Unit 2, Lesson 1

Projecting and Scaling

Let's explore scaling.

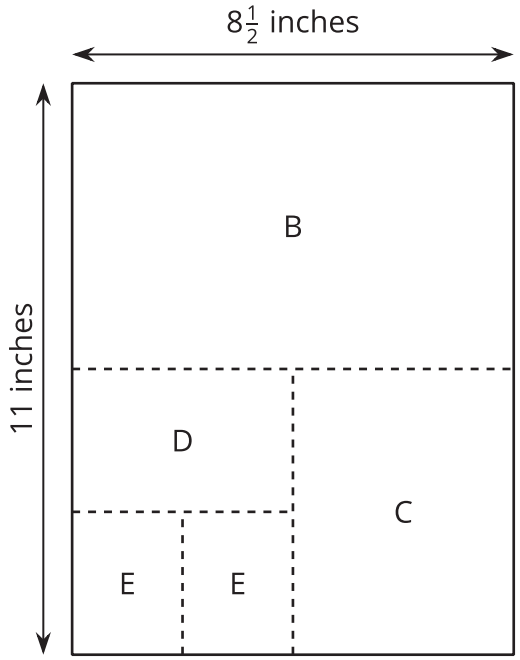
1.1 Math Talk: Remembering Fraction Division

Find the value of each expression mentally.

- $6\frac{1}{4} \div 2$
- $10\frac{1}{7} \div 5$
- $4\frac{1}{3} \div 8$
- $8\frac{1}{2} \div 11$

1.2 Sorting Rectangles

Rectangles are made by cutting an $8\frac{1}{2}$-inch by 11-inch piece of paper in half, in half again, and so on, as illustrated in the diagram. Find the lengths of each rectangle and enter them in the appropriate table.



1. Some of the rectangles are scaled copies of Rectangle A (the full sheet of paper). Record the measurements of those rectangles in this table.

rectangle	length of short side (inches)	length of long side (inches)
A	$8\frac{1}{2}$	11

2. Some of the rectangles are *not* scaled copies of Rectangle A (the full sheet of paper). Record the measurements of those rectangles in this table.

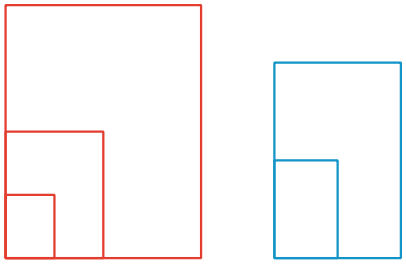
rectangle	length of short side (inches)	length of long side (inches)

3. Look at the measurements for the rectangles that are scaled copies of the full sheet of paper. What do you notice?

4. Look at the measurements for the rectangles that are *not* scaled copies of the full sheet. What do you notice?

5. Stack the rectangles that are scaled copies of the full sheet so that they all line up at a corner, as shown in the diagram. Do the same with the other set of rectangles. On each stack, draw a line from the bottom left corner to the top right corner of the biggest rectangle.

   What do you notice?



6. Stack *all* of the rectangles from largest to smallest so that they all line up at a corner. Compare the lines that you drew. Can you tell, from the drawn lines, which set each rectangle came from? What do you notice?

Are you ready for more?

In many countries, the standard paper size is not 8.5 inches by 11 inches (called "letter" size), but instead 210 millimeters by 297 millimeters (called "A4" size). Are these two rectangle sizes scaled copies of one another?

1.3 Scaled Rectangles

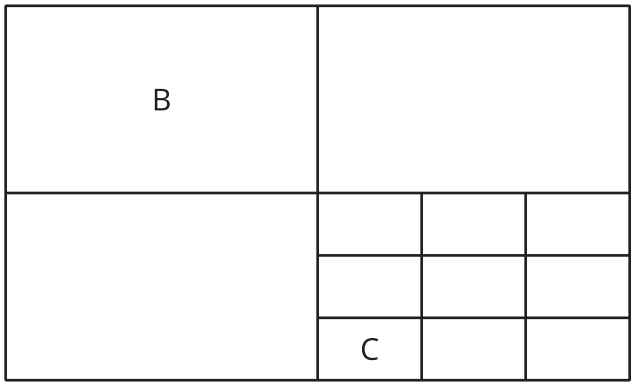
Here is a picture of Rectangle R, which has been evenly divided into smaller rectangles. Two of the smaller rectangles are labeled B and C.

1. Is B a scaled copy of R? If so, what is the scale factor?

2. Is C a scaled copy of B? If so, what is the scale factor?

3. Is C a scaled copy of R? If so, what is the scale factor?

Rectangle R



Lesson 1 Summary

In this diagram, the larger rectangle is a scaled copy of the smaller one, and the scale factor is $\frac{3}{2}$ because $4 \cdot \frac{3}{2} = 6$ and $2 \cdot \frac{3}{2} = 3$. Scaled copies of rectangles have another interesting property: the diagonal of the large rectangle contains the diagonal of the smaller rectangle. This is the case for any two scaled copies of a rectangle if we line them up as shown. If two rectangles are not scaled copies of one another, then their diagonals would not match up.

