Constructing Task: Tile Task

STANDARDS FOR MATHEMATICAL CONTENT

MCC4.NF.3 Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*

d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students will have experienced seeing fractions as both a bar and as a set. This activity will have students see fractions as portions of an area. By having students create multiple designs with the same criteria they will be forced to verify their results repeatedly, as well as show the cost of each design.

Students will also be able to copy their colored tile designs on to grid paper, however they may need their colored tiles to rearrange and help them determine their fractional worth. For example a student could make the design below but be having a difficult time determining what fraction of each color he or she used. With the tiles it can easily be rearranged to aid the students' fractional understanding.

By allowing students to make several designs they will be forced into verifying their answers as well as thinking critically about what looks artistically pleasing while keeping the cost of each tile in mind.

Before asking students to work on this task, be sure students are able to identify the number of equal pieces needed to cover one whole as the denominator, be comfortable with different size "wholes" such as 12 in a dozen, show equivalent fractions with an area model, record on the student sheet equivalent fractions or fraction sets (either by coloring or gluing die cut yellow and red circles), write an equation which shows the equivalent fractions, and write an equation that shows addition of fractions with like denominators.

ESSENTIAL QUESTIONS

- What is a fraction and how can it be represented?
- How can fraction represent parts of a set?
- How can I represent fractions in different ways?
- How can I find equivalent fractions?
- How can I add and subtract fractions of a given set?

MATERIALS

- Colored tiles
- Tile Task recording sheet
- Crayons or colored pencils

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task students are asked to design tiled coffee tables for a local furniture store. It allows for a lot of creativity, but the tiles cost different amounts so some designs are not profitable. Students will need to design several colorful coffee tables. However, some tiles cost more than others.

Comments

A great way to introduce this activity is to bring in some small ceramic tiles and discuss their uniform size. Colored tiles should be available to the students. The students can use these to represent the ceramic tiles. Students will be asked to make arrays and model an area model for fractions.

If available, students can glue die-cut squares of blue, yellow, red and green. Alternately, students can manipulate the color tiles online and easily print and then label their work. One site for fraction bars is:
http://nlvm.usu.edu/en/nav/frames_asid_203_g_2_t_1.html?from=grade_g_2.html

Task Directions

Students will follow directions below from the Fraction Clues task sheet. .

- Obtain a set of colored tiles.
- Work with a partner to make several designs and record it on their activity sheet.
- Keep record of fractional values as well as cost.
- Determine which of their designs is the most cost effective and artistic.

FORMATIVE ASSESSMENT QUESTIONS

- Tell me about your design.
- What tiles are you using most frequently?
- What fraction of the total are your blue tiles? Red tiles? Etc.
- Could you make this design a different way? If so, would it be cheaper or more expensive?

DIFFERENTIATION

Extension

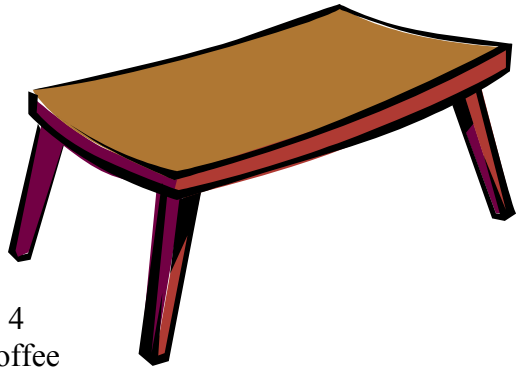
- Once students have completed the task above, this lesson can be extended to have students make a slightly larger coffee table that is perhaps four by eight or even four by nine tiles in area.
- Students could be asked to determine the perimeter of their coffee tables if they were to use standard four inch square ceramic tiles.
- Students could be asked to determine the cost of putting molding around the tiles given a certain cost per foot.

Intervention

- If necessary students could begin this activity with a smaller set
- Also if students are struggling they could attempt with activity with only three colors instead of using all four colored tiles.

Name _____ Date _____

Tile Task



Part 1.

Sammy's Small Furniture Store is selling tiled coffee tables. The tables have four inch tiles on them in an assortment of colors; yellow, red, green and blue. The store is selling coffee tables that are 4 tiles wide and 6 tiles long. Sammy needs your help to design some coffee tables. He wants each table top to have some of each color, and of course he wants it to look great. However, some tiles cost more than others, and yellow tiles are very expensive. Help Sammy out by designing 3 table tops of your own. Make sure to include ALL the colors, and pay attention to the price!

Your job has several parts:

1. Use colored tiles and the grid paper below to design at least three coffee tables.

2. Tally the number of each colored tile,

3. Find what fraction that number is out of a total of 24 tiles.

4. Find the cost of each set of colored tile

5. And finally, determine the total cost of your design.

Design 1.

Color/Price	How many?	How many out of the total of 24 Tiles	$ Subtotal Cost
Yellow/$3			
Red/$1			
Blue/$2			
Green/$1			
TOTAL			

Design 2.

Color/Price	How many?	How many out of the total of 24 Tiles	$ Subtotal Cost
Yellow/$3			
Red/$1			
Blue/$2			
Green/$1			
TOTAL			

Design 3.

Color/Price	How many?	How many out of the total of 24 Tiles	$ Subtotal Cost
Yellow/$3			
Red/$1			
Blue/$2			
Green/$1			
TOTAL			

Of the three designs you created, which design do you think is the best? Which design do you think will be the most cost effective to manufacture?