To Drink or Not to Drink: The Importance of Nutritional Beverages

Objectives
1. Students will understand the difference between healthy and unhealthy beverages.
2. Students will understand the benefits and consequences of drinking healthy beverages.
3. Students will understand and be able to follow instructions to complete an experiment using the scientific method.
4. Students will understand and be able to accurately complete each step of the scientific method.
5. Students will understand and be able to present scientific information to the class.

Materials needed for this lesson (Sponge Bobby)
1. 4” x 6” dishwashing sponge
2. 4” x 6” gingerbread man cookie cutter (optional)
3. Scissors (sharp enough to cut through a dishwashing sponge)
4. Straw
5. Cup of water
6. Plate or paper towel on which to sit a moist sponge.

Materials needed for this lesson (pH Level of Pop)
1. 12 oz. Coca-Cola (6-pack)
2. 12 oz. Pepsi Cola (6-pack)
3. 12 oz. Mountain Dew (6-pack)
4. 12 oz. Sprite (6-pack)
5. 12 oz. Orange Soda (6-pack)
6. 12 oz. Root Beer (6-pack)
7. Milk
8. Water
9. pH meter or pH strips for each group
10. Pack of cups

Background information and notes
As children age, they begin to consume more and more unhealthy beverages including pop and artificial fruit juices instead of water, milk and natural fruit juices. Taste tends to persuade the decision-making process of youth, and the concept of drinking healthy beverages is somewhat forgotten during the shift from adolescence to adulthood. However, what you drink affects your health, and neglecting to choose healthy beverages that serve as replenishment and provide necessary nutrients for the body results in negative consequences.

Presenting the Lesson

Begin by brainstorming the meaning of nutrients. Nutrients are substances that help nourish the body. Inform students that nutrients are responsible for helping hair, nails, teeth, and gums stronger and making skin clear and healthy. Nutrients give energy, help to speed up the healing process from illnesses and can help improve eyesight. Nutrients also aid in concentration and clarity in thinking.

Invite students to brainstorm ideas about the composition of the earth and the human body. After students have discussed the different components of the earth and the human body, explain to the students that the body and the earth are mostly made of water.

Human Body: More than half of the human body consists of water.

Earth: 70% of the earth is made of water.

Note to Teacher: Students may find it difficult to understand that the human body is made mostly of water when humans have an epithelial (skin) outer covering. In order to illustrate this point you may choose to do the Fruit Demonstration Activity.

Dehydration occurs when you lose too much water from your body before you are able to replace water by drinking the recommended amount of water. The recommended amount of water to drink for children includes 3-5 glasses of water per day. Inform students that symptoms of dehydration include headaches, feeling hungry, irritability, tiredness, dizziness, and nausea.

Create a list of beverages by identifying the students’ favorite drinks or the beverages that students prefer to drink. Write the results on the chalkboard or on a transparency so that the children can see the different types of beverages. Did the students mention water, milk and 100% fruit juice in their responses? Ask the students if there is a difference between different types of fruit juices. Explain to students that although there are a variety of different beverages available to drink, water, 100% fruit juices and milk are the best beverages to drink because they provide nutrients and prevent dehydration.

- Water replenishes the body and prevents dehydration.
- 100% Fruit Juice has important nutrients including Vitamin C.
- Milk is an important source of calcium and can include Vitamin D that helps keep bones healthy and strong.

In contrast, pop and artificial fruit juices are not beneficial to drink.

- Pop aids in dehydration and bone calcium depletion.
- Artificial fruit juices do not have the essential vitamins and nutrients that are useful for helping the body stay healthy.

Explain to students that drinking water, 100% fruit juices, and milk will help in preventing dehydration and aid in acquiring nutrients that help keep your body healthy.

To reinforce these concepts students will participate in two scientific experiments that will explore the concept of dehydration, and examine the nutrient concentration of beverages. Each experiment teaches the students how to use the scientific process to produce an evidence-based conclusion. Each experiment builds on the previous to improve scientific experimental skills.
**Learning Activity: Sponge-Bobby Demonstration**

**Explanation of the activity:**
This demonstration helps to show that our bodies lose water while doing everyday activities and how it is important to drink water to stay hydrated.

**Preparation:**
Take a 4” x 6” sponge and draw a man on it, like the outline of a gingerbread man. Cut the sponge-man out using scissors. Sit the sponge out for four days before using it in the lesson, so that it is dried out and stiff to begin the lesson.

**Note:** This demonstration can conclude after several hours or several days, depending on how long it takes the sponge to completely dry out. Therefore, it is important that enough water is added to the sponge so that information can be collected at two time periods. Students should observe Sponge-Bobby in the wet stage and in the dry stage.

**Directions:**
1. Gather students around a table with a sponge, cup of water and plate.
2. Introduce them to Sponge-Bobby and explain that Sponge-Bobby is like us, because he is healthiest and feels his best when his body is full of water.
3. Pass the dry sponge around the class and discuss the texture of Sponge-Bobby. Emphasize that in this state, Sponge-Bobby is dehydrated and doesn’t have any water.
4. Add water to Sponge-Bobby until he is full of water.
5. Have students write a hypothesis (guess) about what will happen to Sponge-Bobby. Have students keep observations in their journals.
6. Let Sponge Bobby sit until he is once again dry.


