MATH NEWS

Grade 5, Module 5, Topic C

5th Grade Math

Module 5: Addition and Multiplication with Volume and Area

Math Parent Letter

This document is created to give parents and students an understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is taught in the classroom. Grade 5 Module 5 of Eureka Math (Engage New York) covers Addition and Multiplication with Volume and Area. This newsletter will discuss Module 5, Topic C. In this topic students will find the area of rectangles with fractional side lengths.

Topic C: Area of Rectangular Figures with Fractional Side Lengths

Words to know:

- area
- square
- distributive property
- rectangle
- tiling

Things to Remember!

Area – the number of square units that covers a two-dimensional figure

Rectangle – a four-sided figure with four 90° angles

Square – a rectangle with four equal side lengths

Distributive Property – breakdown one or two factors of a multiplication problem into its addends, multiply each by the other factor, and then add the products together to get the whole answer

Examples:

$54 \times 2 = (50 + 4) \times 2$
$= (50 \times 2) + (4 \times 2)$
$= 100 + 8$
$= 108$

$38 \times 12 = (30 + 8) \times (10 + 2)$
$= (30 \times 10) + (30 \times 2) + (8 \times 10) + (8 \times 2)$
$= 300 + 60 + 80 + 16$
$= 456$

$3\frac{3}{4}$ units x $5\frac{1}{2}$ units is read $3\frac{3}{4}$ units **by** $5\frac{1}{2}$ units.

u^2 is read units squared. **in^2** is read inches squared.

OBJECTIVES OF TOPIC C

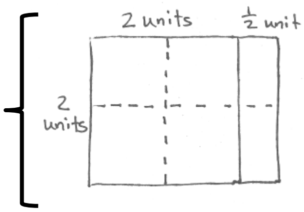
- **Find the area of rectangles with whole-by-mixed and whole-by-fractional number side lengths by tiling, record by drawing, and relate to fraction multiplication.**
- **Find the area of rectangles with mixed-by-mixed and fraction-by-fraction side lengths by tiling, record by drawing, and relate to fraction multiplication.**
- **Measure to find the area of rectangles with fractional side lengths.**
- **Multiply mixed number factors, and relate to the distributive property and the area model.**
- **Solve real world problems involving area of figures with fractional side lengths using visual models and/or equations.**

Focus Area– Topic C

Module 5: Addition and Multiplication with Volume and Area

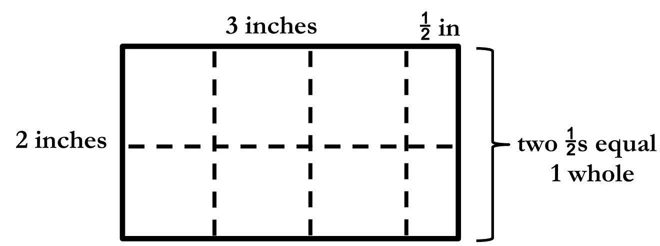
This topic begins with students using tiling to find the area of rectangles. **Tiling** is a strategy used to find area of rectangle by covering the entire figure with square units and fractional parts of square unit.

Example of tiling



Example Problem: Randy made a mosaic using different color rectangular tiles. Each tile measured $3\frac{1}{2}$ inches x 2 inches. If he used six tiles, what is the area of the whole mosaic in square inches?

The drawing below resembles an area model used in earlier modules when students multiplied whole numbers and decimal fractions. Now the area model has fractional parts.
The $3\frac{1}{2}$ is thought of as $3 + \frac{1}{2}$. Using **tiling**, each whole square represents 1 square inch. To represent $\frac{1}{2}$ inch, the whole square is cut in half and only half is showing in the model. There are 6 whole squares and two $\frac{1}{2}$s.



The area of one tile is 7 square inches. Since there are 6 tiles, the area of the whole mosaic is 42 square inches or 42 in^2 (6 x 7).

Algorithm using the distributive property:

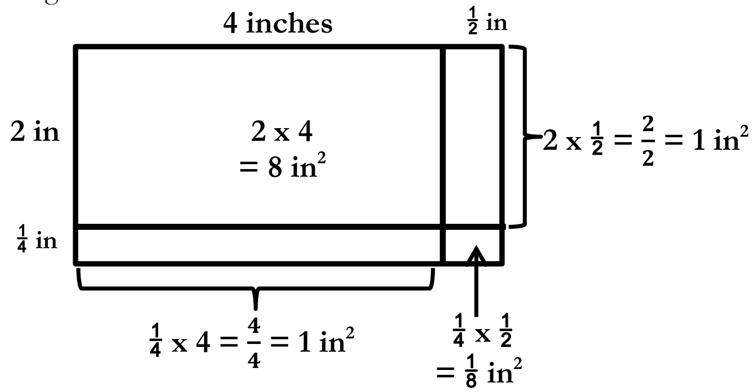
$3\frac{1}{2} \times 2 = (3 + \frac{1}{2}) \times 2$
$= (3 \times 2) + (\frac{1}{2} \times 2)$
$= 6 + 1$
$= 7$

Algorithm without using the distributive property; the mixed number is changed to an improper fraction:

$3\frac{1}{2} \times 2 = \frac{7}{\ } \times 2 = \frac{\ }{\ } = \frac{\ }{\ } = 7$

Eventually students will just record partial products rather than draw individual tiles.

