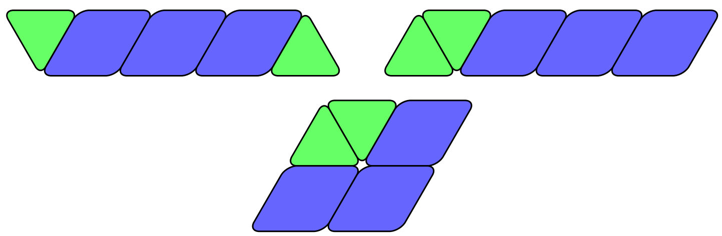
Name: ____________________

Math 1120 **Fraction Patterns Worksheet Solutions** **Spring 2011**

In this worksheet, we investigate fraction patterns. Build the following figures using your "pattern blocks." In the spaces provided, draw a small illustration of each completed figure. (I've done (a) for you, to get you started.)

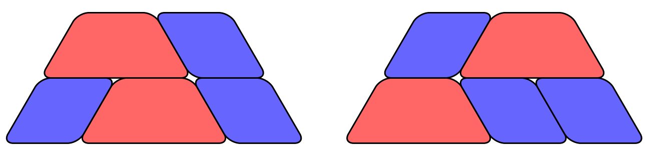
1. (a) Build a parallelogram that is 1/4 green and 3/4 blue.

   Solution: There are several possibilities. Some are shown here.

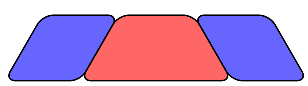
   

   (b) Build a trapezoid that is 1/2 red and 1/2 blue.

   Solution: The main idea here is that the red trapezoid pieces have an area that is $\frac{3}{2}$ the size of the area of the blue parallelograms. Thus, if we use 2 red pieces and 3 blue pieces, the area used by each color will be the same. Again, there are multiple ways of doing this. A couple solutions are given below.

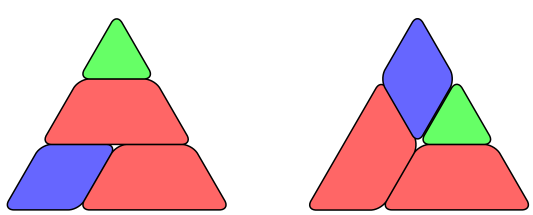
   

   You should notice that the following is NOT a solution, as the red piece represents $\frac{3}{7}$ of the total area, while the blue pieces give $\frac{4}{7}$ of the area.

   (c) Build a triangle that is 2/3 red, 1/9 green and 2/9 blue.

   Solution: Here are two possible solutions.

(d) Build a parallelogram that is 1/3 green and 2/3 blue.

Solution: You'd like to use just one green piece and one blue piece, but that won't allow you to construct a parallelogram. So, instead, we use two green pieces and two blue pieces.

2. Let's say your small blue pattern block has area equal to 7/12 square units. (If you're not comfortable with the abstraction here, then choose your own name for a unit of measurement, e.g., "square what-EVERs.") What is the area of each of the figures you made on the previous page? Express your answers as fractions in simplest form, meaning numerator and denominator are relatively prime. Again, I've done the first one for you.

The main idea here is that a blue piece is worth twice as much as a green piece, while a red piece is worth three times as much as a green piece. So, since the blue piece has an area equal to $\frac{7}{12}$ square units, we know that the green piece (which has half as much area as the blue piece has an area of $\frac{7}{24}$ square units. The red piece has an area of $3 \cdot \frac{7}{12} = \frac{7}{4}$ square units.

(a) The parallelogram of problem 1(a) has area:

$$3 \cdot \frac{7}{12} + 2 \cdot \frac{7}{24} = \frac{21}{12} + \frac{7}{12} = \frac{28}{12} = \frac{7}{3}.$$

(b) The trapezoid of problem 1(b) has area:

$$2 \cdot \frac{7}{4} + 3 \cdot \frac{7}{12} = \frac{14}{4} + \frac{21}{12} = \frac{42}{12} + \frac{21}{12} = \frac{63}{12} = \frac{21}{4}.$$

(c) The triangle of problem 1(c) has area:

$$1 \cdot \frac{7}{24} + 2 \cdot \frac{7}{4} + 1 \cdot \frac{7}{12} = \frac{7}{24} + \frac{14}{4} + \frac{7}{12} = \frac{7}{24} + \frac{84}{24} + \frac{14}{24} = \frac{105}{24} = \frac{35}{8}.$$

(d) The parallelogram of problem 1(d) has area:

$$2 \cdot \frac{7}{24} + 2 \cdot \frac{7}{12} = \frac{14}{24} + \frac{14}{12} = \frac{14}{24} + \frac{28}{24} = \frac{42}{24} = \frac{21}{12} = \frac{7}{4}.$$