

The Power Inside Fruits & Vegetables

Fruits and vegetables contain vitamins, minerals, and antioxidants essential for maintaining good health and development in children. The first activity in this lesson introduces the essential nutrients in fruits and vegetables and is followed by a teacher-led science demonstration. This demonstration allows students to explore the levels of one of these important nutrients in different fruit and vegetable juices. With this knowledge, students will be better prepared to understand nutrient levels in foods and become more informed consumers.

SUBJECTS



SCIENCE



NUTRITION

Aa

LANGUAGE
ARTS

STEM Aligned

GRADE LEVEL

5

TIME

Day 1: 40 min Day 2: 1 hr

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Note: Lesson is divided across two days. Day 1 is the Understanding Nutrients activity and Day 2 is the Demonstration activity.

Objectives

- Students will learn the six key nutrients and understand two of them in detail
- Students can explain why nutrients are important for our health

Materials & Preparation

- Day 1
 - Familiarize yourself with the 13 essential vitamins, their functions, and common food sources.
- Day 2
 - Four cups water
 - Electric tea kettle or another appliance to boil water
 - Heat-resistant bowl or pot
 - Cornstarch
 - Measuring spoons
 - Measuring cups
 - Water glass
 - 10-milliliter eye droppers, one for each juice being tested
 - 2% Iodine solution (found at local pharmacy)
 - **Safety:** Because the solution contains free iodine, without dilution with water it can be irritating to the skin or eyes, or if ingested. You may want to wear rubber gloves if concerned.
 - Various fruit and vegetable juices. You may also want to test a fruit-flavored soda (such as pineapple, apple, orange, lemon, etc).
 - If your school has a garden or fruit trees, this experiment is a great opportunity to incorporate it in the classroom (contingent on season). Have students harvest produce such as apples, leafy greens and root crops. You will need to locate a juicer to break down the produce for the experiment.

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- Small clear plastic cups (one for each juice being tested)
- 15-milliliter test tubes with stand or small plastic cups (one for each juice being tested; these will hold the iodine indicator solution)
- Stirring spoons
- Experiment Procedure and Materials handout, one for each student
- Prepare Experiment Procedure and Materials handout
- Prepare optional Experiment Log handout or have students record in their journals.
- Suggestions for Log contents or journal questions:
 - Pre lab questions - creating a hypothesis, identifying variables
 - Observation space - explaining results pictorially and with words
 - Post-lab questions - drawing conclusions, wrap up questions about vitamin C and other nutrients
- Boil four cups of water in a tea kettle. Pour into bowl/pot and add 1/3 teaspoon cornstarch and stir to dissolve. Allow this solution to cool completely.
- Once cool, measure ¼ cup of mixture into a water glass. Add eight drops of iodine. Stir. The mixture will turn dark blue.
- Pour about 1 tsp. of indicator solution into plastic cups or 15 mL test tubes.
- Pour a small amount of juice into individual plastic cups for each group.

Common Core Standards

- SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly
- W.5.3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

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STEM Alignment

- Using mathematics and computational thinking
- Reason abstractly and quantitatively
- Obtaining, evaluating, and communicating information
- Model with mathematics
- Attend to precision
- Engaging in argument from evidence

Day 1 Lesson Introduction

- Explain the goals of today's activities to the students: to explore the nutrients important for our health and well-being.
1. Ask students if they know examples of the nutrients we need to be healthy and write them down on the board. Explain to the class that today's focus is on the essential vitamins humans need to grow, develop and maintain good health. There are six vital nutrients: carbohydrate, protein, fat, vitamins, minerals and water. Go over definitions of vitamins and minerals.
 2. Vitamins: vitamins are organic, naturally occurring chemicals we must get through our food because our bodies do not produce enough by themselves.
 3. Minerals: minerals are inorganic elements that come from soil and water and are absorbed by plants.

Day 1 Body of Lesson

4. On the board, list the 13 essential vitamins with their functions on one side and a list of their food sources on the other side. Facilitate a class discussion to help students learn which foods contain which vitamins. Which ones grow nearby? Which ones grow in different parts of the world?
5. If students don't know the answers to these questions, you can help them look up the answers in a reference book or online. A comprehensive source on the different vitamins and minerals is "The Real Vitamin and Mineral Book" by Nancy Pauling Bruning.

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Day 2

Lesson Introduction

1. Introduce the demonstration science experiment comparing relative levels of vitamin C in fruit and vegetables juice. (Note: this is a teacher-led demonstration. The lesson can easily be modified for students to do on their own or in groups, however a demonstration will decrease the time and difficulty involved.)
2. Hand out Lab Procedure and Materials handout and Experiment Log handout
3. Explain the objective of the lab: to determine which juice has the highest content of vitamin C. On the pre-lab sheet, ask students to write down their hypotheses about how the Vitamin C levels will compare between the juices. (Note: You might want to mention that fruit juices should be students' second choice after whole fruits because we lose some of the other nutrients like fiber.)

Day 2

Body of Lesson

4. Using the Lab Procedure and Materials handout, review the materials and preparation necessary. Go over the safety precautions involved with the iodine solution.
5. Review the variables involved in the experiment.
6. Using the lab procedure handout and walk through lab procedure with students.
7. Have students get together in small groups and complete the pre-lab questions.
8. Once completed, ask for student volunteers to instruct as you carry out, step by step, on one round of the experiment. For the following rounds, you can call on students to physically carry out steps of the procedure.

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9. Procedure:

- Pull 10 mL of one type of juice into the dropper.
- Observe and note the color of the iodine solution.
- Add to iodine solution and stir with a clean spoon.
- Observe and note the color of the mixture.
- Repeat part one for each juice you want to test. Always use a clean eyedropper and spoon for each juice.
- After testing all juices, hold up the cups to a white background and order from lightest to darkest. The lighter the solution, the greater the vitamin C content.

Conclusion

10. Discuss why the experiment works by illustrating it pictorially on the board. This experiment works because iodine molecules and starch molecules hook together in solution, causing the blue color. The solution is an indicator for vitamin C, meaning it tells you if vitamin C is present. Vitamin C breaks these molecules apart and causes the solution to lose its color. So the lighter the solution is, the more vitamin C the juice contains.
11. Clean up. After the remaining iodine solution is diluted with water, it can be safely poured down the drain.
12. Have students work in groups to complete the remaining exercises in the Experiment Log or in their journals.
13. Lesson Adapted from “Agricultural Research Service Sci4Kids.” USDA Agricultural Research Service. N.p., 2010. Web.<<http://www.ars.usda.gov/is/kids/Index.htm>> and “What Fruit Juice Has the Most Vitamin C?” Education.com. N.p., n.d. Web. <<http://www.ars.usda.gov/is/kids/AgSciProjects/ideas.htm#health>>