

Cover-Up Problems

Reporting Category Equations and Inequalities

Topic Deriving a method of solving simple equations in one variable

Primary SOL A.4 The student will solve multistep linear and quadratic equations in two variables, including

- b) justifying steps used in simplifying expressions and solving equations, using field properties and axioms of equality that are valid for the set of real numbers and its subsets;
- d) solving multistep linear equations algebraically and graphically.

Related SOL A.1

Materials

- Cover-Up Problems activity sheet (attached)

Vocabulary

equation, variable (earlier grades)

inverse, addition property of equality, subtraction property of equality, additive inverse, multiplicative inverse, multiplication property of equality, commutative property of addition and multiplication, associative property of addition and multiplication, and symmetric property (A.4)

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

1. Distribute copies of the Cover-Up Problems activity sheet, and work through the problems, leading students to solve the equations for x with the following steps:
 - **Equation 1: $4 \cdot x = 12$**
 -  = 12 What is the value “under the hand”? (12)
 - $4 \cdot$  = 12 Now what is the value under the hand? (3)
 - Therefore, $x = 3$.
2. Discuss with students *how* they know their answers are correct and *why* the operations they performed to get them are important. Have students use the properties of real numbers and equality to justify the steps in equation solutions.
3. Identify and discuss inverse operations.

Assessment

- **Questions**
 - Create a one-step equation, filling in the blank: _____ = 10. Solve your equation.
 - Create a two-step equation, filling in the blank: _____ = 17. Solve your equation.

- **Journal/Writing Prompts**
 - One of your classmates was absent when we did the Cover-Up Problems activity. Write a detailed description explaining how to solve one- and two-step equations, using the Cover-Up method.
- **Other**
 - Have students create a children’s book that uses an equation. They may manipulate the equation and explain the how and why of the manipulation in simple terms.
 - Have students create a poster that uses an equation. They may manipulate the equation and explain the how and why of the manipulation in simple terms.

Extensions and Connections (for all students)

- Have students record their steps when solving one-variable equations.

Strategies for Differentiation

- Have students use algebra tiles and an algebra balance to solve simple equations.
- Copy the equations from the Cover-Up Problems activity sheet in large format onto large sheets of paper. Have students physically cover up the values indicated on the sheet.

Cover-Up Problems

Name _____ Date _____

Equation 1: $4 \cdot x = 12$

 = 12 What is the value “under the hand”? _____

$4 \cdot$  = 12 Now what is the value under the hand? _____
Therefore, $x =$ _____.

Equation 2: $x + 7 = 43$

 = 43 What is the value under the hand? _____

 + 7 = 43 Now what is the value under the hand? _____
Therefore, $x =$ _____.

Equation 3: $x - 11 = 15$

 = 15 What is the value under the hand? _____

 - 11 = 15 Now what is the value under the hand? _____
Therefore, $x =$ _____.

Equation 4: $\frac{x}{5} = 10$

 = 10 What is the value under the hand? _____

$\frac{}{5}$  = 10 Now what is the value under the hand? _____
Therefore, $x =$ _____.

Equation 5: $4 \cdot x + 8 = 12$

 = 12 What is the value under the hand? _____

 + 8 = 12 Now what is the value under the hand? _____

$4 \cdot$  + 8 = 12 What is the value under the hand now? _____
Therefore, $x =$ _____.

Equation 6: $\frac{x}{5} - 1 = 4$

 = 4 What is the value under the hand? _____

 - 1 = 4 Now what is the value under the hand? _____

$\frac{}{5}$  - 1 = 4 What is the value under the hand now? _____
Therefore, $x =$ _____.

Equation 7: $\frac{2 \cdot x}{3} + 7 = 13$

 + 7 = 13 What is the value under the hand? _____

$\frac{}{3}$  + 7 = 13 Now what is the value under the hand? _____

$\frac{2 \cdot$  + 7 = 13 What is the value under the hand now? _____
Therefore, $x =$ _____.