MeTEOR Learning Modules

STEM MEA (Model Eliciting Activity)

Designing Nutritional Size Sundae Containers

800-699-7516 | meteoreducation.com

METEOR
CONNECTING THE DOTS

Designing Nutritional Size Sundae Containers

Reflective Planning

Description/Summary of Lesson:
Students will compare current nutritional values in the ice-cream sundaes made at Faye's restaurant chain. They will brainstorm with a partner how to design a smaller container to hold the ice cream for 4 ounces (they need to find this amount in research) rather than the 6.3 ounces currently given to lower the caloric intake as well as cutting down the fats and sugars. Then, students will design and construct a container out of clay to mirror their design to scale. To be considered operational, it must be able to hold 4 ounces without overflow. The students will use proportions to recalculate the new nutritional values in the 4-ounce cups to give to the CEO of Faye's. Throughout this activity, students will gain an understanding of how engineers must use volume and proportions to design containers for their clients. In addition, students will gain an understanding of how the math processes they are performing relate to various careers in the world, such as engineering.

Essential Questions:
- How do you read nutrition labels and why is it important to pay attention to them?
- Have you ever noticed the food labels on all processed foods? What do these labels mean?

Suggested Grade Level: Middle Grades 6-8

Approximate Time: Two days (50 minute class periods)

Teacher's Role: Facilitator

Class Set-Up: Groups of two students at tables or desks put together

Success Standards:
- Students can interpret data from a table.
- Students can solve problems involving volume and proportions.
- Students can define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution — taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Students can communicate their reasoning effectively and coherently.
- Students can design and use models.
- Students can engage in argument from evidence.

- Students can recognize the different items listed on the nutrition label and understand how reading nutrition labels can contribute to better health for them and their families.

Learning Purpose:

- Students will define the problem.
- Students will communicate their problem-solving plan.
- Students will use proportions to calculate healthier sundae desserts.
- Students will use social, interaction skills for completing projects with peers.
- Students will design a container that holds a volume of 4 ounces.
- Students will incorporate design, volume and mathematics to participate in a new container-building challenge.

Vocabulary:

- Nutrition
- Proportion
- Calories
- Carbohydrates
- Volume
- Common Measures
- Saturated Fats
- Serving Size
- Sugars
- Design

Math Practices:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 6: Attend to precision.

Depth of Knowledge:

- DOK Level 3: Strategic Thinking

Materials:

Teacher Materials

- Challenge Letter to Students
- Copies of Rubric
- Exit Slip
- Nutritional Value Worksheet
- 4-Ounce Measuring Cup

Student Materials

- Clay
- Calculators
- Computers and/or Electronic Devices

Summary of Tasks/Experiences

Spark Activity:

Do you ever have left overs when you order something at a restaurant? Or, have you ever had the feeling you must consume the whole thing so you do not waste food? Have you ever wondered how people gain weight when they don't eat all the time? Have you ever thought the more ice cream you eat the more calcium you will get to make your bones stronger? Today, you will seek information on how size matters in portion control. Then, you will design a new container for a nationwide restaurant chain to alter their ice-cream sundae size making it healthier for the patrons of this chain.

Lesson Descriptions:

Introduction: Day 1

The teacher will:

- discuss the real-world challenge listed above.
- hand out the challenge letter to each group.
- hand out copies of the rubric for evaluation.
- hand out nutritional value worksheet.
- hand out clay to each group.
- allow students to collaborate around a plan of action to accomplish their goal.

Day 1 and 2

The students will:

- research serving sizes of ice cream.
- complete the nutritional value worksheet using proportions.
- design a new sundae container to meet the needs of the new volume of ice cream.
- build and test their container.
- write about their design - explaining and defending what measures they used for the container they built to be more efficient in their design.
- complete their exit slip (can finish for homework if needed).

Teacher facilitates class asking guiding questions as students work in groups:

- What is the most challenging part of the design process?
- What is Faye's CEO asking for?
- What is the problem?
- What things do you need to include in your solution?
- Do you think there is more than one correct answer to what the client is asking for?
- If you were a customer what type of container would you prefer and why?

Student Engagement

Social/Emotional Engagement: Students will use social, interaction skills for completing projects with peers.

Physical Engagement: Students will collaborate while completing research regarding nutritional size through the use of electronic devices and discourse while working in groups of two.

Cognitive Engagement: Students will work together using math concepts such as volume and proportions to complete their task.

Evidence of Learning

Checks for Understanding/Expected Outcomes:

- Students will complete the Challenge letter describing their design.
    - Letters should include the measurements of the container along with an explanation of why they built this design.
- Students will build their container.
    - The container must hold slightly more than 4 ounces (they discover this amount in research) to keep from having an overflow which will be measured by the teacher using a 4-ounce container (1/2 cup).
- Students will complete an exit slip.
    - The exit slip will allow the students to show they did some research as requested and reflect on what they learned.
- Students will be evaluated using the included rubric.
    - The rubric should be given as a guide to help students as they write their findings and design and build their container.

