Rich Mathematical Task – Grade K– *Sharing Cookies*

Task Overview/Description/Purpose:

- The purpose of this task is for students to share equally with two sharers, when given a practical situation.
- In this task, students will represent fair shares pictorially, when given a practical situation.

Standards Alignment: Strand – *Number and Number Sense*

Primary SOL: K.5 The student will investigate fractions by representing and solving practical problems involving equal sharing with two sharers.

Related SOLs: 1.4, 2.4

Learning Intention(s):

- **Content** - I am learning to create equal shares for two people.
- **Language** - I am learning to use the language of mathematics to describe my understanding of equal shares.
- **Social** - I am learning to describe my thinking and listen as classmates share their mathematical thinking.

Success Criteria (Evidence of Student Learning):

- I can use pictures to show fair shares.
- I can describe shares as equal pieces or parts of the whole.
- I can describe my thinking and listen as my classmates share their mathematical ideas.

Mathematics Process Goals

Problem Solving	• Students will apply the mathematical concept of fair share/ equal share to share a whole equally with two sharers when given a practical situation.
Communication and Reasoning	• Students will describe shares as equal pieces or parts of the whole (e.g., halves), when given a practical situation.
Connections and Representations	• Students will represent fair shares pictorially, when given a practical situation.

Task Pre-Planning

Approximate Length/Time Frame: 45 minutes

Grouping of Students: Students begin the task independently. As the task progresses, students share ideas with a partner. Students will communicate their findings by sharing models and representations during a whole group reflection.

Materials and Technology:

- Task for each student
- Construction paper cut into rectangles or the template attached for cookies
- Drawing tools, crayons, pencils, etc.

Vocabulary:

- equal
- fair shares
- part, whole
- halves

Anticipate Responses: See the Planning for Mathematical Discourse Chart (columns 1-3).

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Task Implementation (Before)

Task Launch:

- In a whole group setting, invite students to connect with the context of the problem by asking questions such as:
  - Have you ever shared something with a friend, brother, or sister?
  - How did you share it?
  - Was it fair?
  - How did you know it was fair?
  - How did you know how much each person got?
- Today we are going to solve a problem where will be sharing some cookies.
- Introduce the task by reading the problem aloud to students. Ask a few students to restate the task in their own words to promote understanding and clarify questions.
- Pass out the task to each student to solve. Make manipulatives and drawing tools available, as needed.

*Teacher should listen and take notes as students work and share ideas. For those unable to record their own thinking, the teacher should feel free to record student explanation or strategy on the student's work.

Task Implementation (During)

Directions for Supporting Implementation of the Task

- Monitor – The teacher will observe students as they work independently on the task. The teacher will engage with students by asking assessing or advancing questions as necessary (see attached *Planning for Mathematical Discourse).*
- Select – The teacher will decide which strategies or thinking will be highlighted (after student task implementation) that will advance mathematical ideas and support student learning.
- Sequence – The teacher will select 2-3 student strategies to share with the whole group. One suggestion is to look for one common misconception and two correct responses to share.
- Connect – The teacher will consider ways to facilitate connections between different student representations.

Suggestions For Additional Student Support

- Students who have difficulties with decoding/reading math text may benefit from pairing vocabulary with visuals. For example, have a picture of a fair share and a picture of an unfair share.
- Students who have difficulty getting started with the task, planning, and/or self-monitoring can be supported through questioning. See the planning for mathematical discourse chart for possible questions to ask these students.
- Students who have trouble expressing themselves may benefit from sentence frames such as:
  - Ruth has ____ cookies. Her friend has ___cookies.
  - This is fair because ____.
- After students have shared solutions, create an anchor chart including picture representations to summarize student findings.
- Students who are ready for an extension can be asked to share between four people.

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Task Implementation (After)

Connecting Student Responses (From Anticipating Student Response Chart) and Closure of the Task:

- Reflect on student solution strategies during a whole group discussion. Use this time to connect different students' responses and connect the responses to the key mathematical ideas of fair/equal shares.
- Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during the task discussion.
- Questions to promote student engagement and discourse:
  - What is one way that Ruth could share her cookies?
  - How do you know that is fair?
  - Who can add on to that?
  - Do you agree or disagree? Why?
  - Did anyone think about that in a different way?
- Close the lesson by creating an anchor chart including picture representations to summarize student findings.

Teacher Reflection About Student Learning:

- Use the rich mathematical task rubric to evaluate students' progress toward the goals.
- Look at the students' work. Who employed what strategies?
  - Who benefitted from the use of manipulatives to fair share?
  - Who was able to use pictures to show their thinking?
  - Who was unable to complete the task even with support?
  - Who selected only even numbers of cookies to share?
  - Who selected odd numbers of cookies to share?
  - Who found a pattern that helped them to find multiple solutions?

