Math 2100 – Spring 2018

Lab 3

Names:_____

_____

_____

Fractions Part 1

One meaning of fractions is that they represent the number of equivalent parts being considered out of the unit amount; using area models can be a helpful visualization, too.

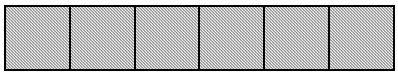
1. When writing a fraction such as $1/3$, we see that two numbers are involved, each having a particular meaning.

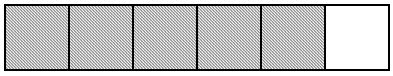
   a. In $1/3$, 3 is called the denominator. What does the 3 represent?

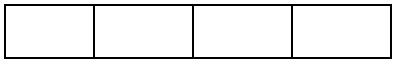
   b. In $1/3$, 1 is called the numerator. What does the 1 represent?

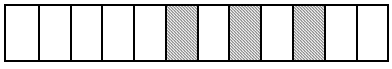
   c. What does the fraction $3/5$ represent?

2. With the fraction-strip model, we assign a value of 1 unit to the entire strip. For each of the following, identify the (unreduced!) fraction represented by the shaded portion of the fraction strip.

a. 

b. 

c. 

d. 

3. Sketch and shade fraction strips to model both of the following fractions. Try your best to draw both strips the same length.

   a. $1/9$

   b. $4/5$

4. If you were given a fraction strip that did not have any subdivisions marked (like the one pictured below), how would you determine the fractional amount of the bar that is shaded?

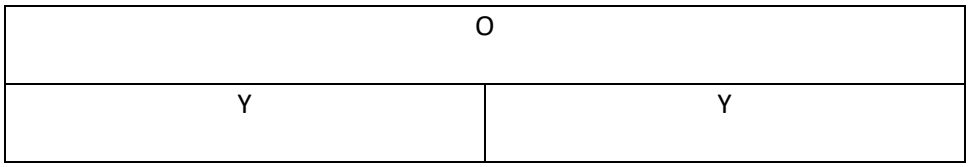
Fractions Part 2

1. Next we will use Cuisenaire rods to model fractions. We will use the following abbreviations for the colors:

   W = White; R = Red; G = Light Green; P = Purple; Y = Yellow;

   D = Dark Green; K = Black; N = Brown; B = Blue; O = Orange

   Let O represent 1 unit. Notice two Y's can be placed end-to-end to make the same total length as O.



   a. Y is what fractions of O?

   b. With O as the unit, use your Cuisenaire rods to find the value of each of the following and write the fraction in the space provided. Make a sketch of your picture.

W = _____ R = _____ B = _____

2. Now let N be the unit. What color represents each of these fractions? Record a sketch.

a. $1/2 =$ _____ b. $1/8 =$ _____

c. $1/4 =$_____ d. $3/4 =$_____

3. Using two Orange rods as the unit, find the value of the following strips.

a. Y = _____ b. P = _____ c. R = _____

4. Complete the following statements with a color.

a. W is $1/2$ of _____ b. R is $1/2$ of _____

c. _____ is $1/2$ of N d. _____ is $1/2$ of D

e. Why do these different colors all represent $1/2$?

5. Complete the following equations with a fraction.

a. R = _____ of D b. R = _____ of N

c. R = _____ of Y d. R = _____ of G

e. How can R represent all these different fractions?

Decimals Part 1

Decimals provide a convenient way to represent fractions. We will address decimals next.

1. When you used base ten pieces to represent whole numbers, the unit cube represented the number 1. What numbers did the following pieces represent?

   Block = _____ Flat = _____ Long = _____

   Complete the chart:

Piece:	Block	Flat	Long	Unit
Value:				

2. When representing numbers that have two decimal places, we use the flat for the unit amount of 1. Determine the value of each of the following pieces, expressed as a fraction, where the flat is the unit.

   Block = _____ Flat = _____ Long = _____

   Complete the chart using fractions:

Piece:	Block	Flat	Long	Unit
Value:				

3. Review the charts you completed in (1) and (2).

   a. As you move from right to left, how are the values of the adjacent columns related?

   b. How are the values of the adjacent columns related as you move from left to right?

   c. Use your observations to label the missing places values on the top of this chip abacus.

		1			

   d. We can distinguish where the whole number part of a numeral ends and the fraction part begins by placing a decimal point in the appropriate spot. Label this point on the chip abacus above.

