Constructing Task: Fraction Cookies

Approximately 2 Days

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.

MCC.2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

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

(Information adapted from North Carolina DPI Instructional Support Tools)

Within this task, students will be partitioning circles (cookies) and discussing these circles in reference to their fractional parts. Students will the use this information to create graphs. At first students should create real object and picture graphs so each row or bar consists of countable parts. These graphs show items in a category and do not have a numerical scale. For example, a real object graph could show the students' shoes (one shoe per student) lined end to end in horizontal or vertical rows by their color. Students would simply count to find how many shoes are in each row or bar. The graphs should be limited to 2 to 4 rows or bars. Students would then move to making horizontal or vertical bar graphs with two to four categories and a single-unit scale.

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, page 254)

"All of the sharing tasks involved sharing something that could be cut into smaller parts. In these situations the fractions are based on parts of an area or region. This is a good place to begin and

is almost essential when doing sharing tasks. There are many good region models, as shown in Figure 9.3 on page 254.

Circular "pie" piece models are by far the most commonly used area model. The main advantage of the circular region is that it emphasizes the amount that is remaining to make up a whole. The strong emphasis on the circle as a whole also has disadvantages. To use the semicircle or any other piece other than the circle to represent the whole would be very confusing. So there is no challenge for students to construct a whole given one of the pieces as a fractional part. Another disadvantages lies in the fact that each piece is a unit fraction. Drawings of circle models can mislead and be overused. Even adults have difficulty partitioning a circle in a reasonably accurate manner." *In order to overcome this concern, the flag task which follows this one involves the use of rectangular wholes.*

ESSENTIAL QUESTIONS

- What is a fraction and how can it be represented?
- How do we add fractions?
- How do we apply the use of fractions in everyday life?
- When is it appropriate to use fractions?
- How can we use a pictograph, bar graph, chart, or table to organize data and answer questions?
- What is a survey?

MATERIALS

- "Fraction Cookie Order" worksheet, 2 pages (one per student)
- Crayons, colored pencils, or markers
- Survey
- Paper for constructing graphs

GROUPING

Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will create a cookie order in which cookies are divided into fractional parts.

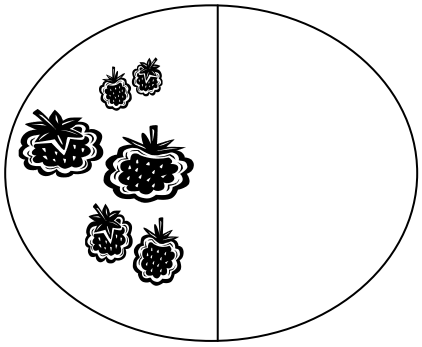
Part I

- Tell the students the following scenario:
  - You own your own bakery. Your specialty is fraction cookies. People place orders from all over the country for your cookies. You have recently received the following orders.
  - Before filling the order by making the cookies, you like to confirm your order with a drawing for the customer. (If the toppings ordered do not cover an entire cookie, customers want the remaining portion of the cookie to be left plain.)

- Using the circle templates below, show how you would create each cookie with the correct fractional amounts of toppings.
- Share your illustrations with your teacher.

- As students are working, be sure they are dividing the circles into equal-sized pieces and filling the sections as described in the order form.

Example:
This made to order cookie is split equally half raspberries and half plain.



Part II
Ask students to survey ten family members and/or classmates about their favorite cookie topping, each person can choose up to 4 toppings. The students will write a question that will generate the information needed to determine what their families or classmates like on their cookies. Brainstorm a list of possible topping and have the students make the decision for their survey choices based on this discussion. Remind students that most surveys will use information that is common to all people. This could lead to a discussion about how survey items are chosen and their purpose. Responses to the survey will be recorded on the survey form with a check mark. Point out to the students that a survey form is different from a graph.

Discuss possible ways their answers could be recorded. Students will record their answers on their "Cookies Please" survey form. Each student needs to be sure to label the top row of the table with their four topping options.

Once the items have been decided, have students determine what kind of graph will be needed to record the information. Have students create a blank graph they will use for their survey data of the choice of toppings. Allow students to take this survey home if necessary.

When the surveys come back the next day, discuss the results with the class. If students do not have ten responses, they may also ask their classmates and add these results to their survey.

<u>FORMATIVE ASSESSMENT QUESTIONS</u>

- How do you partition a shape?
- How do you know what name to give a fraction?
- When you were creating your survey, what difficulties did you have?

