Lesson 13: Rectangles with Fractional Side Lengths

Let's explore rectangles that have fractional measurements.

13.1: Areas of Squares

1 in

$\frac{1}{2}$ in

2 in

1 in

$\frac{1}{2}$ in

2 in
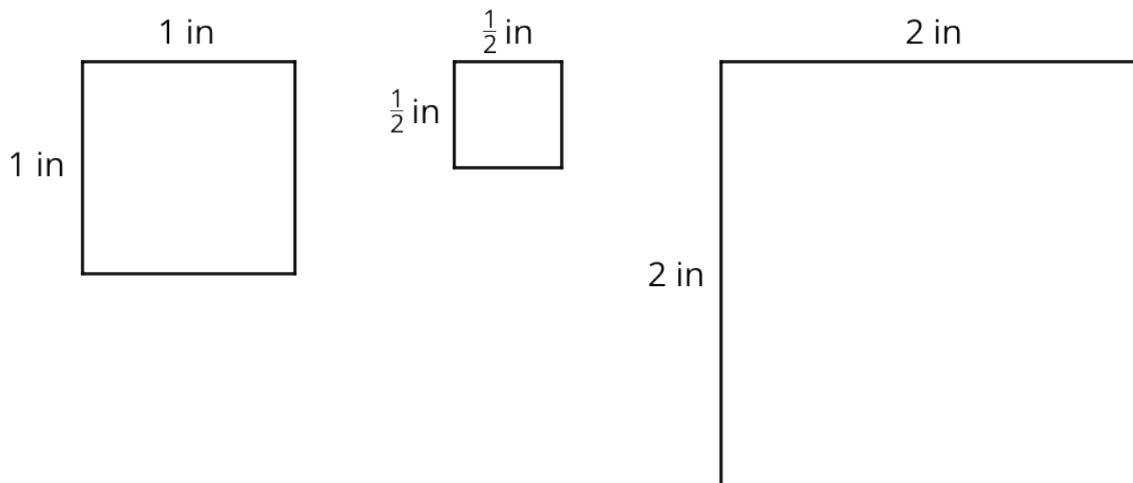
1. What do you notice about the areas of the squares?

2. Kiran says "A square with side lengths of $\frac{1}{3}$ inch has an area of $\frac{1}{3}$ square inches." Do you agree? Explain or show your reasoning.

Grade 6 Unit 4
Lesson 13

CC BY Open Up Resources. Adaptations CC BY IM.

1

13.2: Areas of Squares and Rectangles

Your teacher will give you graph paper and a ruler.

1. On the graph paper, draw a square with side lengths of 1 inch. Inside this square, draw another square with side lengths of $\frac{1}{4}$ inch.

   Use your drawing to answer the questions.

   a. How many squares with side lengths of $\frac{1}{4}$ inch can fit in a square with side lengths of 1 inch?

   b. What is the area of a square with side lengths of $\frac{1}{4}$ inch? Explain or show your reasoning.

2. On the graph paper, draw a rectangle that is $3\frac{1}{2}$ inches by $2\frac{1}{4}$ inches.

   For each question, write a division expression and then find the answer.

   a. How many $\frac{1}{4}$-inch segments are in a length of $3\frac{1}{2}$ inches?

   b. How many $\frac{1}{4}$-inch segments are in a length of $2\frac{1}{4}$ inches?

3. Use your drawing to show that a rectangle that is $3\frac{1}{2}$ inches by $2\frac{1}{4}$ inches has an area of $7\frac{7}{8}$ square inches.

Grade 6 Unit 4
Lesson 13

CC BY Open Up Resources. Adaptations CC BY IM.

2

13.3: Areas of Rectangles

Each of these multiplication expressions represents the area of a rectangle.

$2 \cdot 4$ $\qquad$ $2\frac{1}{2} \cdot 4$ $\qquad$ $2 \cdot 4\frac{3}{4}$ $\qquad$ $2\frac{1}{2} \cdot 4\frac{3}{4}$

1. All regions shaded in light blue have the same area. Match each diagram to the expression that you think represents its area. Be prepared to explain your reasoning.