Designing Nutritional Sized Sundae Containers
RUBRIC

CATEGORY	3	2	1
Research	Research shows students know the amount of ice cream in one serving size.	Research shown, but students do not know the amount of ice cream in one serving size.	No evidence of any research done.
Modification/ Testing	Clear evidence of student container being able to hold one serving of ice cream through testing.	Clear evidence of student container being tested, but unable to hold one serving of ice cream.	No evidence of testing student container for holding ice cream.
Function	Container functions extraordinarily well and holds teacher tested amount of ounces with no spillage.	Container does function or hold teacher tested amount of ounces with no spillage.	Container unfinished.
Group Member	The student worked well with his/her partner throughout the entire project, and was present both days.	The student worked well with his/her partner throughout most of the project but was not present both days.	Students did not work well together and someone was absent.

Challenge Letter to Students:

The CEO of Faye's Restaurant chain has decided to change their current ice-cream sundae container size for better nutritional value. Currently, their container holds 6.3 ounces of ice cream. Sales are down in this product due to an increase of nutritional awareness of caloric intake. In addition, many people are concerned about the levels of fat, carbohydrates and sugars. Your task is to research what the serving size should be, update the nutritional value label, design a new container and help them promote a sundae under 180 calories.

Below, you must explain and defend why you and your partner choose to build this size of container. Be sure to include why this would be the most efficient model to build and your container's measurements of base and height.

To be able to submit your design to the CEO of Faye's, your container must hold the appropriate volume, the nutritional label must be accurate and there must be at least two choices of sundaes to choose from under 180 calories.

You will have a total of two class periods to research, complete your nutritional value worksheet, design, build and test your container. Brainstorm ideas for the design of your container with your partner; then begin.

Team Members:

Description:

Ounces for new container: _____ Base: _____ Height: _____

Did your container hold the serving size with the teacher? _____

Did any of your sundaes meet the 180 caloric intake or less? Which ones?

Designing Nutritional Size Sundae Containers
Exit Slip

Name:

Upon completion of this lesson you are to answer the following:

1. To know more about what we are eating, how can we check nutritional values of foods?

2. Were there any sundaes less than 180 calories after changing the serving size? If so, which one(s).

3. Were there any sundaes that were above 180 calories? If so, which one(s)?

4. Do we eat more than the suggested serving sizes for food? If so, how do we know what the serving sizes should be?

5. Name the five nutritional values you used in this learning experience:

6. About how much was the percentage difference in the current amount of ice cream in Faye's serving verses the amount you found to be a real serving size?

7. Describe any "ah ha" moments you had during this research.

Nutritional Value Worksheet **Name** _____

Faye's ice-cream sundae selection:

Plain Sundae 6.3 ounce	**Hot Fudge Sundae 6.3 ounce**	**Caramel Sundae 6.3 ounce**	**Strawberry Sundae 6.3 ounce**
Nutrition Facts	**Nutrition Facts**	**Nutrition Facts**	**Nutrition Facts**
Calories 210	Calories 330	Calories 340	Calories 280
Fat 6g	Fat 9g	Fat 8g	Fat 6g
Total Carbs 21g	Total Carbs 53g	Total Carbs 60g	Total Carbs 49g
Sugar 28g	Sugar 48g	Sugar 44g	Sugar 45g
Calcium 200mg	Calcium 250mg	Calcium 250mg	Calcium 200mg

New Nutritional Values to send to Faye's Restaurant (rounded to the nearest whole number)

Plain Sundae _____ ounce	**Hot Fudge Sundae _____ ounce**	**Caramel Sundae _____ ounce**	**Strawberry Sundae _____ounce**
Nutrition Facts	**Nutrition Facts**	**Nutrition Facts**	**Nutrition Facts**
Calories	Calories	Calories	Calories
Fat	Fat	Fat	Fat
Total Carbs	Total Carbs	Total Carbs	Total Carbs
Sugar	Sugar	Sugar	Sugar
Calcium	Calcium	Calcium	Calcium

ADDITIONAL TEACHER INFORMATION:

Answers to Description of Container:

Answers will vary, but should mention:

- The new container should hold 4 ounces which is considered a single serving of ice cream.
- Students would need a container that holds just over 4 ounces when the teachers fills the ½ cup and pours it inside so there would be no spillage.
- The base and height will vary as long as it holds the 4 ounce amount.
- There are two sundaes that will pass the new caloric value. The plain and the strawberry.

Answers to Exit Slip:

1. Read the nutritional labels on the containers
2. Yes, plain and strawberry
3. Yes, hot fudge and caramel
4. Yes, read the nutritional labels and measure what we eat. If no label, look it up on the computer
5. Calories, fat, carbohydrates, sugars and calcium
6. About 1/3 less (or something closer to 63% of the original value)
7. Answers may vary, but might include something about learning about nutritional labels and serving sizes. Also, the toppings create the most calories which cause the other items to be high on the sundaes.

Answers to Nutritional Value Worksheet to send to Faye's Restaurant:

Plain Sundae 4 ounce	**Hot Fudge Sundae 4 ounce**	**Caramel Sundae 4 ounce**	**Strawberry Sundae 4 ounce**
Nutrition Facts	**Nutrition Facts**	**Nutrition Facts**	**Nutrition Facts**
Calories 132	Calories 208	Calories 214	Calories 176
Fat 4	Fat 6	Fat 5	Fat 4
Total Carbs 13	Total Carbs 33	Total Carbs 38	Total Carbs 31
Sugar 18	Sugar 30	Sugar 28	Sugar 28
Calcium 126	Calcium 157	Calcium 157	Calcium 126