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Planning for Mathematical Discourse

Mathematical Task: Sharing Cookies Content Standard(s): K.5

Teacher Completes Prior to Task Implementation			**Teacher Completes During Task Implementation**	
Anticipated Student Response/Strategy *Provide examples of possible correct student responses along with examples of student errors/misconceptions*	**Assessing Questions** *Teacher questioning that allows student to explain and clarify thinking*	**Advancing Questions** *Teacher questioning that moves thinking forward*	**List of Students Providing Response** *Who? Which students used this strategy?*	**Discussion Order - sequencing student responses** • *Based on the actual student responses, sequence and select particular students to present their mathematical work during class discussion* • *Connect different students' responses and connect the responses to the key mathematical ideas* • *Consider ways to ensure that each student will have an equitable opportunity to share his/her thinking during task discussion*
Anticipated Student Response: Student is not sure how to start.	• Reread the task. What is the problem asking? • How many cookies could Ruth have? How might you share them? • Tell me about how Ruth is sharing her cookies. • What do you know about sharing things? (Trying to get to the idea of equal) • What does equal mean?	• Imagine your mom made a plate of cookies. How many cookies are on your plate? How might you share them with a friend? • What might it look like if Ruth had two cookies?		
Anticipated Student Response: Student does not create fair shares.	• Tell me about your work. Do you think these are fair shares? Why or why not? • Did Ruth and her friend get equal amounts how do you know? • What do you know about sharing things? (Trying to get to	• How can we make this fair? • What could it look like to share that cookie equally?		

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	the idea of equal) • What does equal mean?			
Anticipated Student Response: Students only share an even number of cookies.	• Tell me about your work. • How do you know that each child has an equal amount? • How do you know that your solution makes sense? • If you had one more cookie, how could Ruth and her friend share the cookies?	• Is there ever a time when you are sharing cookies that you might have one left over? What could you do to share it equally? • How could you share the cookies a different way?		
Anticipated Student Response: Student tries to share an odd number of cookies but isn't sure how to break a cookie apart.	• I see that you shared two cookies with each person, but there are five cookies. What could you do with that last cookie, so each person could get an equal share? • How do you know that Ruth and her friend have equal shares?	• Without getting rid of the leftover cookie, how could you share it equally with Ruth and her friend?		
Anticipated Student Response: Student tries to share a large number of cookies and loses count resulting in an unfair share of	• Tell me about your work. • How did you keep track of the cookies you were sharing? • Are these equal shares? Why or	• How could you keep track of the cookies you are sharing?		

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cookies.	why not?			
Anticipated Student Response: Student correctly shares between two sharers keeping wholes with an odd split in half (5 cookies are shared and each friend gets 2 ½ cookies)	• Tell me about your work. • How do you know they are fair shares? • How do you know that your solution makes sense?	• Is there another solution to this task? • Do you see any patterns? • What if we were sharing with four people?		
Anticipated Student Response: Student correctly shares between two sharers but splits each cookie in half (5 cookies is split and each friend gets 2 ½ cookies or five halves)	• Why did you decide to break apart each cookie? • How do you know that each person gets the same amount?	• After you broke apart each cookie how would you name the amount each person has?		

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NAME _____ DATE _____

Sharing Cookies

Ruth is sharing cookies with her friend. Ruth wants to make sure they share the cookies equally.

Draw a picture showing how many cookies each person might have. Show your work and explain your thinking.

Cookie Template

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Possible sentence frames for supporting learners:

Ruth has _____cookies.

Her friend has _____cookies.

This is fair because _____.

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Rich Mathematical Task Rubric

	Advanced	Proficient	Developing	Emerging
Mathematical Understanding	Proficient Plus: • Uses relationships among mathematical concepts or makes mathematical generalizations	• Demonstrates an understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to a valid and correct solution	• Demonstrates a partial understanding of concepts and skills associated with task • Applies mathematical concepts and skills which lead to an incomplete or incorrect solution	• Demonstrates no understanding of concepts and skills associated with task • Applies limited mathematical concepts and skills in an attempt to find a solution or provides no solution
Problem Solving	Proficient Plus: • Problem solving strategy is well developed or efficient	• Problem solving strategy displays an understanding of the underlying mathematical concept • Produces a solution relevant to the problem and confirms the reasonableness of the solution	• Problem solving strategy displays a limited understanding of the underlying mathematical concept • Produces a solution relevant to the problem but does not confirm the reasonableness of the solution	• A problem solving strategy is not evident • Does not produce a solution that is relevant to the problem
Communication and Reasoning	Proficient Plus: • Reasoning or justification is comprehensive • Consistently uses precise mathematical language to communicate thinking	• Demonstrates reasoning and/or justifies solution steps • Supports arguments and claims with evidence • Uses mathematical language to communicate thinking	• Reasoning or justification of solution steps is limited or contains misconceptions • Provides limited or inconsistent evidence to support arguments and claims • Uses limited mathematical language to partially communicate thinking	• Provides no correct reasoning or justification • Does not provide evidence to support arguments and claims • Uses no mathematical language to communicate thinking
Representations and Connections	Proficient Plus: • Uses representations to analyze relationships and extend thinking • Uses mathematical connections to extend the solution to other mathematics or to deepen understanding	• Uses a representation or multiple representations, with accurate labels, to explore and model the problem • Makes a mathematical connection that is relevant to the context of the problem	• Uses an incomplete or limited representation to model the problem • Makes a partial mathematical connection or the connection is not relevant to the context of the problem	• Uses no representation or uses a representation that does not model the problem • Makes no mathematical connections