M2C3 Math Modeling Lesson Overview

LESSON TITLE: Sharing Snacks – Mandarin Oranges

Standards Alignment

GRADE 3	GRADE 4	GRADE 5
3.0A 3: Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. **3.OA.B.5** Apply properties of operations as strategies to multiply and divide. **3.OA.C.7** Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations.	**4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm. **4.0A.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. **4.OA.A.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. **4.OA.C.6** Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **4.MD.** Solve problems involving measurement… **4.MD.2:** Use the four operations to solve word problems involving … money including problems involving simple fractions and decimals…	**5.OA.1 and 5.OA.2** Write and interpret numerical expressions. **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.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.
MP: 1 Make sense of problems and persevere in solving them. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problems and persevere in solving them. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problems and persevere in solving them. **MP: 4** Model with Mathematics

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. Snack time rituals. Determining the cost of buying food.

• Language Considerations: *How does this lesson connect and distinguish between everyday language and math language? What might be specialized vocabulary used in this lesson? Connections to home language?* Rate language may arise (e.g., 14 oranges per bag.)

***TASK VARIATIONS:* Sharing Snacks – Mandarin Oranges**

Level 1: Routine: Mathematizing World - Open Ended (10 minute) - [Show slide 1] Ask if anyone has eaten a mandarin orange or a clementine. Students may know them by their brand name Halos or Cuties. What do they like about them? (Easy to peel, easy to separate, no seeds, sweet, good source of vitamin C, …)

Show slide 2: Have you ever though about where these oranges come from and how they are packaged. Show video.

- What do you notice?
- What do you wonder?
- What questions do you have that you could answer using mathematics?

Level 2: Routine: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building [Show image of 2 lb bag of Cuties™ -- slide 3] Have student guess how many oranges are in the bag.

How many oranges were in the bag? Do you think it is always the same number? If you have the optional realia, a 2 lb bag of Cuties™ you could have a student count this bag or show slide 4 and count the number or oranges on the plate. Doing both may show that there are not always the same number of oranges in a bag. Why do you think the bag is sold by weight and not by number of oranges? (Note: Some students may know that depending on the time of year, the oranges can be much smaller than other times of year. They may want to take this into considerations when solving the next problems.)

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

The Healthy Snack Club at your school wants to buy mandarin oranges for snack time.

- How many 3 lb. bags of mandarin oranges should they need to buy if they want to give each student in your grade an orange?
- How many 5 lb. boxes of mandarin oranges would they buy if they want to give each student in your grade an orange?
- What will it cost the Healthy Snack Club to buy mandarin oranges for all of the students in your grade?

Extension: Is your solution the least expensive solution? Why or why not? If it is not the least expensive, how could you modify it so that it would cost less to by oranges for every student in your class?

POSSIBLE ASSUMPTIONS

Number of students who will be at school each day
All students will come to school each day; OR, some students will be absent
Not everyone will want the snack; some students may have dietary restrictions
Only students will eat the snack; not adults; OR, everyone will eat the snacks
A serving will be one orange. Some may say two oranges, especially if the oranges are small.

ANTICIPATED STUDENT STRATEGIES (Examples for Sharing Snacks – Mandarin Oranges):

Students might:

Determine the number of students in their grade by counting the number of students in their class and multiplying by the number of classes in their grade.

Calculate the number of oranges in a 3-pound bag by dividing the amount in a two-pound bag by 2 and multiplying that result by 3. 15-18 oranges divided by 2 = 7.5 to 9 or 7 to 9 in one pound. 3 pounds would be 21 to 27 oranges.

Calculate the 5 lb. bag the same way – multiplying the 1 lb. amount by 5. They could add the two-pound amount and the 3-pound amount.

Ignore the range of oranges per bag and just use 18, the number that Collin got when he counted.

If they have 23 students in a class and 3 classes, they need 69 oranges. If the 3 teachers each get an orange, that would be 69+3 = 72. 72 oranges / 18 oranges/bag = 4 2-lb bag of oranges. They may decide to get 5 bags incase there are not 18 in the bag.

In determining the cost, students may only use one size. 4 2-lb bags 4 x $3.99 = $15.96. Others may combine two or all three sizes. 1 5-lb box + 1 3-lb bag. = 8.75 +5.49 = 14.24 (5x9+3x9) oranges = 72 oranges. (Assuming 9 oranges/lb)

They should complete the same calculation with the minimum expected amount (15, per 2 lb)). 72/15= 4.8 bags rounded to 5 bags. (Note students may round down. This could undercount the amount they need.) They may only use the minimum expect amount to ensure they have enough oranges.

To find the least expensive way to buy the oranges, student should try different amounts like the response above.

Students may want to buy at least an extra 2 lb bag to ensure that there will be enough oranges for everyone.

MATERIALS

Snack Sharing_Mandarin Oranges_Lesson Overview
Snack Sharing_Mandarin Oranges_Student Task

Snack Sharing_Mandarin Oranges_Lesson Slides
Relia – Bag of Mandarin Oranges - optional