M2C3 MATH MODELING LESSON OVERVIEW

LESSON TITLE: Pupusa Making Task

STANDARDS ALIGNMENT:

GRADE 3	GRADE 4	GRADE 5
3.OA.A.2: Interpret whole number quotients of whole numbers (e.g., interpret 56 ÷ 8 as the number of objects in each group when 56 objects are partitioned equally into 8 groups, or as a number of groups when 56 objects are partitioned into equal groups of 8 objects each). **3.OA.A.3:** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities **3.MD.A.1b**: Solve word problems involving money through $20.00, using symbols $, ".", ₵.	**4.OA.A.1:** Represent verbal statements of multiplicative comparisons as multiplication equations. Interpret a multiplication equation as a comparison (e.g., 35 is the number of objects in 5 groups, each containing 7 objects, and is also the number of objects in 7 groups, each containing 5 objects). **4.OA.A.2.** Multiply or divide within 1000 to solve word problems involving multiplicative comparison (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison). **4.OA.A.3.** Solve multistep word problems using the four operations, including problems in which remainders must be interpreted. Understand how the remainder is a fraction of the divisor. Represent these problems using equations with a letter standing for the unknown quantity. **4.MD.** Solve problems involving measurement and conversion of measurements from larger units to a smaller unit. **4.MD 2.** Us the four	**5.OA.A:** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them (e.g., express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18,932 + 921) is three times as large as 18,932 + 921, without having to calculate the indicated sum or product) **5.NBT.** Perform operations with multi-digit whole numbers and with decimals to hundredths. **5.NBT 7.** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations… ; relate the strategy to a written method and explain the reasoning used.**5.NF.** Apply and extend previous understandings of multiplication and division to multiply and divide fractions. **5.NF 4**. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. A) Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of

	operations to solve word problems involving… money, including problems involving simple fractions or decimals…	operations $a \times q \div b$.
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 pupusa with their families. They may have a favorite family recipe for pupusa or may eat at restaurants that serve this dish.
- Students may have experiences with family businesses. For example, if a family makes and sells tamales, or resells candy, they may understand that pricing needs to consider making a profit.

TASK VARIATIONS:

Routine 1: Mathematizing World - Open Ended (10 minute) - [Show first slide with different ethnic food. Note: You may want to select foods that better fit your students' ethnic choices]

- Use initial slides to connect to students' experiences with food and culture.
- Discuss family favorites, who makes them and how they are made.

Routine 2: Mathematizing World - Specific Questions (20 minute) Sensemaking and assumption building. Watch a video for making pupusa. Slide 4 as two video options. The first is in Spanish, but is easy to follow even with non-Spanish speaking students. The second

shows how pupusa is made and includes written English descriptions of the process.

- Ask students what they notice and what they wonder?
- What do they think the City Café changes for pupusa. What goes into pricing? What would they have to know? 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 three different pupusas to be served at her restaurant. Students will be given costs of ingredients and the ingredients for several different pupusas. They must decide what information to use and what assumptions they should make to determine their pricing model.

Pupusa Pricing Task

Your task is to recommend Pupusa Prices for the City Market menu. Use the information on the ingredient chart and recipe and :

- ■ Select 2 different kinds of pupusas to put on the menu.

- ■ Use mathematics to estimate the cost of making one pupusa (for each kind of pupusa you chose).

- ■ Decide what price the owner should charge for each pupusa, so that she makes a profit, but also keeps prices low.

A note to the owner

- a. Write a note to the owner explaining your menu decisions and pricing recommendations. Use pictures, numbers and words.

- b. Include your assumptions.

- c. Tell the owner how she could use your method to set prices for other items she might want to sell at her pupuseria.

ANTICIPATED STUDENT ASSUMPTIONS

Students may assume:

- they should add up the cost of the ingredients and charge that as the price.
- they cannot sell just 1 pupusa.
- they need to charge more than the cost of the ingredients because they must pay for the people who make the pupusas and those that serve it.
- the recipe makes one serving.
- the recipe makes more than one serving.
- the recipe that makes 4-6 always makes 4 for pricing purposes or (6).

- say that one serving is 3 pupusas.
- want to add more ingredients to make a favorite recipe.
- when they use two ingredients they add a cup of each.

ANTICIPATED STUDENT STRATEGIES

Students may

- follow the recipe and divide by 4 and 6 to get a range for the price. Ex: 1 cup of Mari harina is $ .25. 2 cups cost 2 x $.25 = $.50. Cheese costs $1.00 for 1 cup. Pupusa con queso cost $.50 +$1.00 = $1.50 for 4-6 servings. $1.50/4 = $.35 and $1.50/6=$.25. The cost of ingredients is $.25-$.35 / 1 pupusa. They might charge $1.00 for making and serving the pupusa. So, the cost of one serving would be $.25-$.35 +$1.00 = $1.25 - $1.35 pupusa.
- for recipes with two or more fillings they would need to factor the number fillings into the amount of each. Ex. for pupusa de pollo con queso the filling is cheese and chicken. The cost of cheese would be $1.00/2 or $1.00 x ½. The cost of chicken would be $1.50/2 or $1.50 x ½.
- add up the cost of the ingredients and not divide by 4-6.
- not include money for cooking or serving
- add a fixed cost for making and serving the pupusa before dividing the recipe by 4-6. Ex.: The cost of making pupusa con queso is $1.50 for 4-6 servings. They might add a fixed cost, say $1.00 for making and serving. $1.50 +$1.00 = $2.50. Then divide by 4-6 -> $2.50/4= $.625 $2.50/6 = $.417. These amounts do not divide to the nearest cent, thus students would need to round their answer. Third grade students might estimate the amount.
- change dollars to cents and work with whole numbers rather than decimals. Ex. $1.00 is 100 cents. $.25 is 25 cents.

MATERIALS NEEDED:

Pupusa Making_Lesson Slides

Pupusa_Student Task

Internet (YouTube) access for videos.