Name_____

Using a Menu to teach division of fractions

The idea of using a "menu" to teach math is simple: with minimal time spent on introduction, you make available a wide array of problems. The students have several days to work their way through as many of the problems on the worksheets as they can. **They do not have to finish every one**. Rather, the problems are differentiated: the "appetizers" are easier warm up problems; the "main course" are more substantial and complex; "dessert" is challenge problems, and in this case connect to some interesting areas of higher mathematics.

Launch (15 minutes)

Open with Counterexamples (see accompanying document on website), building to: "When you divide one positive number by another, you get a smaller answer." The counterexample, of course, is division by fractions.

Compare with multiplication of fractions, and sketch out what division means. Have the class try a few examples. I find the model of "portion size" is helpful.

Group question 1: "Let's divide 3 pizzas so that every slice is 1/5 of a pizza. How many slices are there?" Give students two minutes to discuss, then have someone explain their solution to the class. Point out that this question models $3 \div 1/5$.

Group question 2: "Again, 3 pizzas, but this time every slice is 2/5 of a pizza. How many slices are there now?" Give students 3-5 minutes to discuss, then have someone explain their solution to the class. Point out that this question models $3 \div 2/5$.

You can do more of these if necessary, but if kids have a way to draw a picture or otherwise handle the basic setup of division, you can set them to work on the menu from here. **Do not show "flip and multiply" as a shortcut.** Give students time to work out what dividing fractions actually means.

Students should each have their own "menu" (page 9 of this document), and can work in groups of 2-4. The rest of the handouts can be available in piles throughout the classroom, where students can easily get their hands on them.

Wrap Up

This menu could be good for 3-5 days of class. Specify one sheet that students will be responsible for turning in a nice version of at the end of the week. I recommend Ribbon Wrapping. It's also a good time to have a class discussion about how to divide fractions. Any tricks or observations that students noticed can be highlighted then, as well as any other mechanics you as the teacher want to underline.

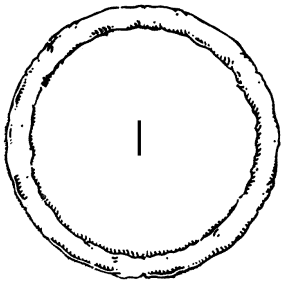
If you try this menu out, please let me know how it went for you!
You can email me at dan@mathforlove.com.

Name_____

Pizza Slices

Start with one pizza. How many slices do we get if...

1. Each slice is 1/3 of the pizza?



$1 \div 1/3 =$ _____ slices

2. Each slice is 1/5 of the pizza?

$1 \div 1/5 =$ _____ slices

3. Each slice is 1/8 of the pizza?

4. Each slice is 2/5 of the pizza?

5. Each slice is 2/9 of the pizza?

6. Each slice is 3/7 of the pizza?

7. Is there a quick way to divide 1 by a fraction? Explain with words, equations, and/or pictures.

Name_____

Dividing by 1/3 and 2/3

Solve.

$2 \div 1/3 =$

$2 \div 2/3 =$

$4 \div 1/3 =$

$4 \div 2/3 =$

$8 \div 1/3 =$

$8 \div 2/3 =$

$1 \div 1/3 =$

$1 \div 2/3 =$

$4/3 \div 1/3 =$

$4/3 \div 2/3 =$

$8/3 \div 1/3 =$

$8/3 \div 2/3 =$

$1/2 \div 1/3 =$

$1/2 \div 2/3 =$

Name_____

Ribbon Wrapping

1. Sofia has 20 feet of ribbon. It takes her one and two thirds feet of ribbon to wrap a big present. How many big presents could she wrap with her ribbon?

2. For small presents, Sofia uses 3/4 of a foot of ribbon. How many small presents could she wrap with her 20 feet of ribbon?

3. How many presents can she wrap if she wants to wrap some big and some small presents, and have no ribbon left over? Show why your answer works.

Name_____

The Cake Recipe

Simple White Cake

1 cup white sugar
1/2 cup butter
2 eggs
2 teaspoons vanilla extract
1 1/2 cups all-purpose flour
1 3/4 teaspoons baking powder
1/2 cup milk

You are having a party, and need to bake as many cakes as you can. The recipe you're using is above.

You have:

seven and a half cups of sugar
four and a half cuts of butter
fifteen eggs
twelve teaspoons of vanilla extract
eight cups of flour
nine teaspoons of baking powder
five cups of milk

How many cakes can you make?

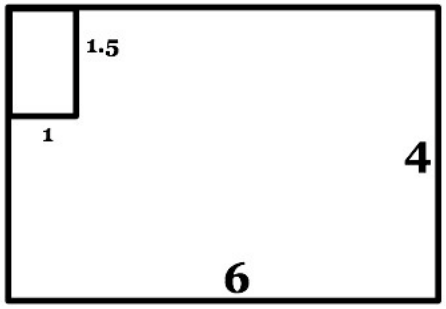
How much of each ingredient will you have left over?

Name_____

Brownies!

1. I baked a 4 inch by 6 inch pan of brownies, and cut out a 1 inch by 1 and a half inch brown.

   How many brownies this size can I cut out of the pan?



