

Connect to Prior Knowledge of Math

Write the expression  $5a + 3b$  on the board. We use a **variable** for an **unknown number**. What are the variables in this example? (*The variables are  $a$  and  $b$ .*) Tell the students that  $a$  is the cost of one apple and  $b$  is the cost of one banana. Explain that an **algebraic expression** uses both numbers and variables. **What does this expression help me find?** (*The cost of 5 apples and 3 bananas*) **If one apple costs 10 cents and one banana costs 7 cents, how much did I spend?** ( $(5 \times 10) + (3 \times 7) = 50 + 21 = 71$  cents)

Expand Student Responses

Read aloud the examples below one at a time. **What are the variables in these examples?** ( $c$  and  $d$ ;  $p$ ;  $r$  and  $s$ ) Write each word phrase on the board as an algebraic expression.

the number of cats plus the number of dogs " $c + d$ "

30 cents minus the cost of 2 pencils " $30 - 2p$ "

the number of rows times the number of seats in each row " $r \times s$ "

## Properties of Equality

### ACCESS CONTENT



**Objective** Explain why expressions are or are not equivalent, and give values for variables that make equations true.

**Vocabulary** Equation

Use Demonstration

Have three students stand on each side of a large equal sign drawn on the board. **This equation is balanced.** What does the word *balanced* mean in this sentence? (*Same on both sides*) **I am going to add a student on one side of the equation.** Call a student up to stand on one side. **What do you have to do to keep the equation balanced?** (*Add a student to the other side.*) Call a student to stand on the other side. **This is called the Addition Property of Equality. What do you think this means?** (*If you add something to one side of the equation, you must add the same thing to the other side to keep the equation balanced.*)

Write the following equations on the board.

$$1 + 2 = 3$$

$$1 + 2 + 1 = 3 + 1$$

Next, point to two students on one side of the equation and have them sit down. **This time I subtracted two students from one side. What do you have to do to keep the equation balanced?** (*Have two students on the other side sit down.*) Have students make the appropriate physical response. **This is called the Subtraction Property of Equality. What does this mean?** (*If you subtract something from one side of the equation, you must subtract the*

same thing from the other side to keep the equation balanced.) Write the following equations on the board.

$$1 + 3 = 4$$
$$1 + 3 - 2 = 4 - 2$$

Continue the activity to illustrate the multiplication and division properties of equality.

## Solving Equations with Whole Numbers



**ACCESS CONTENT; EXTEND LANGUAGE**

**Objective** Solve one-step equations with one variable.

**Materials** (per group) 1 cup; counters

**Vocabulary** Solve, equation

**ESL Strategies**

**Use before** **LEARN**

10–15 MIN

**Use Manipulatives** > Place a cup that has an  $n$  written on it and 5 counters on one side of a table. On the other side, place 8 counters. Gesture and say, **This stands for an equation. The number of counters on one side of the table equals the number of counters on the other side. 5 plus  $n$  equals 8. To find out what  $n$  stands for, take away 5 counters.** Remove 5 counters from both sides. **Subtract 5 counters from this side so that  $n$  stands alone. Both sides must always be equal. Subtract 5 counters from the 8 counters. How many counters remain? (3) So,  $n$  must equal 3. When we find the value of  $n$ , we solve the equation.**

**Have Students Report Back Orally** > Write the following equation on the board and solve it.

$$15 + n = 20$$
$$15 + n - 15 = 20 - 15$$
$$n = 5$$

Explain that any letter can be used in an equation. Divide the class into groups of 3 or 4 students. Give each group of students counters and a cup and ask them to use the preceding method to solve the following problems. Write them on the board.

$$7 + n = 25 \quad (n = 18)$$

$$15 = 19 - y \quad (y = 4)$$

$$14 = b + 14 \quad (b = 0)$$

Then have students report back orally to describe how they solved each problem. Invite volunteers to demonstrate their strategy for the class.