The Language of Equations

Purpose

Students will use a variable to represent an unknown number to write an equation that correctly represents a situation.

Materials

For the teacher: chalk, chalkboard
For each student: copy of Black Line Master (BLM) *I'm Thinking of a Number*

Activity

A. Introduction

1. Ask students if anyone speaks more than one language. Discuss responses.
2. Tell students that they will be learning a "new language" today, but this language is easy to learn. Tell them that the new language is the language of equations. Explain that the class will be reading word problems and writing them in the language of equations.

B. Class Activity

1. Review simple story problems that can be written as number sentences (e.g., "Sara bought 6 apples and 3 oranges. How many pieces of fruit did Sara buy altogether?"). Have students assist you in writing the number sentences.
2. Tell students that there are some story problems that tell you the answer to the number sentence but are missing another part of the number sentence.
3. Write the following story problem on the board: Micah needed 26 cookies in order to give everyone in his class one cookie for his birthday. His father gave him two packages of cookies. Micah used all of one package and eight cookies from the other package. How many cookies were in the packages?
4. Say the equation in words: "The number of cookies in one of Micah's packages plus eight cookies equals 26 cookies." Explain that you will now show students how to write the problem in the language of equations. Write the equation using symbols, writing words for the missing information:

The number of cookies in Micah's package	+ 8 = 26

(continued)

EXTENDING THE ACTIVITY

Have students write word problems to be converted to equations. Allow students to write either story problems, such as the ones in the activity, or word problems involving numbers only, such as the ones on the BLM.

MEETING INDIVIDUAL NEEDS

Work individually with students having difficulty writing correct equations. Ask questions such as: "What is the result you will have after you are done?" and "What number will you be adding to this number?" Focus on the information that is available before determining the placement of the variable.

Standards Links
5.2.1, 5.7.1, 5.7.3

Activity (continued)

5. Tell students that in the language of equations, it is easier to use a variable that is simply a letter that represents missing numbers. Erase the text and replace with it with an "*x*." Explain that it is helpful to write the meaning of the variable until you have solved the equation, so that you know what the solution represents. Write "*x* = the number of cookies in one of Micah's packages" to the side.
6. Ask students to determine the missing number by looking at the equation. Have students explain how they arrived at their answers. Refer back to what the variable represented to apply the meaning of the solution.
7. Write the following two-step word problem on the board: On Elise's birthday, she also bought cookies for the 26 students in the class. Her packages were smaller than Micah's. She used two full packages and two cookies from another package. How many cookies were in each of her packages?
8. Use the same method as the one-step problem above to lead the students to write the equation: $2x + 2 = 26$. Write "*x* = the number of cookies in one of Elise's packages" to the side. Emphasize that while you are using the same variable as in the last problem, it represents a different number.
9. Repeat the procedure using three or four other similar word problems.

C. Partner Activity

1. Divide the class into pairs. Hand each student a copy of the BLM *I'm Thinking of a Number*.
2. Have students write equations based on the word problem listed and the numbers that they choose for the first four problems. Instruct students to trade papers with their partners and find the number their partners thought of based on the equation they wrote. Check equations on disputed answers.
3. Have students write equations for the last two word problems on their own and solve the equations.

Questions for Review

Basic Concepts and Processes

While students are completing the last portion of the BLM, ask the following questions:

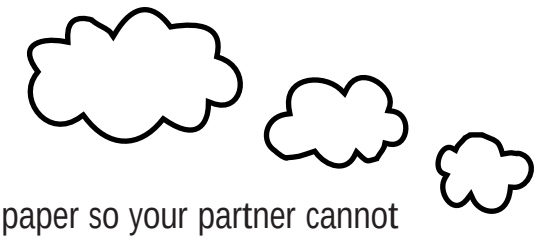
📖 Write a subtraction sentence for the word problem by using the variable *n*: When a certain number is subtracted from 37, the result is 24.

💡 How would you find the number that *n* represents?

📖 What does the variable [*referring to one of the last two problems on a student's BLM*] represent?

Name: _____

I'm Thinking of a Number



In problems 1 through 4, write a number on a piece of paper so your partner cannot see it. On another piece of paper use x for the number you chose and write an equation that represents the operations you used.
Remember to include the result of those operations on the right side of the equation.
Trade papers with your partner when you have finished the four problems.
Looking at the equations on your partner's paper, find the numbers that your partner chose.

Example: Think of a number 1 through 20. [4]

Triple it.	$3 \times x$ [12]
Subtract 1.	$3 \times x - 1$ [11]
Write an equation.	$3x - 1 = 11$

Have your partner decide what number you chose for "x."

1. Think of a number 1 through 20.
Double the number.
Add 5 to the number.
Write an equation.

2. Think of an even number 2 through 40.
Divide by 2.
Write an equation.

3. Think of a number 1 through 20.
Multiply by 6.
Take away 6.
Write an equation.

4. Think of a number 2 through 20.
Multiply by 10.
Subtract 11.
Write an equation.

Write an equation that represents the story problems below. Use x to represent the missing number. Solve the equations by finding the value that x represents.

5. Nikki bought tickets for her three friends to go to the football game. Once inside, she also spent a total of $2 on popcorn for her friends. She spent $11 altogether on her friends. Solve to find the cost of one football ticket.

6. Ray brought home some candy to share equally with his two brothers. He saved 6 pieces for himself. He had 12 pieces altogether. Write an equation that shows how Ray split the candy among himself and his brothers. How many pieces did each of his brothers get?

I'm Thinking of a Number

Teacher Directions

Distribute one copy of the BLM *I'm Thinking of a Number* to each student.

For items 1-4, have students write equations based on the numbers they choose and then trade papers with their partners so that the partners can solve the equations for x. Check equations and answers for any disputes.

For items 5-6, have students write the equations for the story problems and solve them.

Answer Key

1-4 Answers will vary. Check equations and answers for any disputes.

5. $3x + 2 = 11$, $11 - 2 = 3x$, or $11 - 3x = 2$; $x = 3$, the cost of one football ticket

6. $2x + 6 = 12$, $12 - 6 = 2x$, $12 - 2x = 6$; each of Ray's brothers got 3 pieces of candy.