



## **Constructing Task: Sharing Equally**

Approximately 1 Day

### **STANDARDS FOR MATHEMATICAL CONTENT**

**MCC.2.G.3** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

### **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.

**\*\*\*Mathematical Practices 1 and 6 should be evident in EVERY lesson\*\*\***

### **BACKGROUND KNOWLEDGE**

While this task is supporting a geometry standard, it also builds fraction understanding through manipulation of shape. It is important for teachers to understand the connections inherent in the task.

(Information quoted from Van de Walle and Lovin, *Teaching Student-Centered Mathematics: Grades K-3*, partial excerpts, pages 252-258)

“The first goal in the development of fractions should be to help children construct the idea of *fractional parts of the whole*- the parts that result when the whole or unit has been partitioned into *equal-sized portions* or *fair shares*. Children seem to understand the idea of separating quantity into two or more parts to be shared fairly among friends. They eventually make connections between the idea of fair shares and fractional parts. Sharing tasks are, therefore, good places to begin the development of fractions.

Students initially perform sharing tasks (division) by distributing items one at a time. When this process leaves leftover pieces, it is much easier to think of sharing them fairly if the items can be subdivided. Typical “regions” to share are brownies (rectangles), sandwiches, pizzas, crackers, cake, candy bars and so on.

Problem difficulty is determined by the relationship between the number of things to be shared and the number of sharers. Because children’s initial strategies for sharing involving halving, a good place to begin is with two, four, or even eight sharers, many children will deal out two to each child and then halve each of the remaining brownies.” ...

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“It is a mistake to think that fractional parts such as sixths or eighths are conceptually more difficult than halves or thirds. Note that in the discussion of sharing, halves, fourths, and eighths were explored prior to thirds, sixths, and fifths. This is done because successive halving of parts is a natural process for young children. The number of parts does not correlate with conceptual difficulty. Most state curricula would lead you to believe differently. In fact, if we want children to generalize the concept of fractional parts and connect to this generalization the numeric names of thirds, fourths, fifths, and so on, they must be exposed to more than just halves and thirds in the earliest stages of exploring fractions.”

### **ESSENTIAL QUESTIONS**

- How many different ways can we divide a rectangle into two equal parts?
- How are square and rectangles related?

### **MATERIALS**

- Math Journal
- “Sharing Equally” Student recording form
- *Give Me Half*, by Stewart Murphy, or similar text

### **GROUPING**

Partners

### **TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION**

#### **Part I**

Begin the lesson by asking students this question, “Have you ever had to share something before?”

Hold up an even set number of items, and ask the students for suggestions on how you could share these items with one other person. Have students record their answer in their math journals including pictures and words. This will allow you to begin to see how students see “sharing”. This will produce a variety of results, possibly including students may describe handing objects out one at a time, some students will match all the items up into pairs and then take half of each pair, and some students may even describe cutting each item in half and then giving each person a series of halves. Have students share their explanations and illustrations with the class.

#### **Part II**

Read **Give Me Half** by Stewart Murphy or some other similar book that describes sharing things equally between two people. As you read, stop to discuss the ways the children are sharing the items in the story.

Present students with the situation: Jessica and Katie wanted to share a cake equally. The cake was in the shape of a rectangle. Katie said, “There are two ways to cut the cake to make equal size pieces. Either cut from one vertex to the opposite vertex or cut from the midpoint

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of one side to midpoint of the opposite side. Those are the only two ways to make one straight cut and have two equal size pieces.” Jessica said, “No, there are other ways to make one cut and share the cake equally besides the ways that you named.” Who is right?

Students should explain their thinking on their student recording form using pictures and words.

### **Part III**

Present students with a similar situation as above but this time they need to share the cake between 4 friends. Ask questions such as, “What will happen to the size of the pieces? Would you rather share with 4 friends or 2 friends? Why? How many different ways could they cut the cake and still have four equal pieces? What do you think we should call each of these four pieces? Why wouldn’t the name thirds or fifths or sixths make sense for these pieces? What would those pieces look like? Would they be bigger or smaller than fourths? Bigger or smaller than halves? How do you know? How many pieces (halves or fourths) do we need in order to talk about the whole cake?”

### **FORMATIVE ASSESSMENT QUESTIONS**

- When sharing, how do you make sure all parts are equal?
- Do equal parts have to be the same shape? Why?
- Is there more than one way to cut something in half?
- Is there more than one way to cut something into fourths?

### **DIFFERENTIATION**

#### **Extension**

- Students can attempt to divide other polygons into equal halves and fourths.

#### **Intervention**

- Students who are having difficulty can use pattern blocks, fraction strips, index cards, or construction paper shapes which they can compare and/or cut into equal parts.

Name: \_\_\_\_\_



## Sharing Equally

Jessica and Katie wanted to share a cake equally. The cake was in the shape of a rectangle. Katie said, "There are two ways to cut the cake to make equal size pieces. Either cut from one vertex to the opposite vertex or cut from the midpoint of one side to midpoint of the opposite side. Those are the only two ways to make one straight cut and have two equal size pieces." Jessica said, "No, there are other ways to make one cut and share the cake equally besides the ways that you named." Who is right?

Prove your findings. Using pictures and words, explain your thinking and who you think is correct.

(Information adapted from the Noyce Foundation, Problems of the Month)