Rectangle Fractions

Let's compare fractions and rectangles.

6.1 Finding Equivalent Fractions

1. Use this rectangle to answer the questions. Suppose this rectangle is 9 units by 4 units.

   a. In the rectangle, draw a line segment that decomposes the rectangle into a new rectangle and a square that is as large as possible. Continue until your original rectangle has been entirely decomposed into squares.

   b. How many squares of each size are there?

   c. What are the side lengths of the last square you drew?

   d. Write $\frac{9}{4}$ as a mixed number.

2. Use this rectangle to answer the questions. Suppose this rectangle is 27 units by 12 units.

   a. In the rectangle, draw a line segment that decomposes the rectangle into a new rectangle and a square that is as large as possible. Continue until your original rectangle has been entirely decomposed into squares.

   b. How many squares of each size are there?

   c. What are the side lengths of the last square you drew?

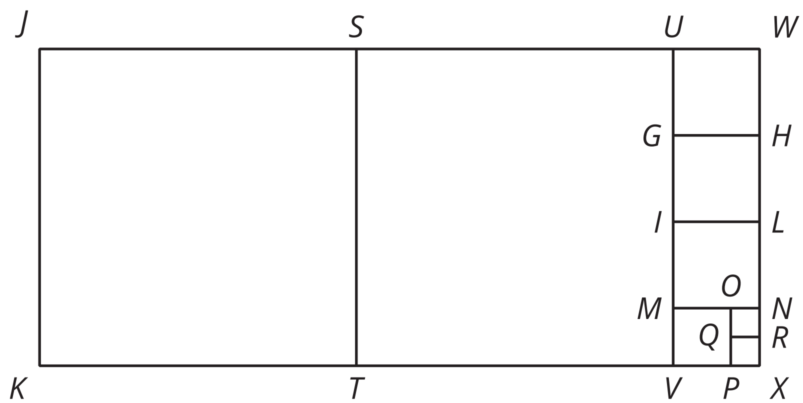
   d. Write $\frac{27}{12}$ as a mixed number.

   e. Compare the diagram you drew for this problem and the one for the earlier problem. How are they the same? How are they different?

3. What is the greatest common factor of 9 and 4? What is the greatest common factor of 27 and 12? What does this have to do with your diagrams of decomposed rectangles?

Are you ready for more?

We have seen some examples of rectangle tilings. A *tiling* means a way to completely cover a shape with other shapes, without any gaps or overlaps. For example, here is a tiling of rectangle $KXWJ$ with 2 large squares, 3 medium squares, 1 small square, and 2 tiny squares.



Some of the squares used to tile this rectangle have the same size.

Is it possible to tile a rectangle with squares where the squares are all different sizes?

If you think it is possible, find an example that works. If you think it is not possible, explain why it is not possible.

6.2 It's All about Fractions

1. Draw a 37-by-16 rectangle. (Use graph paper, if possible.)

   a. In your rectangle, draw a line segment that decomposes the rectangle into a new rectangle and a square that is as large as possible. Continue until your original rectangle has been entirely decomposed into squares.

   b. How many squares of each size are there?

   c. What are the dimensions of the last square you drew?

   d. How does your decomposition relate to $2+\frac{1}{3+\frac{1}{5}}$?

2. Draw a 52-by-15 rectangle.

a. In your rectangle, draw a line segment that decomposes the rectangle into a new rectangle and a square that is as large as possible. Continue until your original rectangle has been entirely decomposed into squares.

b. Write a fraction equal to this expression: $3 + \frac{1}{2+\frac{1}{7}}$.

c. What are some connections between the rectangle and the fraction?

d. What is the greatest common factor of 52 and 15?

3. Draw a 98-by-21 rectangle.

   a. In your rectangle, draw a line segment that decomposes the rectangle into a new rectangle and a square that is as large as possible. Continue until your original rectangle has been entirely decomposed into squares.
   b. Write a fraction equal to this expression: $4 + \frac{1}{1+\frac{7}{14}}$.
   c. What are some connections between the rectangle and the fraction?
   d. What is the greatest common factor of 98 and 21