraction equation that expresses the information in the problem.

Look Out!

Be sure students left-align the rods in their models to help them recognize the relationship between the numbers.



Use Cuisenaire Rods to model each equation. Write an addition equation using the variable n . Use the Rods to solve the equation.

(Check students' work.)

1. 



$6 + n = 20; n = 14$

2. 



$2 + 10 + n = 28; n = 16$

Using Cuisenaire Rods, model the given equation. Sketch the model. Solve the equation.

3. $18 = 2 + q$

$q = 16$

4. $30 = 23 + r$

$r = 7$

Solve each equation.

5. $12 + w = 31$

$w = 19$

6. $35 = t + 14$

$t = 21$

7. $42 = u + 28$

$u = 14$

8. $11 + v = 29$

$v = 18$

9. $7 + c = 19$

$c = 12$

10. $19 + x = 25$

$x = 6$

Answer Key

Challenge! How can you check your answer after you have solved an equation?

Challenge: (Sample) I can put the number in the equation and then do the operations. I should get a true statement.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

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Name _____

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