

# Name That Formula!

## Purpose

Students will write and use formulas with up to three variables that describe geometric quantities.

## Materials

*For the teacher:* chalk, chalkboard, permanent marker, large box of plastic drinking straws, package of pipe cleaners

*For each student:* copy of Black Line Master (BLM) *Fun With Formulas!*, set of pre-cut and labeled straw pieces, pipe cleaners, pencil

## Activity

### A. Pre-Activity Preparation

1. Cut plastic drinking straws into lengths of two, four, and six inches, enough for each student to have four pieces of each size.
2. Label each using a permanent marker. Two-inch pieces should be labeled “a.” Four-inch pieces should be labeled “b.” Six-inch pieces should be labeled “c.”

### B. Introduction

1. Write the terms “length” and “width” on the chalkboard. Ask students what these terms mean. Discuss types of shapes commonly associated with these terms. Draw these shapes on the board as they are mentioned and label the length and width where appropriate.
2. Tell the students that formulas can be written to describe many geometric shapes using variables to represent the length and width.
3. Draw a rectangle on the chalkboard. Ask students where the labels for length and width should be placed. Label the sides of the rectangle using the variables “ $l$ ” and “ $w$ .” Tell the students other variables can be used to represent length and width however “ $l$ ” and “ $w$ ” are used most commonly.
4. Tell the students that the perimeter or *distance around* this rectangle can be expressed by using these two variables.
5. Ask the students to construct a formula for the perimeter of the rectangle. Start with  $P = l + l + w + w$ , then rework the formula to read  $P = 2l + 2w$ . Remind students that the variable  $P$  represents the value of the perimeter of the rectangle.

(continued)

## connecting across the curriculum



### Social Studies

Introduce students to the Distance Formula,  $D = r \times t$ . Have students use an atlas to determine distances between cities. Ask students to compute the travel time if the rate of travel is 55 miles per hour.

## EXTENDING THE ACTIVITY



Explain that formulas are in use all around us. Give students an at-home assignment to construct a formula for the perimeter of common items, such as the front door, a window, the top of a coffee table, etc.

## Standards Links 6.4.3, 6.5.1

**Activity (continued)**

6. Ask students to find the value of  $P$  when  $l = 5''$  and  $h = 3''$ .  
[ $P = 16''$ ]
7. Explain to students that we can find the equation for the perimeter of any polygon. Draw a picture of a polygon on the chalkboard, labeling the sides " $a$ ," " $b$ ," and " $c$ ." (Make sure you use no more than three different side measures.) Explain that the perimeter is found by adding the measure of all the sides of the polygon. Write the formula for the perimeter of the polygon in the form " $P = 3a + 2b + c$ ."
8. Tell students that there are many situations in everyday life when individuals write a formula to simplify problem solving. Give some examples, such as figuring perimeter to fence a yard.


**C. Class Activity**


1. Distribute a set of pre-cut and labeled straws, two or three pipe cleaners, and a copy of the BLM *Fun With Formulas!* to each student.
2. Tell students that they will be creating their own formulas now. Ask each student to build a polygon from the straw pieces. (Pipe cleaners can be used to hold the straws. Bend the pipe cleaner to form the angles of the polygon and insert them into straw openings.) Tell students they may create a polygon with as few or as many sides as they wish.
3. Have the students draw a sketch of the polygon on the BLM. Remind students to label the sketch with the variable that appears on the straw piece.
4. Instruct students to write the formula for perimeter of each polygon.
5. Have the students repeat steps 3 through 5 five times to complete questions 2 through 6 on the BLM.
6. Instruct students to complete the table by substituting the values listed for  $a$ ,  $b$ , and  $c$ .


**Classroom Assessment****Basic Concepts and Processes**

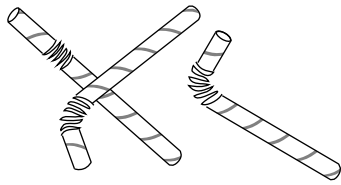
While students work on the class activity, ask the following questions to gauge their understanding of the Standard Indicator:

 Which of your sides are the same length?

 How are you going to label these sides in your sketch?

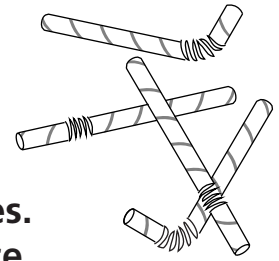
 What is the formula for the perimeter of your polygon?

 How can you find the actual perimeter of your polygon?



Name: \_\_\_\_\_

# Fun With Formulas!



Create 6 polygons using straw pieces and pipe cleaners. Draw sketches of each polygon inside the numbered boxes. Label the sides with the variable shown on the straw piece.

1.	2.
3.	4.
5.	6.

Complete the table below by writing a formula for the perimeter of each polygon you sketched above. Use substitution to compute the perimeter of each. Label your solution with the correct unit of measurement.

	Formula for perimeter	<i>a</i>	<i>b</i>	<i>c</i>	Perimeter
1.		2 in	8 in	10 in	
2.		8 cm	15 cm	22 cm	
3.		13 yd	20 yd	35 yd	
4.		1 km	2 km	3 km	
5.		2 ft	4 ft	6 ft	
6.		100 mm	120 mm	135 mm	

# Fun With Formulas!

## Teacher Directions

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Distribute copies of the BLM *Fun With Formulas!* to students. Have students create six of their own polygons at their desks using the pre-cut and labeled straw pieces and pipe cleaners (the pipe cleaners may be bent to form the angles of the polygons). Direct students to insert the pipe cleaners into the straw openings to hold the polygon together. Each student should sketch and label the polygon (according to the label marked on each straw piece) on a copy of the BLM. Tell the students to complete the table, writing a perimeter formula for each polygon, substituting the indicated values for  $a$ ,  $b$  and  $c$ , and finding the actual perimeter of each polygon. Each solution should be labeled with the proper unit of measurement.

Note: Instruct the students to write their formulas in the manner " $P = 2a + 3b + c$ ." Tell them that the formula " $P = a + a + b + b + b + c$ " is another way to write the formula, but they should simplify by combining like variables.

## Answer Key

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Answers vary depending on the polygon. Each student should sketch the polygon, label the sides, write a formula for perimeter and find the value of  $P$  by substituting the indicated values for  $a$ ,  $b$ , and  $c$ .