EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

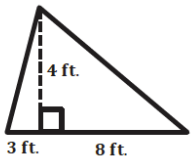
In this topic, students relate the **parallelogram** to the more familiar rectangle and discover that the **areas** of both figures are calculated the same way (area = **base** × height, or $A = bh$). Students also discover that a right triangle is exactly half of a rectangle. From there, students generalize that the area of every triangle is one-half the area of its corresponding parallelogram. They then generalize the formula for the area of a triangle as $A = \frac{1}{2}bh$. Using their knowledge of the area formulas for rectangles, triangles, and parallelograms, students find the areas of irregularly shaped **polygons** (or **composite figures**) by composing or decomposing the figures into familiar shapes and finding their areas.

You can expect to see homework that asks your child to do the following:

- Draw and label the **altitude**, or height, of a parallelogram.
- Calculate the areas of rectangles, parallelograms, and triangles using the area formula for each figure.
- Compare the areas of two different figures to see whether they are the same.
- Through decomposition and composition, calculate the area of a composite figure given the lengths of its sides.
- Use knowledge of area to solve real-world problems.

SAMPLE PROBLEMS *(From Lesson 3)*

Examine the given triangle and expression.



$\frac{1}{2}(11 \text{ ft.})(4 \text{ ft.})$

a. Explain what each part of the expression represents according to the triangle.

The $\frac{1}{2}$ is used in the expression because the area of a triangle is half the area of its corresponding parallelogram.

The length of the base of the triangle is 11 ft. because 8 ft. + 3 ft. = 11 ft.

The height of the triangle is 4 ft. because that is the length of the altitude, the perpendicular segment from a vertex to the base.

b. Joe found the area of the triangle by writing $A = \frac{1}{2}(11 \text{ ft.})(4 \text{ ft.})$, while Kaitlyn found the area by writing $A = \frac{1}{2}(3 \text{ ft.})(4 \text{ ft.}) + \frac{1}{2}(8 \text{ ft.})(4 \text{ ft.})$. They are both correct. Explain how each student approached the problem.

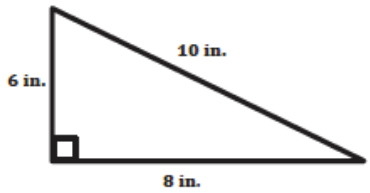
Joe combined the lengths of each part of the base of the triangle first and then calculated the area of the entire triangle, whereas Kaitlyn decomposed the figure into two smaller right triangles, calculated each area, and then added these areas together.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are some tips to help you get started.

- Have your child sketch two different rectangles, two different parallelograms, and two different right triangles, each with an area of 16 cm^2. Remember to label the dimensions (base and height) of each figure.
- Josiah, Jeremiah, and Ryanne were asked to calculate the area of the triangle below.



Their responses were as follows. Josiah stated, "The area of the triangle is 24 in^2 because I added the lengths of the sides and I know area is in square units." Jeremiah stated, "I know area is found by multiplying the length of the base and the length of the height, so the area is 8 in. × 6 in., or 48 in^2." Ryanne stated, "Since this is a triangle, I multiplied the length of the base and the length of the height and then divided the product by 2. The area is 24 in^2." With your child, figure out who explained the calculation for the area of this triangle correctly. (Ryanne is correct because she used the correct method of finding the area of a triangle: $A = \frac{1}{2}bh$, or $A = (bh) \div 2$. Although Josiah found the correct area, his method was faulty.)

TERMS

Altitude: A perpendicular line segment from the vertex of a triangle to the opposite side (the base). In a parallelogram, the altitude is a perpendicular line segment from the base to its opposite side. The measurement of this line segment is the height of the figure. (See Figures 1 and 3.)

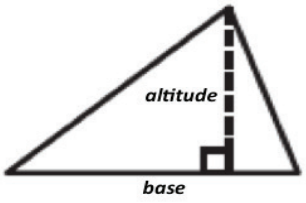


Figure 1

Area: The number of square units (e.g., square feet) that make up the inside of a two-dimensional shape.

Base: The side of a figure that is perpendicular to the altitude. (See Figures 1 and 3.)

Composite figure: A figure that can be divided into more than one basic shape. The trapezoid is composed of a square and a triangle. (See Figure 2.)

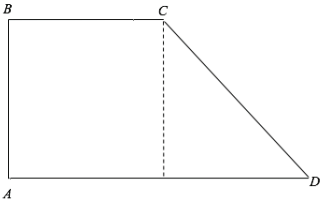


Figure 2

Parallelogram: A four-sided closed figure with opposite sides that are parallel and equal in length. (See Figure 3.)

Polygon: A closed shape with straight sides (e.g., triangle, square, rectangle, parallelogram, hexagon).

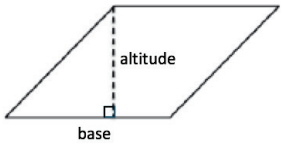


Figure 3

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