DIFFERENTIATION

Extension

- Challenge student to become the creator of the triangular or square cookie. Have them convert their illustrations showing the fractional cookies to a triangle template, or square template
- Have students develop a list of survey questions on a topic of their choice. Allow them to survey additional classrooms or grade levels to compare results.

Intervention

- Provide manipulatives such as connecting cubes for students to model the toppings for the cookies.
- Provide the student with the questions and the survey so that their task is limited to collecting the information and recording the results.
- Provide students with shapes already divided up into the fractional shares halves, thirds, and fourths. These students should still select which they need to use, but they will not be physically partitioning them.

Name _____ Date _____

Fraction Cookies

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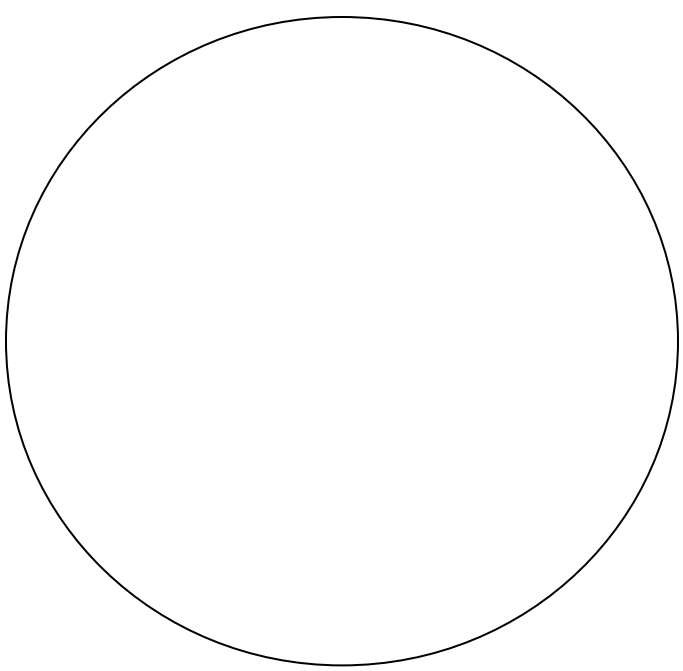
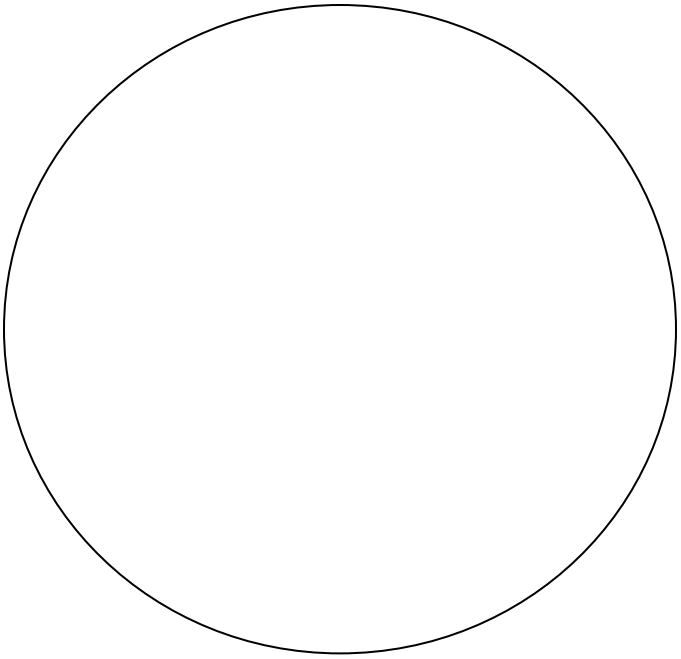
Cookie Orders

