M2C3 MATH MODELING LESSON OVERVIEW

LESSON TITLE: Pricing Guacamole Task

STANDARDS ALIGNMENT:

GRADE 3	GRADE 4	GRADE 5
3.NF.A.1 Understand a fraction (1/*b*) as the quantity formed by one part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by *a* parts of size 1/*b* **3.NF.A.2** Understand a fraction 1/*b* as a special type of fraction that can be referred to as a unit fraction (e.g. 1/2, 1/4). **3.MD:** Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects. **3.MD.2:** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add subtract, multiply or divide to solve one-step word problems involving masses or volumes that are given in the same units.	**4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of unit fractions (1/*b*). a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. **4.NF.B.3, 4.NF.B.4** Build fractions from unit fractions. Use this understanding to multiply a whole number by a fraction (n x a/b). Solve word problems involving multiplication of a whole number by a fraction. **4.MD:** Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. **4.MD 2:** Use the four operations to solve word problems involving intervals of time, liquid volumes, masses of objects and money, including problems involving simple fractions or decimals…	**5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators by using a variety of representations, equations, and visual models to represent the problem. **5.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number and a fraction by a fraction.

MP: 1 Make sense of problem and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problem and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **MP: 4** Model with Mathematics	**MP: 1** Make sense of problem and persevere in solving them. **MP: 3** Construct viable arguments and critique the reasoning of others. **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?*

Students must understand how to add, subtract, multiply, and divide using :

- measurement - pounds (lb), cups, fractions of cups.
- money

• 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??*

Students may have experiences making and eating guacamole with their family. They may have a favorite family recipe for guacamole or may eat at restaurants that serve guacamole.

TASK VARIATIONS:

Routine 1: Mathematizing World - Open Ended (10 minute) - [Show first slide of a bowl of guacamole]

- Use initial slides to connect to students' experiences with guacamole.
- What is in the bowl?
- Does anyone in your family make guacamole?
- How do they make it?
- Do you ever order Guacamole when you go out to eat? Where?

Routine 2: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building. The first video gives a recipe for making guacamole. What information do you need to determine the cost?

- How much you think it costs to make guacamole using the recipe in the video?
- What information would you need to determine the cost?
- What assumptions could you make? What assumptions are reasonable?

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

In this task students will explain to a restaurant owner how they would determine the price of a guacamole to be served at the restaurant. Students will be given two recipes for guacamole and the cost of the ingredients. They must decide what information to use and what assumptions they should make to determine their pricing model.

Pricing Guacamole Task

Your task is to recommend a menu price for a serving of guacamole.

- ***What do you know*** that can help you in this task?
- What else ***do you need to know***?
- ***What decisions and assumptions will you have to make?***

Use the recipe and list of prices for the various ingredients.

Explain and justify your method for determining a recommended price using words, numbers, pictures and equations.

Explain how the restaurant owner could use your method in the future, or to price other items on the menu.

Task Variations

Task A: Ingredient table has fewer options to choose from, dollar amounts in whole, half and quarters, and more information about how many items (tomatoes, onions, etc) in each amount listed.

Task B: Ingredient table has more options and less information about each option. Students will need to determine how many items in a pound or bundle. To get the answers, they could weight or measure the amount if the items are available, check with a store or farm stand, check the internet, or ask the cafeteria manager.

Task C: Asks students to compare their price with that of guacamole prices in local restaurants. Teachers may want to modify the table to reflect their local restaurants.

Task D: Students will watch the first part of a short video (to minute 1:29) of restaurant owner Sue Torres, chef and owner of the restaurant Sueños, talking about how math is used in the restaurant business. Chef Torres states toward the end of the video that she charges 4 times the cost of the ingredients for a serving of guacamole. Students will compare their recommended price with Chef Torres's price. (Note: The challenge task set up after minute 1:29 is a trend-line task. It is beyond the scope of this lesson.)

ANTICIPATED STUDENT ASSUMPTIONS

Students may assume:

- they should add up the cost of the ingredients and charge that as the price.
- they need to charge more than the cost of the ingredients because they must pay for the people who make the guacamole and those that serve it.
- how many items in a pound.
- how many cups or tablespoons of celantro are in a bunch

- how many onions make a cup or half cup.
- the recipe makes one serving.
- the recipe makes more than one serving.

ANTICIPATED STUDENT STRATEGIES

Students may

- buy items for the recipe in bulk and add up the cost.
- determine the cost of the amount needed for the recipe. Ex: After talking with the cafeteria manager they may know that there are 2 ½ (or 2.5) cups of onions in a pound. The recipe needs ½ cup. A pound of onions can make 5 of the ½ cups needed. Students would divide the cost of a pound of onions ($0.50) by 5 to get the cost of onions for the recipe.
- add a fixed cost for making and serving the guacamole or multiply the amount by 2, 3, or more to account for cost of making and serving. They may identify this as a need to know and find out by asking restaurant owners or watching the second video. (Two rules mentioned in the video are 4 times the cost of the ingredients or one serving is the cost of an avocado +$0.40).
- understand that the recipe makes more than one serving they may divide the cost by the number of servings made.

MATERIALS NEEDED:

Pricing Guacamole_Lesson Slides

Pricing Guacamole_Student Task

Realia – ingredients for guacamole (optional)

Note: There may be ads at the beginning of the first video. Teachers should review the ads and play through them prior to class if they wish to avoid ads.