

Chapter 4

Fruits

Fruits are sweet plant parts that we eat. There are many different groups of fruit. There are pomes, drupes, berries, melons and citrus fruits. Most Americans do not eat the variety or amount of fruits that they need for healthy living. For this reason, it is important to learn about the nutrition and science of fruits.

Enjoy the fruit follies!

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Virtual Lessons:

(See *Virtual FoodMASTER CD*)

Super Citrus

Serious Sections

A is for Apple

Cooking or Eating Apples

Fruit Groups

Summary

Students will use hand lenses to investigate five fruits. Students will draw detailed pictures of the fruits and classify them based on size, parts, location of seeds and number of seeds.

Objectives

1. Students will be able to name five fruits.
2. Students will represent fruits and their parts pictorially.
3. Students will complete a fruit facts table and classify fruits into five groups.

Academic Content Standards

MATH

Data Analysis and Probability Standard

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Expectation:

- Collect data using observations, surveys, and experiments.
- Represent data using tables and graphs such as line plots, bar graphs, and line graphs.

Reasoning and Proof Standard

Recognize reasoning and proof as fundamental aspects of mathematics.

SCIENCE

Science as Inquiry: Content Standard A

Develop abilities necessary to do scientific inquiry.

Expectation:

- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.

Physical Science: Content Standard B

Properties of objects and materials.

Expectation:

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.

Life Science: Content Standard C

The characteristics of organisms.

Expectation:

- Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.

SCIENTIFIC INQUIRY:

Pomes, Drupes, Berries, Melons & Citrus Fruit

Materials

For the teacher: 1 pairing knife, 1 cutting board, paper towels.

For each group: 1 tray (cafeteria style), 3-4 hand lenses, 1 package of colored pencils, 1 apple cut in half (with core & seeds), 1 slice of cantaloupe (with the rind & seeds), 1 clementine (cut in half or partially peeled), 1 peach cut in half (with pit), 1 strawberry cut in half.

Procedure

1. Read *Fruit Groups* and complete the Doodle Bugs.
2. Review the different classifications of fruit by answering the matching questions in *Scientific Inquiry: Pomes, Drupes, Berries, Melons & Citrus Fruit*.
3. Divide the class into groups of four.
4. Ask one student from each group to use a cafeteria style tray to collect the fruit for their group.
5. Students will complete *Scientific Inquiry: Pomes, Drupes, Berries, Melons & Citrus Fruit* by studying and drawing the inside and outside of each piece of fruit. Using cherry as an example, students will record their findings in the *Fruit Facts* table. Ask students **“Why fruits have rinds and peels?”** (for protection) and **“Why fruits have seeds?”** (for reproduction).

Teacher Tips:

- If the suggested fruit is unavailable or too expensive, feel free to use an appropriate substitute as listed below:
 - Apple: Pear
 - Peach: Nectarine, apricot, plum
 - Strawberry: Blueberry, raspberry, blackberry, cranberry, grapes (with seeds)
 - Cantaloupe: Watermelon, honeydew
 - Clementine: Tangerine, orange, lemon, lime
- Keep the pairing knife in a safe location for adult use only.
- Cut fruit ahead of time to help this lab run smoothly.
- An adult may use the pairing knife and cutting board to prepare the fruit. Be sure to leave the rind, peel and seeds attached to help with classification. Apples and peaches may brown if cut too far in advance. (Dipping in orange juice may help prevent browning.)
- Clementines do not need to be cut but should be partially peeled. Students can easily explore the fruit by peeling the rest of the Clementine and pulling the sections apart. Note: Clementines and tangerines are much easier to peel and separate than oranges. However, clementines are often seedless.
- Extension: Discuss the role of seeds in reproduction. Try planting seeds in foam cups or small pots in the classroom.

Fruit Reactions

Summary

Students will learn about chemical reactions by observing browning reactions in bananas. Students will observe the differences in browning between plain bananas, bananas coated in sugar, bananas covered with lemon juice and bananas covered with cream of tartar.

Objectives

1. Students will be able to identify environmental changes that can affect browning of fruit.
2. Students will be able to name a kitchen acid.
3. Students will be able to describe an example of a chemical reaction.
4. Students will conduct an experiment, record data and draw reasonable conclusions.
5. Students will time reactions.

Academic Content Standards

SCIENCE

Science as Inquiry: Content Standard A

Develop abilities necessary to do scientific inquiry.

Expectation:

- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.

Physical Science: Content Standard B

Properties of objects and materials.

Expectation:

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.

Science and Technology: Content Standard E

Abilities of technological design.

Expectation:

- Identify a simple problem.
- Implement a proposed solution.
- Evaluate a product or design.

