MATH NEWS

Grade 6, Module 5, Topic A

6th Grade Math

Module 5: Area, Surface Area, and Volume Problems

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) and is also posted as the Engage New York material being taught in the classroom. In Module 5 of Eureka Math (Engage New York), students utilize their previous experiences in shape composition and decomposition in order to understand and develop formulas for area, volume, and surface area.

Focus Area Topic A:

Area of Triangles, Quadrilaterals, and Polygons

Words to Know:

Perpendicular lines - two lines are said to be perpendicular if they cross each other and form 90° angles

Altitude of a Triangle – a perpendicular segment from a vertex of a triangle to the line containing the opposite side

Base of a Triangle – the side of a triangle opposite of the perpendicular segment drawn from a vertex
For every triangle there are three choices for altitude, hence there are three base-altitude pairs.

Cube – a right rectangular prism all of whose edges are of equal length

Parallel lines – Lines are parallel if they are always the same distance apart (called "equidistant"), and will never meet.

Parallelogram – a quadrilateral with both pairs of opposite sides parallel

Focus Area Topic A:

Area of Triangles, Quadrilaterals, and Polygons

In Topic A, students discover the area of triangles, quadrilaterals, and other polygons through composition and decomposition.

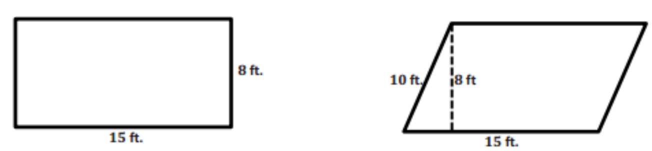
The Area of Parallelograms through Rectangle Facts

Students show the area formula for the region bounded by a parallelogram by composing it into rectangles. They understand that the area of a parallelogram is the area of the region bounded by the parallelogram.

Example Problems and Solutions:

1. Calculate the area of the parallelogram. Note that the figures are not drawn to scale.

Do the rectangle and the parallelogram below have the same area? Explain why or why not.



Yes the rectangle and parallelogram have the same area because if we cut off the right triangle on the left side of the parallelogram, we can move it over to the right side and make the parallelogram into a rectangle. At this time, both rectangles would have the same dimensions; therefore, their areas would be the same.

$A = bh$

$A = 15\text{ ft}(8\text{ ft})$

$A = 120\text{ ft}^2$

2. A parallelogram has an area of 20.3 cm² and a base of 2.5 cm. Write an equation that relates the area to the base and height, h. Solve the equation to determine the length of the height.

$A = bh$
$20.3\text{ cm}^2 = 2.5\text{ cm}(h)$
$20.3\text{ cm}^2 \div 2.5\text{ cm} = 2.5\text{ cm}(h) \div 2.5\text{ cm}$
$8.12\text{ cm} = h$

The height of the parallelogram is 8.12 cm.

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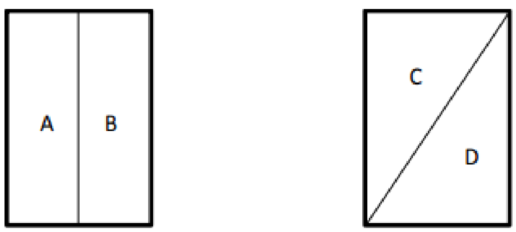
The Area of Right Triangles

Students justify the area formula for a right triangle by viewing the right triangle as part of a rectangle composed of two right triangles.

Example Problems and Solutions:

1. Elania has two congruent rugs at her home. She cut one vertically down the middle, and she cut diagonally through the other one.



After making the cuts, which rug (labeled A, B, C, or D) has the larger area? Explain.

All of the rugs are the same size after making the cuts. The vertical line goes down the center of the rectangle, making two congruent parts. The diagonal line also splits the rectangle in two congruent parts because the area of the right triangles formed is exactly half the area of the given rectangle.

2. If the area of a triangle is $\frac{9}{16}$ ft^2 and the height is $\frac{3}{4}$ ft., write an equation that relates the area to the base, b, and the height. Solve the equation to determine the base.

$\mathbf{A = \frac{1}{2}bh}$

$\mathbf{\frac{9}{16}\ ft^2 = \frac{1}{2}b\ (\frac{3}{4}\ ft)}$

$\frac{9}{16}\ ft^2 = (\frac{3}{8}\ ft)b$

$\frac{9}{16}\ ft^2 \div \frac{3}{8}\ ft = (\frac{3}{8}\ ft)b \div \frac{3}{8}\ ft$

$\frac{3}{2}\ ft = b$

$1\frac{1}{2}\ ft = b$

The length of the base is $1\frac{1}{2}$ ft.

Focus Area Topic A:

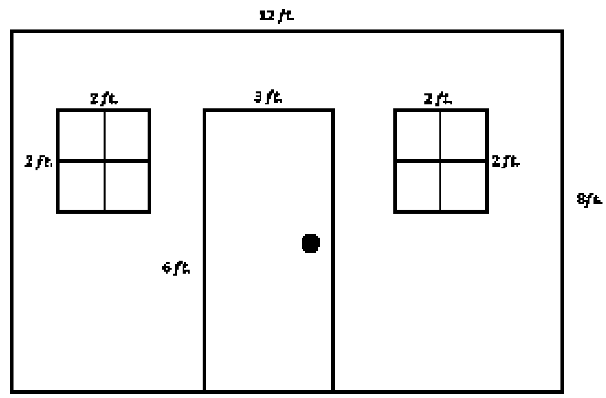
Area of Triangles, Quadrilaterals, and Polygons

The Area of Polygons through Composition and Decomposition

Students will compose (put together) and decompose(take apart) irregular figures into triangles, rectangles and other polygons in order to find the area.

Example Problems and Solutions:

1. Here is a sketch of a wall that needs to be painted:



a. The windows and doors will not be painted. Calculate the area of the wall that will be painted.

Whole wall – 12 ft x 8 ft = 96 ft^2
Window – 2 ft x 2 ft = 4 ft^2
There are two identical widows. 4 ft^2 x 2 = 8 ft^2
Door – 6 ft x 3 ft = 18 ft^2
18 ft^2 + 8 ft^2 = 26 ft^2 (Area of door and 2 windows)

96 ft^2 – 26ft^2 = 70 ft^2
Area of the wall that will be painted is 70 ft^2.

b. If a quart of Extra-Thick Gooey Sparkle paint covers 30 ft^2, how many quarts must be purchased for the painting job?

$\mathbf{70 \div 30 = 2\frac{1}{3}}$
3 quarts of paint must be purchased for the painting job.

2. A classroom has a length of 20 ft and a width of 30 ft. The flooring is to be replaced by tiles. If each tile has a length of 24 in and a width of 36 in, how many tiles are needed to cover the classroom floor?

A = bh
20 ft x 30 ft = 600 ft^2
Classroom area = 600 ft^2
Area of each tile - 36 in x 24 in = 864 in^2

To determine how many tiles are needed to cover the classroom floor we must convert the floor area to square inches. There are 144 square inches in one square foot; therefore, we multiply 600 x 144 = 86,400 in^2.

Divide 86,400 in^2 by the area of each tile which is 864 in^2.
86,400 ÷ 864 in^2 = 100
One hundred tiles are needed to cover the floor.