

## ***Mathematics: The Language of STEM***

Division of Fractions- Model It

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### **CONTENT AND TASK DECISIONS**

**Grade Level(s):** 6

**Description of the Task:** Students will create models to conceptualize the division of fractions without using the algorithm.

**Indiana Mathematics Content Standards:** 6.C.4 Compute quotients of positive fractions and solve real-world problems involving division of fractions by fractions. Use a visual fraction model and/or equation to represent these calculations.

#### **Indiana Mathematics Process Standards:**

PS.1: Make sense of problems and persevere in solving them- Students will have to discuss with their partner why their model represents the fraction problem and will have to justify their solutions.

PS.2: Reason abstractly and quantitatively- Students will have to explain their models and have to identify if their solutions are reasonable.

PS.4: Model with mathematics- Students will be drawing pictures to model the division of fractions, or will use unifix cubes or Legos to demonstrate the division of fractions.

PS.5: Use appropriate tools strategically- Students will use tools that they feel would work to model the division of fractions problems.

**Mathematics Content Goals:** Students will understand that division of fractions can be expressed through the use of models.

#### **Language Objectives:**

- Students will create division of fractions expressions using models.
- Students will listen to the ideas presented for dividing fractions from their group and express their division models to their group.

**Materials:** A variety of manipulatives can be offered to students: (paper/pencil, unifix cubes, Legos), cake picture

### **THE LESSON**

**Before:** Break the class up into teams of 3-4 students. Display the image of cake for the class. Explain that my son's first birthday was in August. I purchased a cake to serve to all of my guests. I thought I calculated the right amount of cake I needed for everyone to have at least one piece, but as the cake started to get smaller, I realized there was still a lot of people waiting for a piece of cake. This photo is how much cake I had remaining when I noticed that most of my guests were still in line for cake. Ask the class what kind of questions do you have? List them on the board. You may need to focus the class on asking mathematical questions such as:

- How many servings of cake are in a whole?
- How many people did you plan to serve?
- How many people already had cake?
- Did anyone take more than one piece?
- What fraction of the cake was eaten already?
- How many people were still in line for cake?
- Were all the pieces the same size?

\*You will not be solving this problem yet. Students will solve it for the exit ticket.

**During:**

Present the class with a division problem involving fractions such as: A serving is  $\frac{1}{2}$  cupcake. How many servings can I make from 2 cupcakes? Have the groups use manipulatives or draw a picture to help them figure out the amount of servings. Explain to the class that they are not to use the algorithm for dividing fractions. Today they must show the division problem. Once the groups are finished, have each group share their model with the rest of the class and explain their thinking.

Continue to model division of fraction problems with their groups using the following problems:

- A serving is  $\frac{1}{2}$  a cupcake. How many servings can I make from 1 cupcake?
- A serving is  $\frac{1}{2}$  a cupcake. How many servings can I make with  $\frac{3}{4}$  cupcake?
- A serving is  $\frac{1}{2}$  cupcake. How many servings can I make with  $\frac{3}{8}$  cupcake?
- A serving is  $\frac{1}{2}$  cupcake. How many servings can I make with  $\frac{5}{8}$  cupcake?
- A serving is  $\frac{3}{4}$  cupcake. How many servings can I make from  $\frac{1}{2}$  cupcake?

\*During this time, teachers should be monitoring groups and guiding as needed: How could you represent that serving amount? Is there another way you could show that serving size? How much of a cupcake do we have to start with?

**After:**

Give students the following problem:

- A serving is  $\frac{5}{8}$  cupcake. How many servings can I make from  $\frac{1}{2}$  cupcake?

Have students work independently on this problem. The teacher will monitor students and guide them as needed. When students have completed the problem, have students share with a partner. They should explain how they created their model and explain their solution. Then call on students to share their partner's thinking.

**ASSESSMENT**

Exit ticket: Display the birthday cake picture from the Before section of the lesson. Share with the class the following information about the photo:

- There is  $\frac{3}{4}$  cake remaining.
- A serving size is  $\frac{1}{32}$  cake.
- How many people can I serve with the remaining cake?

Create a model to show the division problem. Justify your answer using words.

## Asher's Birthday Cake



Differentiate:

Information:

- There is  $\frac{3}{4}$  cake remaining.
- A serving size is  $\frac{1}{12}$  cake.
- How many people can I serve with the remaining cake?

Information:

- There is  $\frac{3}{4}$  cake remaining.
- A serving size is  $\frac{1}{32}$  cake.
- How many people can I serve with the remaining cake?