A   B
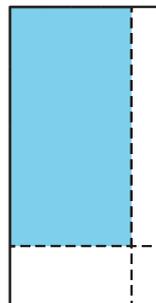
C   D
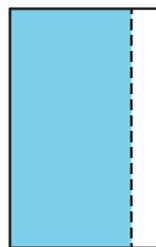
2. Use the diagram that matches $2\frac{1}{2} \cdot 4\frac{3}{4}$ to show that the value of $2\frac{1}{2} \cdot 4\frac{3}{4}$ is $11\frac{7}{8}$.

Grade 6 Unit 4
Lesson 13

CC BY Open Up Resources. Adaptations CC BY IM.

3

Are you ready for more?

The following rectangles are composed of squares, and each rectangle is constructed using the previous rectangle. The side length of the first square is 1 unit.

1. Draw the next four rectangles that are constructed in the same way. Then complete the table with the side lengths of the rectangle and the fraction of the longer side over the shorter side.

short side	long side	$\dfrac{\text{long side}}{\text{short side}}$
1		
1		
2		
3		

2. Describe the values of the fraction of the longer side over the shorter side. What happens to the fraction as the pattern continues?

Grade 6 Unit 4
Lesson 13

CC BY Open Up Resources. Adaptations CC BY IM.

4

13.4: How Many Would it Take? (Part 2)

Noah would like to cover a rectangular tray with rectangular tiles. The tray has a width of $11\frac{1}{4}$ inches and an area of $50\frac{5}{8}$ square inches.

1. Find the length of the tray in inches.

2. If the tiles are $\frac{3}{4}$ inch by $\frac{9}{16}$ inch, how many would Noah need to cover the tray completely, without gaps or overlaps? Explain or show your reasoning.

3. Draw a diagram to show how Noah could lay the tiles. Your diagram should show how many tiles would be needed to cover the length and width of the tray, but does not need to show every tile.

Grade 6 Unit 4
Lesson 13

CC BY Open Up Resources. Adaptations CC BY IM.

5

Lesson 13 Summary

If a rectangle has side lengths a units and b units, the area is $a \cdot b$ square units. For example, if we have a rectangle with $\frac{1}{2}$-inch side lengths, its area is $\frac{1}{2} \cdot \frac{1}{2}$ or $\frac{1}{4}$ square inches.
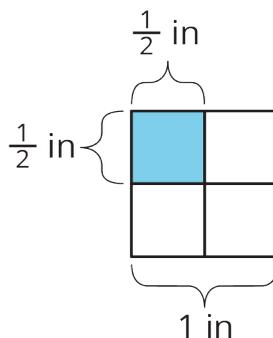
This means that if we know the *area* and *one side length* of a rectangle, we can divide to find the *other* side length.
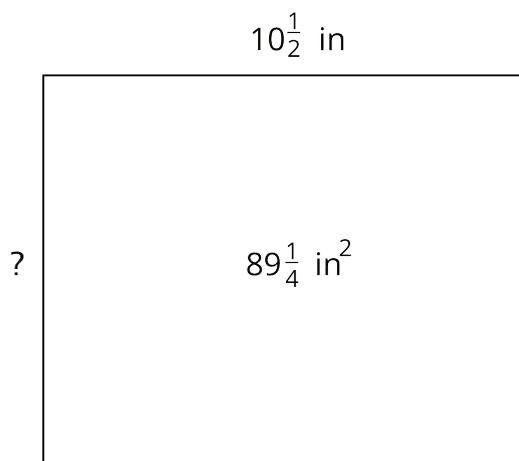
If one side length of a rectangle is $10\frac{1}{2}$ in and its area is $89\frac{1}{4}$ in^2, we can write this equation to show their relationship:

$$10\frac{1}{2} \cdot \, ? = 89\frac{1}{4}$$

Then, we can find the other side length, in inches, using division:

$$89\frac{1}{4} \div 10\frac{1}{2} = \, ?$$