

# Math 5 - Act. 11: Understanding Variables

## Summary

This activity will help students understand what a variable is and give them practice solving equations.

## Materials

Large symbol cards for board

Symbol card sets for individuals or small groups

## Additional Resources

*The Best of Mailbox Magazine Math: Grades 4-6* Teacher resource book

*Cooperative Learning and Mathematics K-8* by Beth Andrini

*Lessons for Algebraic Thinking* by Maryann Wickett, Katherine Kharas, and Marilyn Burns

*Family Math: The Middle School Years* by Virginia Thompson and Karen Mayfield-Ingram

*Ready, Set, Hop!* by Stuart J. Murphy (MathStart Series)

*The Mailbox: Intermediate* April/May 2001

## Background for Teachers

The definition of a variable is a letter, symbol, or other placeholder in a mathematical expression that has an unknown value. Students should be familiar with finding missing values though they may not associate them with the term variable. Several different symbols and letters should be used so students can feel comfortable solving equations with any variable used.

## Intended Learning Outcomes

2. Become mathematical problem solvers.

## Instructional Procedures

### Invitation to Learn

Tell the students that you are going to play a true/false game. You will write an equation on the board and they will put their thumbs up if it is true and down if it is false. Proceed to write several true and several false equations (i.e. true:  $3 + 6 = 9$ ,  $10 - 8 = 2$ ,  $7 \times 2 = 14$ ; false:  $5 \times 10 = 45$ ,  $24 - 20 = 14$ , etc).

Explain that today we will be working with equations that are neither true nor false, but are "open" and have a missing number for them to solve.

### Activity A

#### Instructional Procedures

Begin by practicing using algebraic language. Have students write the following mathematical expressions write in their math journals and make them true:

Six more than 17

Five less than 25

Three times as large as 11

A number increased by 5

Four times the sum of two numbers

The product of eight and another number (a.  $17 + 6 = 23$ , b.  $25 - 5 = 20$ , c.  $11 \times 3 = 33$ , d, e, and f are open ended)

*Note:* A picture book that gives students the opportunity to practice this is *Ready, Set, Hop!* by Stuart J. Murphy.

Check for understanding and then proceed. Explain that you did not give them the answer so the problem should look like this:

$$17 + 6 =$$

After they solve it the equation should look like this:

$$17 + 6 = 23$$

Tell students that many times not all of the number values are given and there are missing addends. For example:

Kelly had 5 more marbles than Mike and together they had 12 marbles. The problem would look like this:

$$+ 5 = 12$$

Explain that when a symbol or letter is used in place of an unknown number it is called a variable. Ask students what number would go in the place of the *variable* to make this equation true.

Do several more simple examples with different variables and have students write them in their math journals and solve:

$$10 - = 6$$

$$5 \times n = 15$$

$$30 - = 10$$

Have each student create five equations using one variable, then switch with a partner to solve. Switch back to correct.

### Activity B

Explain that not only is it important to be able to figure out what a variable's value is equal to, it is also important to know how to set up the expression.

Pass out the envelopes of *variable symbol* and *operation cards*. Have students remove the cards and use them to set up the following expressions:

Jeff's ticket for a movie cost . His dad's cost . What was the total of the two tickets?

( + )

Cindy has to buy a book that costs . How much change will she receive?

( -- )

One can of pop costs . How much would a -pack cost?

( x )

Next have students write in their math journals how they would write these expressions:

I started with beans, then I increased them by 10.

( + 10 )

There were beans in the bag. Now there are 7 less.

( -- 7 )

I started with  $n$  beans in a bag and decreased it by 4.

(  $n$  -- 4 )

There were  $y$  beans in the bag. Now there are 2 more.

(  $y$  + 2 )

To conclude, write  $x + 5$  on the board and have students think of a word problem to match the expression. Have them share their ideas with their partners and vice versa. Repeat the activity with  $n - 2$ .

### Extensions

## Possible Extensions/Adaptations

Students who are ready could use the variable cards to represent two-step problems:

Katie purchased a box of popcorn for  $x$  and a liter of pop for  $y$ . What was her total cost if she used a coupon for  $z$  off?

$$(x + y) - z =$$

Blake had  $a$  dollars saved. He bought a radio for  $b$ .

The next week he got  $c$  dollars for his allowance.

How much money does he have now?

$$(a - b) + c =$$

Students can work in pairs to play "mystery numbers." Have the partners draw a circle and square at the top of their paper. Then have them draw two cards from a number card set of 0-9 (or just assign them two different numbers). The pair chooses which number will be represented by the circle and which by the square and writes that on their paper. Then they write down five number sentences using the circle and the square with the answer. Have pairs use addition, subtraction, multiplication, or division. They can come to the board and write their first sentence, then call on volunteers to see if they can determine what the circle and square represent. If they can't, then the pair writes their next sentence and calls on volunteers as before. Continue if necessary until all five number sentences have been used or until the numbers have been discovered. This could also be done in small groups. See example below:

$$x = 24 + y = 11$$

$$z = 16 + x =$$

$$-- = 4$$

$$\text{Answer: } = 8 = 3$$

## Homework & Family Connections

Have students play the "mystery number" game at home (see extensions). Students choose two numbers to represent the circle and square and see how many number sentences (clues) it takes for their parents to decide what the variables represent.

## Assessment Plan

Carefully observe as students write their equations and use variables to make sure they understand. Have them use white boards or chalkboards to show you their answers quickly or just have them write in their math journals as you walk around and assess their learning.

## Authors

[Utah LessonPlans](#)