4. Using a chip abacus with decimal point marker, represent the following numbers.

a. 321.04

b. 3.2104

c. 32.104

5. Write the expanded form for the numbers from #4.

a. 321.04 =

b. 3.2104 =

c. 32.104 =

6. A chip abacus can be useful for explaining why we name decimal numbers the way we do.

a. Write the numeral represented in the chip abacus below._____

1	1/10	1/100
● ● ●	●	● ●

b. Next, exchange the chip in the tenths column in the chip abacus above for hundredths chips. Show the result of these exchanges in the chip abacus below.

1	1/10	1/100

Now how many hundredths do you have? _____ hundredths

c. This is the name given to the fraction part of the given number. We read numbers like this by first reading the whole number part as usual. Next, the decimal point is read as "and" and then the fraction part is read. How would you read the number in part (b)?

7. Write the word names for the numbers illustrated here.

100	10	1	1/10	1/100
●	●●		●●●	●

10	1	1/10	1/100	1/1000
●●●	●●●●	●		●●●

8. Write the decimal numerals to represent the following numbers.

a. Thirty two and thirteen hundredths

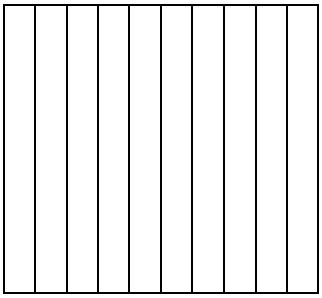
b. Five hundred and twenty-one thousandths

c. $16\frac{694}{10{,}000}$

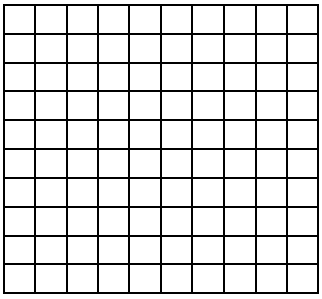
Decimals Part 2

We have used fraction strips to represent fractions as equivalent parts of a whole. Similarly, decimal squares can be used to picture decimals and to illustrate relationships between them.

1. a. If a square represents our unit amount, you can divide it into parts in different ways to represent decimal fractions. For example, you can form ten columns. What decimal part does each column represent?

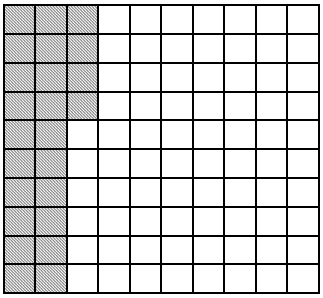


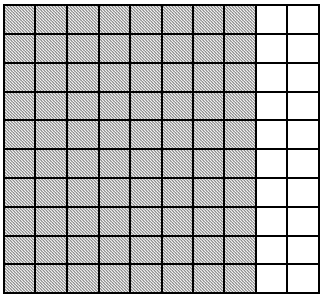
b. If the square is divided into 100 equivalent parts as shown, what decimal part does each small square represent?

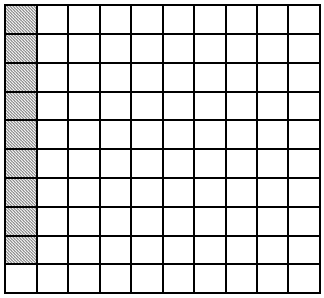


c. If you were to divide each of these small squares into 10 equally sized parts, how many parts would be formed altogether? What decimal does each of these parts represent?

2. Write the decimal number represented by the shaded part in each of the following hundreds squares.

a 

b 

c 

3. Shaded models also help to order decimals (i.e. determine which one is smaller/larger than the other)

a. Which is larger, 0.36 or .40? Explain this in terms of shaded area.

4. Hundreds squares provide a "parts-of-a-whole" way of comparing decimals. Another method involves place value. As an example, consider the decimals 0.709, 0.71, and 0.7.

a. Write the expanded from for each of these numerals.

0.709 =

0.71 =

0.7 =

b. Explain how you can use the concept of place value, together with what you've written in part (a), to order these decimals. Write the numerals in order from smallest to largest.

c. Express the decimals in part (a) so that they all have digits through their thousandths places (this is expressing all of the decimals so that they are all written to the same smallest place value). Arrange these decimals from smallest to largest. Which method for comparing decimals (using shaded area on hundreds squares, using place value, or the method used for this problem) do you think would be most effective in teaching students? Explain.