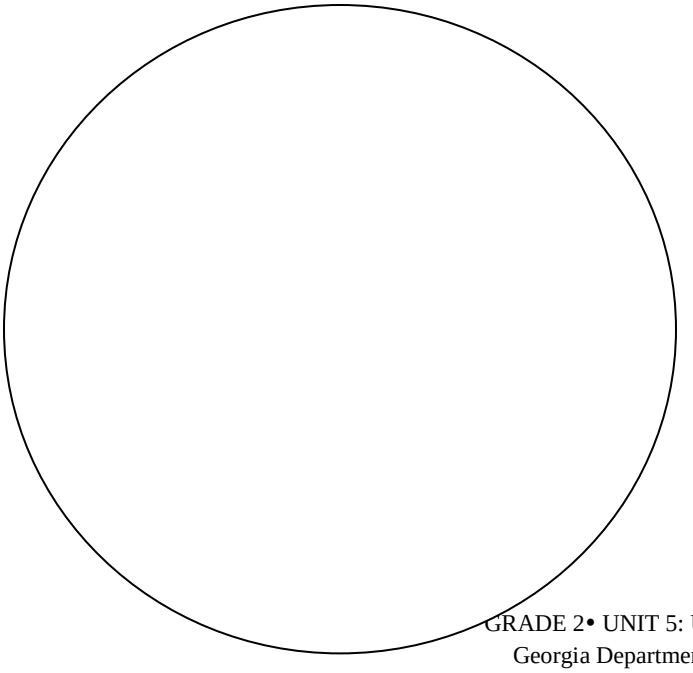
Order Number	M & Ms	Walnuts	Chocolate Chips	Vanilla Icing	Sprinkles	Chocolate Icing
#1	Half	Half				
#2				Two fourth	One fourth	
#3	One fourth				One fourth	Two fourths
#4	One fourth		One fourth			Two fourths
#5	One third		One third	One third		
#6			Two fourths		Two fourths	
#7		One fourth	One fourth	One fourth		One fourth
#8	One third					Two thirds

