

M2C3 Math Modeling Lesson Overview

LESSON TITLE: Popcorn Sharing for Family Movie Night

STANDARDS ALIGNMENT:

GRADE 3	GRADE 4	GRADE 5
<p>3.OA: Represent and solve problems involving multiplication and division.</p> <p>3.OA 3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.</p>	<p>4.OA: Use the four operations with whole numbers to solve problems. Gain familiarity with factors and multiples.</p> <p>4.OA 3: Solve multistep word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted...Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p>	<p>5.OA: Write and interpret numerical expressions.</p> <p>5.OA 2: Write simple expressions that record calculations with numbers...</p> <p>5.NBT: Perform operations with multi-digit whole numbers and with decimals to hundredths.</p> <p>5.NBT 6: Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.</p>
<p>MP: 1 Make sense of problems and persevere in solving them.</p> <p>MP: 4 Model with Mathematics</p>	<p>MP: 1 Make sense of problems and persevere in solving them.</p> <p>MP: 4 Model with Mathematics</p>	<p>MP: 1 Make sense of problems and persevere in solving them.</p> <p>MP: 4 Model with Mathematics</p>

CONNECTIONS (Consider while planning):

- Previous Math Knowledge: *What prior math knowledge and experiences does this lesson consider and/or build on?*

Four operations (addition, subtraction, multiplication and division) using numbers between 0-1000. Representing math ideas with pictures, symbols, and words.

- Cultural/Community/Family Connections: *How does the lesson connect to, or build on the knowledge, practices, or experiences of children and families? On community contexts??*

Sharing food and other items among siblings, friends, classmates. Fair sharing. Estimating how many items to buy to share with a group. Estimating how many people will come to a party.

TASK VARIATIONS (to numbers, context, structure):

Routine 1: Mathematizing World - Open Ended (10 minute) - [Show image of big bag of popcorn]

- What do you notice? What does this picture make you wonder about? Brief class discussion.
- What questions do you have? What would you need to do to answer those questions?

Routine 2: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building [Show image of big bag of popcorn and elicit and/or pose specific questions that can be answered using mathematics; consider using anchor chart to record “math” questions using questions stems - How much? How many? How much more/less; How big/small?]:

- Look at this big bag of popcorn... (use realia or slide)
- What questions do you have that you could use mathematics to answer?
- What information do you need to find out how to share this giant bag of popcorn?
- How will you use this information to figure out a fair way to share the popcorn?

Routine 3: Full Modeling Task (60-90 minute) Students participate in entire modeling cycle

In this task students will plan for enough popcorn to serve their class and/or their school including families during family movie night. The mathematics used focuses on estimation, and multiplication and division of whole numbers. Students must also communicate mathematically by providing a plan that can be used in other sharing situations. To promote communicating their plan, teachers may want to provide sentence stems such as:

- The plan shows the popcorn last for the entire evening by...
- Everyone gets enough popcorn because...
- My plan is fair because...
- This plan could work in a similar situation because...
- I could use this plan for other situations such as ...

Task A: Whole Class

Your class is having a movie night for students and their families. You will serve popcorn as a snack. You will get giant bags of popcorn to share and scoop out servings for each person.

How many giant bags of popcorn does your class need for the movie night?

You need to make sure there is enough popcorn, but not a lot of leftover popcorn.

Make a plan for how to share the popcorn.

Your plan to must show how:

- everyone gets enough popcorn
- it is a fair plan
- you can use the plan in other sharing situations

You can use pictures, numbers and words in your plan.

Task B: Whole School

Your school is having a movie night for students and their families. They will serve popcorn as a snack. They will get giant bags of popcorn to share and scoop out servings for each person.

How many giant bags of popcorn does the school need for the family movie night?

You need to make sure there is enough popcorn, but not a lot of leftover popcorn.

Make a plan for how to share the popcorn.

Your plan to must show how:

- everyone gets enough popcorn
- it is a fair plan
- you can use the plan in other sharing situations

You can use pictures, numbers and words in your plan.

ANTICIPATE ASSUMPTIONS:

Students may assume:

- the number of servings of popcorn/bag rather than investigate to determine that number based on their own experiences.
- that everyone will come to movie night and bring the same number of family members.
- that a fair plan means everyone will get one serving of popcorn.
- that a fair plan means some people can get two servings of popcorn if they wish to do so.

ANTICIPATED STUDENT STRATEGIES:

Students may:

- Measure scoops of popcorn from the bag using a standard measure such as a cup and count the number of servings
- Survey students in their class to see how many are coming to the class/school movie night and how many family members will attend with them and how many servings they would like.
- Use their class survey data to estimate how many people are coming to the whole school event and how many people might want popcorn.
- Use information from the nutrition label to calculate the total number of cups of popcorn in one bag. For example, if 4 cups per serving, and 24 serving per bag, there are $24 \times 4 = 96$ total cups of popcorn in the bag.
- Use the total number of cups of popcorn in the bag, and a decision about a reasonable serving size to determine how many people one bag of popcorn can serve. For example, if a bag has 96 total cups, and if a reasonable serving size is 3 cups per person, then $96 \text{ cups/bag} \div 3 \text{ cups/serving} = 32 \text{ servings/bag}$.
- Buy enough bags of popcorn so that each person gets only one serving. For example, if 120 people will need popcorn, and each bag has 32 servings, then $120 \text{ serving needed} \div 32 \text{ servings/bag} = 3.75 \text{ bags of popcorn needed}$. Students may round this value to determine that 4 bags are needed to give everyone one serving.
- Buy enough bags of popcorn so that each person gets one serving, and there is enough popcorn for some people to get additional serving. For example, if 4 bags is enough for everyone to get one serving, students may decide to buy one extra bags so the X people can have a second serving.
- Decide that four cups of popcorn, the recommended serving size on the label, is too large and determine that another amount, such as two cups, is a reasonable serving size. Use this adjusted serving size to calculate the number of servings/bag. For example, if the bag states that 4 cups is a serving, and there are 24 servings in a bag, then if we cut the serving size in half (2 cups instead of 4) the number of servings doubles (from 24 to 48).

ADDITIONAL RESOURCES: Class/school information about number of students in classes, number of classes per grade and in school. Dietary restrictions. Optional – Nutrition label from bag of popcorn, showing serving size. NOTE: Giant popcorn bags come in various sizes, with different numbers of servings. Bags sold at stores such as Costco often have 24 servings per bag. Bags sold in smaller stores may have 12 or 14 servings per bag.

MATERIALS NEEDED:

Popcorn Sharing_Lesson Slides

Realia – Big bag of popcorn

Popcorn Sharing_Student Handout