



Grade Level: 6-12

Essential Skills: 3, 4, 5, 10

AFNR Skill Set: AGFD02.01.01, AGFD02.01.045

CCSS: 6.SL.1, 7.SL.1, 8.SL.1, 9-10.SL.1, 11-12.SL.1

Math: MP.4, MP.6, 6.DR.A.1, 7.DR.A, 8.DR.A, HS.DR.A

Time: 45 minutes

Materials:

Orville's Choco-Popcorn Kit*:

- 2 bags of microwaveable popcorn or pre-popped popcorn*
- Hershey's chocolate syrup*
- Store brand chocolate syrup*
- 3 condiment cups per student*
- Random Digit Assignment worksheet
- *Orville's Choco-Popcorn* worksheet

AITC Library Resources:

More Lessons:

- Sprouting Seeds to Microgreens!
- Bread in a Bag
- Pumpkin Pie in a Bag
- Yeast Blow Up!
- Physical Changes of Matter & Ice Cream

Orville's Choco-Popcorn

Description:

Students explore the role of a Ingredient Development Specialist calculating the cost analysis of ingredients in Orville's Choco-Popcorn recipe and participating in a triangle test tasting panel to make product improvement recommendations to Orville.

Activity Directions:

Teacher Preparation Prior to Lesson:

1. You will need enough condiment cups for each student to have three samples.
2. You will need product for 1.5 times the number of students. For example, if you have 25 students you will need 38 cups of the Cheaper Chocolate Drizzle cups and 38 cups of the Current Chocolate Drizzle recipe.
3. Label each condiment cup with one of the following numbers. These random three digit numbers have been selected to avoid subconscious bias of students toward single digit numbers. Using the example above, you will need 38 cups of Cheaper Chocolate Drizzle which you will evenly divide between the two numbers associated with the Cheaper Chocolate Drizzle below. So you will have (19) Cheaper Chocolate Drizzle cups labeled with 403 and (19) labeled with 697. You will do the same with the Current Chocolate Drizzle product.
 - 372 - Current Chocolate Drizzle (More Expensive)
 - 403 - Cheaper Chocolate Drizzle
 - 891 - Current Chocolate Drizzle (More Expensive)
 - 697 - Cheaper Chocolate Drizzle
4. Group the condiment cups together based on their number.
5. Microwave the popcorn according to the instructions on the bag or use pre-popped popcorn.
6. Divide popcorn equally among each condiment cup.
7. Drizzle chocolate syrup over the popcorn in the condiment cups. Drizzle the Hershey's chocolate over the condiment cups labeled with 372 and 891. Use the cheaper store brand chocolate to drizzle over the popcorn labeled with 403 and 697.
8. Copy the *Random Digit Assignment* worksheet for the amount of students in the class. Cut out strips for each student.

Part 1: Introduction to Snack Product Lines

1. Ask students to think about some of their favorite snacks. Invite students to share a few of those snacks.
2. Show students a few examples of snack lines containing the same product that has been modified for its customers such as sugar free, less sodium, etc. You can do this by showing the Powerpoint included in this lesson or by bringing in product boxes.
3. Invite students to look at the slide with different boxes on display, ask the following questions:
 - a. Is there anything different about the products?
 - b. Why would companies make multiple version of the same product?
 - c. What considerations would companies have to make when altering their recipes?
4. Explain to students that name brand companies are always developing new products to fit the changing needs of their consumers (i.e. fat free, reduced fat, gluten free, sugar free, etc.). However, when companies try to develop a product similar to their existing product with the dietary need in mind, they try to ensure that the newly developed product doesn't have a drastic change in taste.

This helps protect that companies brand and the product's reputation.

Part 2: The Cost of Choco-Popcorn

1. Distribute a copy of *Orville's Choco-Popcorn* worksheet to students.
2. Read the directions at the top of the worksheet with students. Explain to students that they will be taking on the role of an Ingredient Development Specialist. Orville has come to your team to find a cheaper chocolate drizzle option for their Choco-Popcorn snack.
3. Invite students to begin comparing the products through cost analysis by calculating the cost of the two options in Part 1 of their worksheet.
4. Explain to students that after cost analysis our next step is to set up some taste tests to make sure that the cheaper chocolate won't greatly alter the taste of this popular product.