Example Problem: Francine cut a rectangle out of construction paper to complete her art project. The rectangle measured $4\frac{1}{2}$ inches x $2\frac{1}{4}$ inches. What is the area of the rectangle Francine cut out?



Add the partial products together to find the area.

$8 \text{ in}^2 + 1 \text{ in}^2 + 1 \text{ in}^2 + \frac{1}{8} \text{ in}^2 = 10\frac{1}{8} \text{ in}^2$

The area of the rectangle cut out is $10\frac{1}{8}$ square inches.

Algorithm using the distributive property:

$4\frac{1}{2} \times 2\frac{1}{4} = (4 + \frac{1}{2}) \times (2 + \frac{1}{4})$

$= (4 \times 2) + (4 \times \frac{1}{4}) + (\frac{1}{2} \times 2) + (\frac{1}{2} \times \frac{1}{4})$

$= 8 + 1 + 1 + \frac{1}{8}$

$= 10\frac{1}{8}$

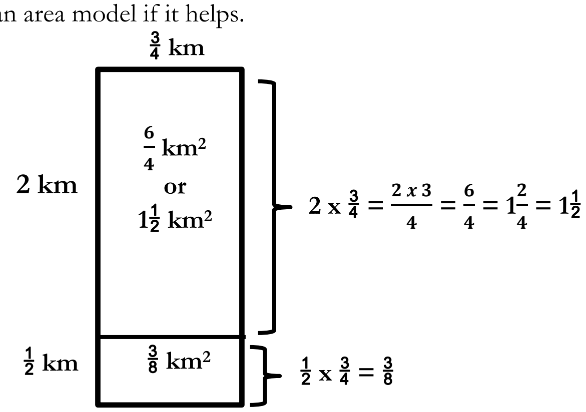
Algorithm without using the distributive property; mixed numbers are changed to improper fractions:

$4\frac{1}{2} \times 2\frac{1}{4}$

$= \frac{9}{2} \times \frac{9}{4} = \frac{81}{8} = 10\frac{1}{8}$

*****The algorithm is provided so students are exposed to a more formal representation of the distributive property. However, students are not required to be as formal in their calculations. Using an area model to keep track of their thinking is sufficient.***

Problem: Find the area of a rectangle that measures $\frac{3}{4}$ km x $2\frac{1}{2}$ km. Draw an area model if it helps.

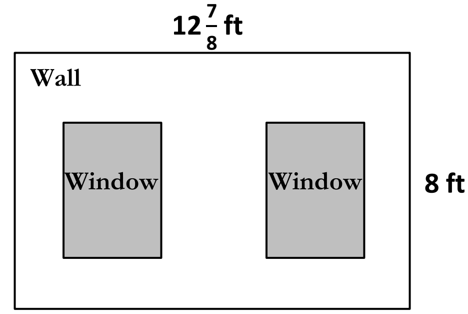


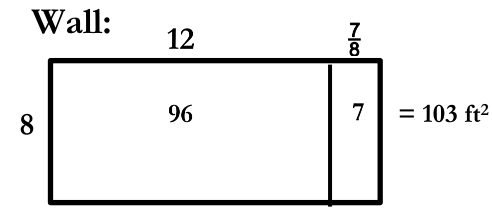
$1\frac{1}{2} + \frac{3}{8} = 1 + \frac{4}{8} + \frac{3}{8}$

$= 1\frac{7}{8}$

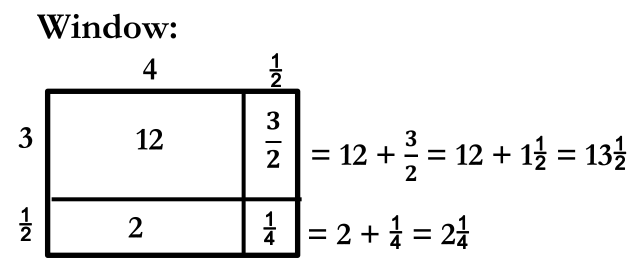
The area of the rectangle is $1\frac{7}{8}$ km².

Application Problem: John decided to paint a wall with two windows. Both windows are $3\frac{1}{2}$ ft by $4\frac{1}{2}$ ft rectangles. Find the area the paint needs to cover.





The area of the wall is 103 ft².



$13\frac{1}{2} + 2\frac{1}{4} = 13\frac{2}{4} + 2\frac{1}{4} = 15\frac{3}{4}$

$15\frac{3}{4} \times 2 \text{ windows} = (15 + \frac{3}{4}) \times 2$

$= (15 \times 2) + (\frac{3}{4} \times 2)$

$= 30 + \frac{6}{4}$

$= 30 + 1\frac{2}{4} = 31\frac{1}{2}$

$31\frac{1}{2}$ ft² is the area of two windows.

$103 - 31\frac{1}{2} = (103 - 31) - \frac{1}{2}$

$= 72 - \frac{1}{2}$

$= 71\frac{1}{2}$

The paint needs to cover $71\frac{1}{2}$ square feet.