2. How many 2/3 inch by 2/3 inch brownies could I cut out of the pan?

Name_____

A Continued Fraction

This infinite, nested fraction is called a *continued fraction*.

$$1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \ddots}}}}$$

We'll try to figure out what it equals, or at least what it is close to, by cutting it off at the bottom and calculating just the

1. What is 1 + 1?

2. What is 1 + (1/(1+1))?

3. What is 1 + (1/(1 + (1/(1+1))))?

4. What is 1 + (1/(1 + (1/(1 + (1/(1+1)))))))?

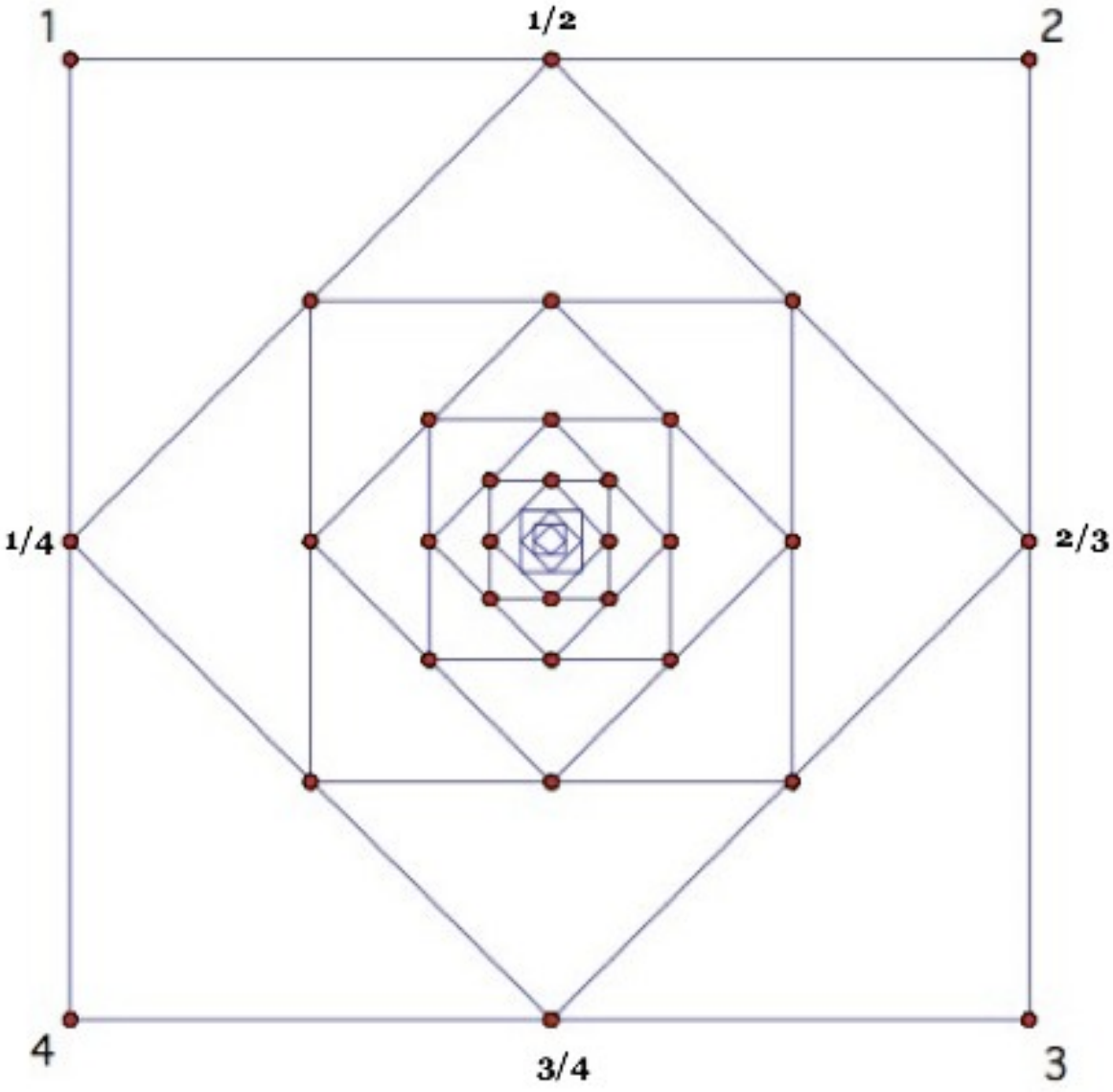
5. Calculate the fraction as far as you can go! What do you notice?

Name_____

Divvy Squares

To solve a *divvy square*, draw a square, put a number at each corner, and write in the midpoints. At the midpoint of each side, write in a fraction given by the larger number on that side divided by the smaller number. For example, 2/3 shows up below because 2 ÷ 3 = 2/3.

Continue this divvy square inward. Does it ever end? What does the end look like?



If you can solve this one, try another on your own. Do they always end?

Name_____

The Menu

Appetizers

_____Pizza Slices
_____Dividing by 1/3 and 2/3

Main Course

_____The Cake Recipe
_____Ribbon Wrapping
_____Brownies

Dessert
_____ A Continued Fraction
_____Divvy Square