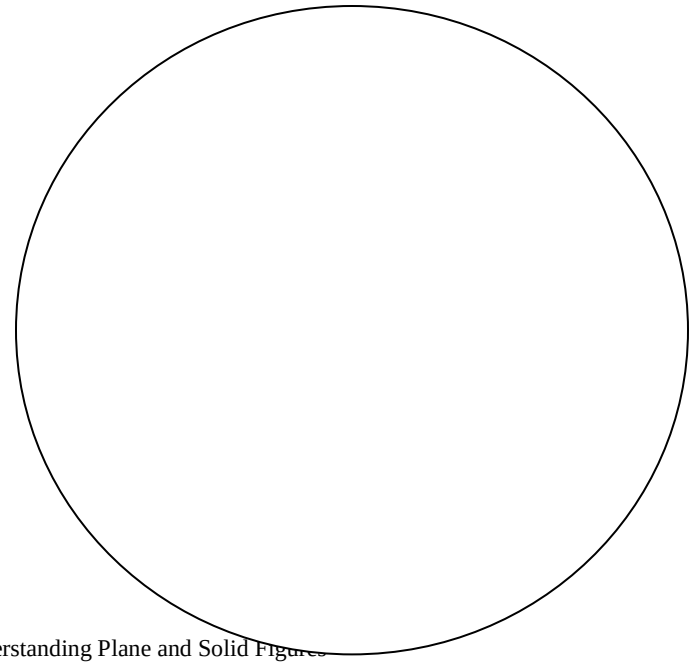
Name _____ Date _____

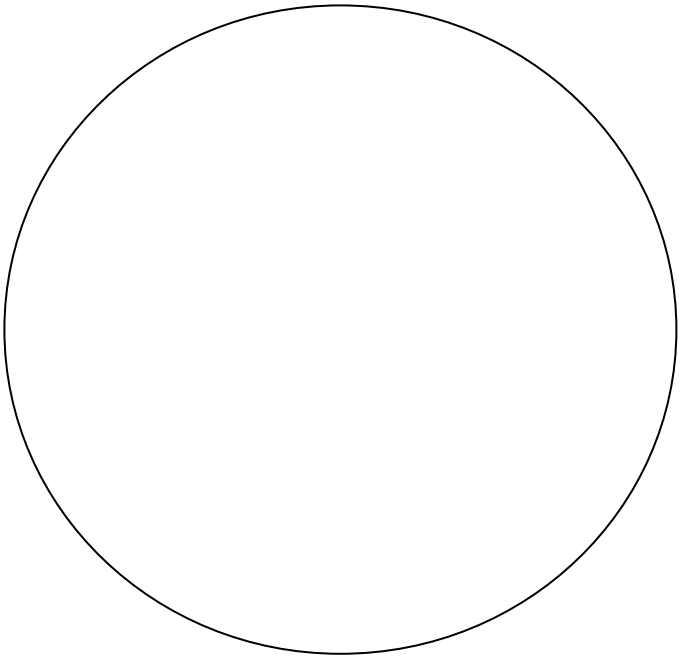
Fraction Cookie Orders

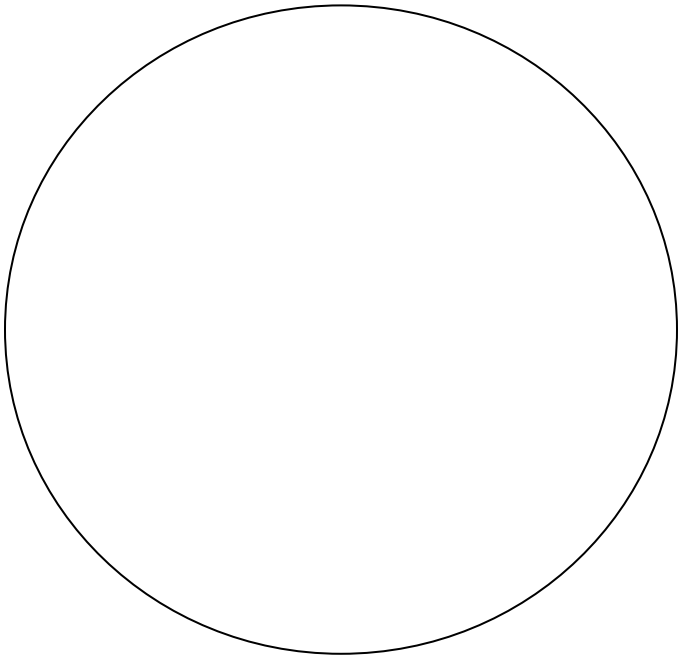


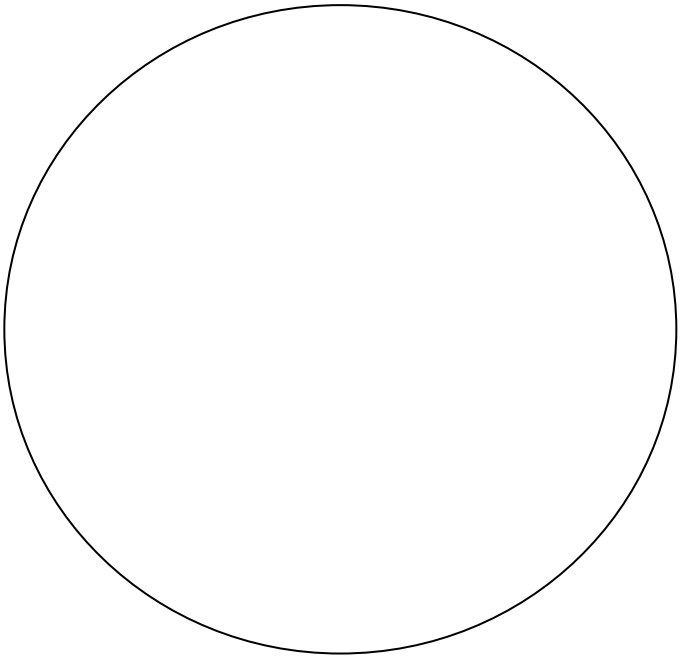


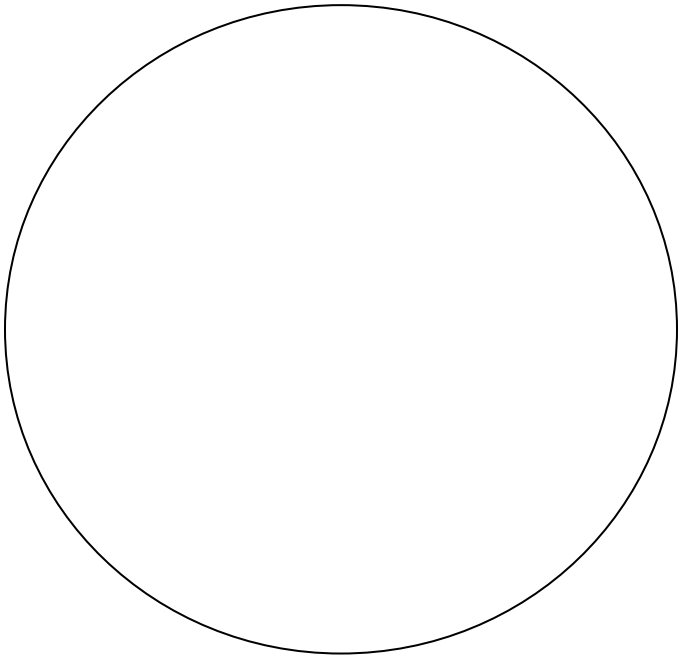












Name: _____

COOKIES PLEASE!

Survey Question:

_____

_____?

	Topping #1	Topping #2	Topping #3	Topping #4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total				