SCIENTIFIC INQUIRY:

Browning

Materials

For the teacher: 1 clock or timer.

For each group: 1 cutting board or tray, 1 table knife, 1 small plate, 1 set measuring spoons, 1 spoon, 4 plates (one per person), 1 banana.

Group B: 1 tablespoon sugar.

Group C: 1 tablespoon lemon juice.

Group D: 1/4 teaspoon cream of tartar & 1/4 teaspoon water.

Procedure

1. Read *Fruit Reactions* and complete the Doodle Bugs.
2. Divide the class into four groups: A, B, C and D.
3. Students will use a cafeteria style tray to collect supplies for their group.
4. Each group will perform their experiment. During the lab, ask probing questions **“Which group’s bananas do you think will brown the most? The least?”**
5. While the bananas brown, the class may complete *While You Wait: Fruit Salad*.
6. After 15-20 minutes have passed, student will return to the experiment.
7. Give each student a piece of all four bananas. After studying and tasting the bananas, the students will complete the *Browning Reactions* table.
8. Complete the activity with a class discussion: **“Why did the lemon juice keep the bananas from browning? Do you think sugar or cream of tartar is an acid? Did any of the additional ingredients change the taste? How?”**

Teacher Tips:

- Do not give students pairing knives to cut the bananas. A dull table knife will cut the bananas. Remind students to be careful with knives.
- Cream of tartar (or potassium bitartrate) can be found in the spice section of your grocery store. It is a kitchen acid.
- If you have a large class, you may want to give each group two bananas and double the amount of cream of tartar, water, sugar and lemon juice added. Alternatively, large classes can form eight groups, in which case two groups will perform each experiment.
- To prevent confusion, you may choose to only serve one group’s banana at a time. Ask students to record their observations before the next banana is served.
- Extension: Explore chemical reactions by mixing vinegar (acid) and baking soda (base) to create a fizzing foaming reaction.

WHILE YOU WAIT: **Fruit Salad**

Materials

For the teacher: 1 can opener, large bowl, 1 pairing knife, 1 table knife, 1 stirring spoon, 1 set dry measuring cups, 15-ounce can pineapples, 2 clementines, 1 apple, 1 banana, 1 cup seedless green grapes. Optional: Apple slicer/corer.

For each student: 1 spoon, 1 small bowl or small cup.

Procedure

1. While waiting for the bananas to brown, the class will make fruit salad.
2. Read the introduction and directions.
3. Complete *While You Wait: Fruit Salad* as a class. Allow students to assist with preparation of fruit, adding fruit to the bowl, measuring, stirring and serving the fruit salad.
4. Give each student a spoon and a small bowl of fruit salad.
5. Allow students to taste the fruit. Ask students to note the color of the fruit. **“Did the apple, banana or clementines brown? What kept the fruit from browning? Do you think adding orange juice, lemon juice or lime juice to fruit salad would keep the fruit from browning?”**

Teacher Tips:

- To reduce prep time, you may wash fruit ahead of time, partially peel clementines and use an apple slicer/corer to cut the apples.
- Recruiting an extra adult to assist with lab management and fruit cutting will help this activity to run smoothly.
- An adult should cut the apple. Remind students to be careful around sharp objects, such as knives or apple slicers/corers.
- Allow students to assist with fruit preparation, such as slicing bananas, measuring grapes and peeling and sectioning clementines.
- Review fractions by providing a one-half-cup or a one-fourth-cup instead of a one-cup measure. **Ask students “How many times the one-half-cup or one-fourth-cup will need to be filled to equal one cup?”**

Perfect Prune

Summary

Students will explore and practice graphing by creating a human bar graph. After studying and tasting prunes and plums, students will compare and contrast the fruits by completing a Venn diagram.

Objectives

1. Students will be able to name examples of dried fruit.
2. Students will be able to describe the process of making prunes.
3. Students will draw a bar graph.
4. Students will complete a Venn diagram.
5. Students will recognize that advertisers may change the name of food products to make them sound more appealing.

Academic Content Standards

MATH

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Science in Personal and Social Perspectives: Content Standard F

Personal health.

Expectation:

- Nutrition is essential to health. Students should understand how the body uses food and how various foods contribute to health. Recommendations for good nutrition include eating a variety of foods, eating less sugar, and eating less fat.

SCIENTIFIC INQUIRY: **Plump Plums and Pit-less Prunes**

Materials

For the teacher: 1 pairing knife, 1 cutting board, 4 plums (enough for each student to taste a piece), large space, masking tape, 3 signs: “Prunes,” “Dried Plums” and “Not Sure.”

For each student: 1 plate, 1 napkin, 1 hand lens, 1 prune, 1 plum piece (cut by teacher).

