

# USING FORMULAS



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# Using Formulas

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## What is it?

Using a Formula is a problem-solving strategy that students can use to find answers to math problems involving geometry, percents, measurement, or algebra. To solve these problems, students must choose the appropriate formula and substitute data in the correct places of a formula. The following problem would be best solved using a formula:

If it is 46 degrees Celsius, how many degrees Fahrenheit is it?  
Students can use the formula  $F = 1.8C + 32$  to find the solution.

## Why is it important?

Using a Formula is a problem-solving strategy that can be used for problems that involve converting units or measuring geometric objects. Also, real-world problems such as tipping in a restaurant, finding the price of a sale item, and buying enough paint for a room all involve using formulas.

## How can you make it happen?

Introduce a problem to students that requires them to use a formula to solve the problem. For example:

A rectangle has an area of 40 square meters. If the perimeter of the rectangle is 26 meters, what are the length and the width of the rectangle?

### 1. Understand the problem

Demonstrate that the first step to solving the problem is understanding it. This involves identifying the key pieces of information needed to find the answer.

2. This may require students to read the problem several times or put the problem into their own words. Here are a few formulas that students can use to solve this problem:

$$A = L \times W$$

$$40 = L \times W$$

$$2W + 2L = P$$

$$2W + 2L = 26$$

(Note: L and W can be interchanged in this problem.)

3. **Choose a strategy**

The strategy of using a formula can be used in situations where measurements are required to find the solution.

4. **Solve the problem**

$$A = L \times W$$

$$40 = L \times W$$

I know 40 is a product of 2 and 20, 4 and 10, or 5 and 8.

$$2W + 2L = P$$

$$2W + 2L = 26$$

Looked at the possible answers that would fit the formula for the area of the rectangle. Then put the numbers into the formula for the perimeter. The numbers 5 and 8 are the two numbers that work for both formulas.

5. **Check**

Read the problem again to be sure the question was answered.

Find the length and width of the rectangle, 5 meters and 8 meters.

Check the math to be sure it is correct.

$$A = L \times W$$

$$40 = L \times W$$

$$40 = 8 \times 5$$

$$P = 2L + 2W$$

$$26 = 2L + 2W$$

$$26 + 2(8) + 2(5)$$

Determine if the best strategy is chosen for this problem, or if there is another way to solve the problem. Using a formula is a good strategy to use for this problem.

## 6. Explain

The last step is explaining how you will find the answer. Demonstrate how to write a paragraph describing the steps taken and how decisions are made throughout the process. Students should explain their answer and the process they went through to solve it. It is important for students to talk or write about their thinking. Know the formulas for area and perimeter, write down the formulas.

$$A = L \times W$$

$$P = 2L + 2W$$

Add the information already provided, the area and the perimeter of this rectangle.

$$40 = L \times W$$

$$26 = 2L + 2W$$

Then write down the numbers that could be the length and width if the area is 40 square meters. 40 is a product of 2 and 20, 4 and 10, or 5 and 8.

Take the possible numbers and use them with the formula for the perimeter. The numbers that did not also fit into this formula, eliminate. Eliminate 2 and 20 as well as 4 and 10, since those numbers did not work in the perimeter formula.

You should be left with the numbers 8 and 5. Since they are interchangeable in this problem, assign the width as 5 meters and the length as 8 meters.

### 7. **Guided practice**

Have students try to solve the following problem using the strategy of using a formula. In an isosceles triangle, the unequal side measures half the length of one of the two equal sides. What is the perimeter if the length of the unequal side is 5 cm? What is the length of the sides if the perimeter is 80 cm?

Have students work in pairs, in groups, or individually to solve this problem. They should be able to tell or write about how they found the answer and justify their reasoning.

### **How can you stretch students' thinking?**

Math problems requiring formulas can be simple, with few criteria needed to solve them, or they can be multidimensional, requiring charts or tables to organize students' thinking. Including more than one formula in a problem, or having multiple correct answers to a problem will help stretch this strategy.

Source:



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