Part 3: Orville's Choco-Popcorn Triangle Test

1. Explain to students that the next step is determining whether the cheaper chocolate will cause a change in the product's taste. Since the Choco-Popcorn is a popular item, Orville does not want the taste to change when finding a cheaper chocolate.
2. Explain to students that they will be performing a triangle test on the Choco-Popcorn samples prepared by the teacher ahead of time. Read the directions under Part 2 to prepare for the triangle test.
3. Invite students to create a statistical investigative question for the triangle test on their worksheet.
4. After, explain to students that they will have three samples with different numbers on them. Two of those samples will be the same and one will be different. You will taste each sample one at a time and take a drink of water in between each sample. After tasting all three samples you will complete the Triangle Sensory ballot on the *Orville's Choco-Popcorn* worksheet by circling the sample number that is different from the other two.
3. Distribute a *Random Number Assignment* cutout to each student.
4. Instruct students to begin filling out the ballot by writing the three numbers on the blank lines provided on their worksheet.
5. Invite students to get their samples carrying only one at a time to prevent spilling. Tell students to place the samples on their desk in the order listed on their *Random Number Assignment* slip and await further instructions to begin.
6. After all students have received their samples, have students begin sampling each condiment cup one at a time making sure they drink water in between each sample. Students may sample their portion again if needed to determine which one is different. If students are struggling to distinguish the different sample, instruct them to guess.
7. After students have finished their ballots, identify the chocolates in each number for students. Have students determine whether or not they selected the odd sample. Ask students to raise their hands if they were able to identify the different sample amongst the three samples they tried. Record how many students selected the odd sample on the board for the class to see and use to complete question three on Part 2 of their worksheet.
8. Invite students to calculate whether or not there was a significant statistical difference between the products. If more than 1/3 of students chose correctly, there is a significant difference in the products.
9. After determining if there was a significant difference, discuss the following question:
 - a. After taste testing and analyzing costs, would you recommend that Orville switch to the cheaper chocolate drizzle for the Choco-Popcorn product?
10. Explain to students that they just took on the role of an Ingredient Development Specialist, a real-life career that they can explore further through Food Science studies.

Random Number Assignment

Student #1	372	403	891
Student #2	372	403	697
Student #3	372	891	697
Student #4	403	891	697
Student #5	403	891	372
Student #6	697	403	891
Student #7	891	697	372
Student #8	891	697	403
Student #9	891	372	403
Student #10	697	372	403
Student #11	697	372	891
Student #12	403	697	372



Activity Page

Orville's Choco-Popcorn

Name: _____

Part 1: Cost Comparison of the Choco-Popcorn Ingredients

Directions: Orville has hired you to look into cheaper chocolate drizzle options for their famous Choco-Popcorn. As a Ingredient Development Specialist, you are tasked with finding a cheaper chocolate to use that does not change the taste of the product. Your team has found a cheaper chocolate drizzle to use. To prepare to present this option to Orville, you must calculate how much per box of 12 bags of popcorn it will cost compared to how much the current product costs. Use the prices and recipe in the table below to calculate the cost of both options.

Ingredients for 12 Pkg. Box	Current Chocolate Drizzle
18 oz. cooking oil	\$0.30 per oz.
4 cups popcorn kernels	\$0.30 per cup
48 Tbsp. butter	\$0.14 per tbsp.
6 tsp. sea salt	\$0.60 per tsp.
24 oz. chocolate drizzle	Current Chocolate: \$3.27 for 24 oz. Cheaper Chocolate: \$1.98 for 24 oz.

1. Calculate the cost of using each chocolate option below.

2. How much cheaper is Choco-Popcorn made with the cheaper chocolate than made with the current chocolate?

Part 2: Triangle Test of Choco-Popcorn

A triangle test determines if there is a perceivable sensory difference between two products. In a triangle test, you will have three samples with different numbers on them. Two of those samples will be the same and one will be different. If more than 1/3 of the testing group is able to correctly identify the sample that is different then there is a significant taste difference in the product.

1. Create a statistical investigative question to describe the triangle test that you will participate in for Orville's Choco-popcorn mix.
2. Complete the triangle test by tasting each sample one at a time making sure to drink water between each sample. After tasting all three samples you will complete the Triangle Sensory ballot below by circling the sample number that is different from the other two.

Orville's Choco-Popcorn Triangle Difference Test

1. Write your three sample numbers on the lines below.
2. Take a bite of the first sample.
3. Take a drink of water to rinse your mouth.
4. Take a bit of the next sample.
5. Repeat steps 3 and 4 for the last sample.
6. Two of the three samples you tasted are the same, circle the sample number below that tastes different. You can make a guess if you are unsure.

3. Calculate the percentage of classmates that correctly identified the odd sample in their pairings.
4. Based on the results above, was there a significant statistical difference between the products in the triangle test?