Procedure

1. Read *Perfect Prunes* and complete the Doodle Bugs.
2. Place one prune and one piece of plum on each student’s plate. After tasting and studying the fruit, students will complete the Venn diagram and questions.
3. Next, your students will create a Human Graph. Use masking tape to create horizontal and vertical axis lines on the floor. Place the three signs along the horizontal axis.
4. Ask students to line up behind their favorite prune name or the “Not Sure” sign.
5. Ask students to visually compare the human bars. **“Which name is the class’s favorite? Least favorite?”**
6. Instruct students to count the actual number of students in each line. Ask students **“What units are used in this graph?”** (People.)
7. Assist students in translating the human graph to the *Students’ Favorite Name for Prunes* paper graph.

Teacher Tips:

- Wash and slice plums ahead of time. Be sure to cut enough plum pieces for every student to taste/eat one piece.
- Help students translate the human graph to a paper graph by completing a large bar graph on the board as a class. Be sure to discuss the components and units of the bar graph.
- Allow your students to discuss why food advertisers may change the name of food products.
- Extension: Encourage students to design a package label for “prunes” or “dried plums.”
- Extension: Bring in grapes and raisins. Compare grapes and raisins using a Venn diagram. Then compare raisins and prunes by completing a Venn Diagram.

Answer Keys

Fruit Groups

Doodle Bugs

- Underline: **Pomes, drupes, berries, melons and citrus fruits are all types or groups of fruits.**
- Circle: **Apricots, cherries or coconuts**
- Box: **Strawberry or blueberry**
- Drawing: **A melon with seeds.**

SCIENTIFIC INQUIRY:

Pomes, Drupes, Berries, Melons & Citrus Fruit

Matching: 1. d 2. a 3. e 4. b 5. c

- Apple: **10 or less seeds in a paper-like core; Outside–red, Inside–white; pome**
- Cantaloupe: **Over 100 seeds in the center; Outside–green and yellowish-tan, Inside–light orange; melon**
- Clementine: **No seeds or 1-2 seeds in each section; Outside–orange, Inside–orange; citrus fruit**
- Peach: **1 pit in the center of the fruit; Outside–bright peach with red flecks, Inside–pale peach; drupe**
- Strawberry: **Over 100 seeds on the outside; Outside–bright red, Inside–pale red; berry**

Fruit Reactions

Doodle Bugs

Circle: **Phenolase, oxygen**

Draw: **A banana turning brown after it is peeled. Phenolase + oxygen = browning**

Fill-in the blank: **Answers will vary. Example:** My idea is to stop browning by not letting oxygen touch the fruit. You can do this by covering the fruit with plastic wrap.

SCIENTIFIC INQUIRY:

Browning

- Plain: **White with light brown spots; sweet; No, phenolase reacted with oxygen.**
- Sugar: **White with a couple yellow spots; very sweet; Yes, less oxygen was able to react with the phenolase, however some oxygen did react with the phenolase to make yellow spots.**
- Lemon juice: **White; slightly tart or sour; Yes, since lemon juice is an acid, it stopped phenolase from reacting with oxygen.**
- Cream of tartar: **White but mushy; bitter; Yes, since cream of tartar is an acid, it stopped phenolase from reacting with oxygen.**

What is the best way to keep your bananas from turning brown? **The best way to keep bananas from browning is to add lemon juice. Lemon juice keeps the bananas from browning and doesn't make the bananas taste bad.**

Answer Keys (continued)

WHILE YOU WAIT:

Fruit Salad

1. **No, phenolase did not react with oxygen. Or: Yes, we took too long to mix the fruit so phenolase did react with the oxygen.**
2. **Clementines and pineapples are both kitchen acids.**

Perfect Prune

Doodle Bugs

- Circle: **Raisins**
- Fill-in the blank: **A plum becomes a prune when it is picked and dried. The pit is also removed.**
- Underline: **California**
- Box: **Potassium, vitamin A, magnesium and iron**

SCIENTIFIC INQUIRY:

Plump Plums and Pit-less Prunes

- Plum Circle: **Purple, plum or deep red: has a pit, plump, smooth, easily chewed, waxy**
- Prune Circle: **Black; no pit; dry; wrinkly; sticky; chewy, shiny**
- Overlap Plum and Prune: **Drupe, fruit, grows on a tree, high fiber, healthy, source of nutrients, sweet & fruity tasting**

1. **Answers will vary.**
2. **Answers will vary.**
3. **Drupe**

Human Graph: **Answers will vary.**

Proficiency Questions (Workbook)

1. **b** 2. **d** 3. **a** 4. **d** 5. **c** 6. **c**

Proficiency Questions (Virtual CD)

1. **b** 2. **d** 3. **a** 4. **b**