ONE OF THESE THINGS IS NOT LIKE THE OTHER
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Annotation
In this classroom activity, students will explore the principles of sensory evaluation as they conduct and analyze a cola triangle test—a test used to determine whether there is a sensory difference between two products.

Primary Learning Outcomes:
Students will be able to define the term *triangle test* and explain its use.

Students will be able to calculate percentages based on a data set.

Students will be able to explain the importance of sensory evaluation in food science.

Assessed Georgia Performance Standards:
Characteristics of Science
SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh3. Students will identify and investigate problems scientifically.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

Related Topics:
Taste & Sensory Perception
Data Analysis

Duration:
Preparation: 30 minutes
Introduction: 15 minutes
Student Activity: 10 minutes
Conclusion: 15 minutes
Total Class Time: 40 minutes

Materials and Equipment:
For Teacher Preparation:
(Per class of 30 students)
1. 120, 5-oz. Plastic cups
2. 2-L Bottle of Pepsi®
3. 2, 2-L Bottles of Coca-Cola®
4. Gallon of drinking water
5. Saltine® crackers
6. Napkins
7. 12-oz. Can of Sprite® *(For Optional Extension)*

8. Blindfold *(For Optional Extension)*

Per Student:
1. *One of These Things is Not Like the Other* student handout
2. 5-oz. Cup of Sample A
3. 5-oz. Cup of Sample B
4. 5-oz. Cup of Sample C
5. 5-oz. Cup of water
6. 2 Saltine® crackers
7. Napkin

Safety:
Because students will be allowed to drink during the activity, precautions should be taken to prevent materials from coming into contact with laboratory equipment or surfaces. Materials should remain in cups or on clean napkins at all times.

Technology Connection:
Not applicable

Procedures:
Teacher Preparation:
Use the attached template to prepare a *One of These Things is Not Like the Other* student handout for each student. For each student, label 4 cups "A," "B," "C," and "water," respectively. Remove all labels and markings from the soft drink bottle. Label the 2-L bottle of Pepsi® "A." Label one 2-L bottle of Coca-Cola® "B" and the second "C." Fill each cup roughly half full with the appropriate sample.

Estimated Time:
30 minutes

Introduction:
Sensory evaluation, an important area of food science, is a tool used to analyze and interpret human sensory responses to food products based on the five senses: sight, sound, smell, taste, and touch. Sensory evaluation is used to improve existing food products or to determine consumer acceptability of new food products. Several types of sensory tests are used. A triangle test is a difference test that is used to determine whether there is a sensory difference between two products. For example, do consumers detect a difference between generic and name-brand food items? During a triangle test, panelists are presented with three samples and asked to identify the sample they believe to be different from the other two. Data is compiled from a number of panelists and analyzed to determine whether there is a detectable difference between the products. A detectable difference is often considered to be one in which fifty percent or more of panelists are able to correctly distinguish the odd sample from the other two. However, food companies and researchers may adjust these levels according to their particular interests or needs.

Explain to students that they will be sampling three cola beverages: two are the same and one is different. Their task is to identify the odd cola sample.

Estimated Time:
15 minutes

Activity:
Provide each student with the materials listed above. Ask students to sample each of the three colas. Advise them to pay close attention to the color and flavor of each sample. Ask students to indicate the odd sample on the *One of These Things is Not Like the Other* student handout. Students should use the water and crackers to cleanse their palates between samples.

Estimated Time:
10 minutes

Optional Extension: Ask one or two students to step out of the classroom. As the class watches, pour, for each student sent out of the room, two cups of Coca-Cola® and one cup of Sprite®. Appoint a student to escort each student, one at a time, back into the classroom, blindfolded. Ask the student(s) to sample each of the three samples and identify the odd sample.   In a blind sensory test, many individuals find it difficult to detect a difference between Coca-Cola® and Sprite®.

Conclusion:
Reveal to students the odd sample. As a class, compile the following data on the board: the number of students that were able to detect the odd sample, the number of male students that were able to detect the odd sample, and the number of female students that were able to detect the odd sample. Discuss with students any difficulties experienced in determining the odd sample. Have students answer the post-laboratory questions found on the *One of These Things is Not Like the Other* student handout.

Estimated Time:
15 minutes

Assessment:
Assessment should be based on completion of the *One of These Things is Not Like the Other* student handout.

Reference:
- Meilgaard, M., Civille G.V., and Carr B.T. 1991. *Sensory Evaluation Techniques.* CRC Press. Boca Raton, Florida.

ONE OF THESE THINGS IS NOT LIKE THE OTHER *Student Handout*

Introduction:
Sensory evaluation, an important area of food science, is a tool used to analyze and interpret human sensory responses to food products based on the five senses: sight, sound, smell, taste, and touch. Sensory evaluation is used to improve existing food products or to determine consumer acceptability of new food products.

A triangle test is a difference test that is used to determine whether there is a sensory difference between two products. For example, do consumers detect a difference between generic and name- brand food items? During a triangle test, panelists are presented with three samples and asked to identify the sample they believe to be different from the other two. Data is compiled from a number of panelists and analyzed to determine whether there is a detectable difference between the products. In this assignment, a detectable difference is assumed to be one in which fifty percent or more of panelists are able to correctly distinguish the odd sample from the other two.

In this activity, you will be sampling three cola beverages: two are the same and one is different. Your task is to identify the odd cola sample.

Purpose:
To use triangle testing to determine the odd cola sample from a set of three cola samples.

Materials:
1. 3 Cola samples (A, B, and C)
2. Cup of water
3. Saltine® crackers
4. Napkin

Cola Triangle Test:
Sample each of the three cola beverages from A to C. Two samples are identical; one is different. Select the odd/different sample and indicate by placing an "X" next to the letter of the odd sample.

| | Indicate | |
Sample	Odd Sample	Comments
A	_____	_____
B	_____	_____
C	_____	_____

Calculations:
(Show all calculations on a separate sheet of paper.)
1. What percentage of students in the class was able to distinguish the odd sample?
2. What percentage of male students was able to distinguish the odd sample?
3. What percentage of female students was able to distinguish the odd sample?

Post-Laboratory Questions:
1. Assume that in this sensory evaluation a detectable difference among samples is one in which thirty-five percent or more panelists are able to distinguish the odd sample from the other two. Based on the class data, is there a detectable difference among the samples?
2. Describe three factors that might account for the differences detected between the cola samples?
3. Why can some students detect differences between the samples while other students cannot?
4. During actual sensory evaluation, measures must be taken to reduce panelist bias towards food products. Describe three measures that could have been taken in this experiment to improve the reliability of the results?