Learning Activity: pH Level of Pop

pH Level of Pop

Explanation of the activity:
Bone calcium is turned into alkaline by the body to neutralize pH in pop, thus depleting bone calcium. This experiment is designed to test the pH level in various beverages to identify the beverage with the lowest pH level. The lower the pH, the more likely the beverage will aid in bone calcium depletion.

Note: It may be more cost-effective to purchase 2-liters instead of 6-packs of pop. Also, even though the students are conducting the experiment individually, have students share a pH meter in groups of 6 unless you have opted to use the pH strips.

Preparation:
Lay out all the materials for the students. Mark the inside of the plastic cups at the same level so the students pour the same amounts of pop in the cup for testing. Make sure not to open the pop before the experiment. The results may change depending on the flatness of the pop.

Directions:
1. Assign students to test Coca-Cola, Pepsi, Mountain Dew, Sprite, Orange Soda, Root Beer, water, or milk. Note: Please make sure that the class is evenly dispersed with the different types of beverages. Ask students to predict the pH levels of their respective beverage. Write some of the predictions on the chalkboard. Have the students fill in the “Hypothesis” and pH level guesses on their Lab Sheets.

2. Have each student gather their 3 cups and pour their respective beverage into the first cup up to the designated mark. To test the pH level, place the pH meter or pH strips in the beverage and wait 10 seconds or until the numbers or color stops changing. Have students record the number that is on the pH meter or the number that is associated with the color on the pH strips. The student should repeat this process two more times and take the average of the results. Note: Since the students will be sharing a pH meter within the group, have each student wait to open their pop until it is their turn to test the pop using the pH meter.

3. Have students complete the experiment using the directions outlined on the Lab Sheet and answer the follow-up questions.

4. At the conclusion of the experiment, have each student present their findings and discuss their conclusions.
Student Lab Sheet – pH Level of Pop

Name: ________________________________________________________________

**Objective**

To determine the pH level in Coca-Cola, Pepsi, Mountain Dew, Sprite, Orange Soda, Root Beer, water, and milk

**Pop: Circle your pop.**

Coca-Cola  Pepsi  Sprite  Orange Soda
Root Beer  Mountain Dew  Water  Milk

**Hypothesis (Pre-experiment predictions):**

1. What is your hypothesis? What do you expect to happen?
   *Example:* I predict that Sprite will have the lowest pH level.

**Procedure**

1) **Labeling**
   Label the three cups.
   Cup 1: Test 1
   Cup 2: Test 2
   Cup 3: Test 3

2) **Test pH Level**
   Cup 1
   a) Pour the beverage from the container into the first cup until it reaches the outlined mark in the cup.
   b) Hold the pH meter in the cup for ten seconds or until the numbers stop changing.
   
   *Alternative:* Hold the pH strip in the cup for ten seconds until the color changes.
   c) Record your result
   Cup 2
   a) Repeat directions from cup 1
   Cup 3
   a) Repeat directions from cup 1.
Data:

Example:

**pH Meter:**

<table>
<thead>
<tr>
<th>Example Pop: Mountain Dew</th>
<th>pH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>3</td>
</tr>
<tr>
<td>Test 2</td>
<td>2.5</td>
</tr>
<tr>
<td>Test 3</td>
<td>2.1</td>
</tr>
<tr>
<td>Average</td>
<td>2.53</td>
</tr>
</tbody>
</table>

*To get the average: Add the pH Levels in Test 1, Test 2, and Test 3 and divide by 3*

*For Example 3 + 2.5 + 2.1 = 7.6 and 7.6/3 = 2.53*

**pH Meter:**

<table>
<thead>
<tr>
<th>Pop:</th>
<th>pH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td></td>
</tr>
<tr>
<td>Test 2</td>
<td></td>
</tr>
<tr>
<td>Test 3</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
</tbody>
</table>

**pH Strips:**

<table>
<thead>
<tr>
<th>Pop:</th>
<th>Color</th>
<th>pH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fruit Demonstration

Explanation of the activity:
This demonstration further explains the somewhat abstract concept that the human body is composed mainly of water, despite the fact that it is not seen due to our skin.

Preparation:
You will need a grapefruit and a sharp knife for this activity.

Directions:
1. (Cut open the fruit) Inform students that this grapefruit is like our bodies. On the outside, it is firm, solid, and can sit up on its own, but on the inside it is filled with water.
2. Slice the fruit and give a piece to each student, allowing them to feel the outside and the inside of the fruit. Discuss the structure of the fruit and how the peel or the outer covering of the fruit aids in protecting the more vulnerable parts inside of the fruit. Discuss how this concept relates to the human body and how the skin helps to protect the inner parts of the body.

Activity Debrief:
Conclude by explaining to the students that the water that gives us shape and form is inside our body. If possible, dissect the grapefruit and extract the tiny bits of the grapefruit that actually hold the water and juices. These tiny pieces of the grapefruit illustrate how the water in the human body is encapsulated in the organs. In fact, that is the reason why we as humans are not like huge puddles or all wet and soggy.