

Apples: A Class Act!

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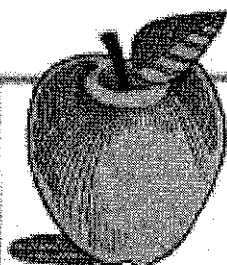
Grades: 4 - 6

Apples, Nutritious and Tasty

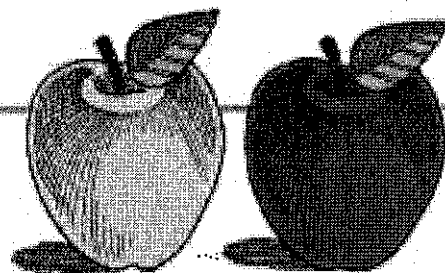
Apples are not only one of America's favorite healthy snacks, they are a favorite topic of students of all ages. A broad, cross-curricular study of apples provides students with diverse learning experiences involving nutrition, poetry, the life cycle of fruit trees, scientific investigations and opportunities for library research. This teacher's guide offers suggestions for accessible and stimulating activities for a series of lessons about apples. The unit encompasses many areas of

the curriculum: math, science, writing, health and nutrition, literature and social studies.

Many of the activities lend themselves naturally to cooperative learning. Small group or partner work is recommended throughout the unit. Students who talk with each other reach a richer level of knowledge and understanding than students who are asked only to perform pencil and paper tasks.



Apple Varieties



There are many apple varieties. The taste of apples depends on many factors - latitude, terrain, weather, and the care with which they were grown, stored and marketed. About 2,500 varieties are grown in the United States. A total of 15 popular varieties account for about 90 percent of the total U.S. apple production. Here are the top 10 varieties.

RED DELICIOUS The most widely recognized of all U.S. apple varieties originated in Iowa in the 1870s. Striped to solid red in color, with rich, sweet, mellow taste. Suitable for snacks and salads, not recommended for pies or cooking. Most widely available of all U.S.-grown varieties, can be purchased year-round nationwide.

GOLDEN DELICIOUS This old favorite was discovered in West Virginia in 1890. Yellow color, rich, tangy, sweet, juicy flavor. Texture and shape are similar to Red Delicious. Resists browning when sliced. All-purpose apple. Desirable for salads, snacks, fresh desserts and baking. Available nationwide all year.

GALA Striped red and yellow, this New Zealand native was brought to the United States in the early 1970s. Crisp, juicy and very sweet, Gala is excellent for snacks or salads, and is also good for pies, sauce and baking. U.S. Galas are available nationwide year-round.

GRANNY SMITH Green coloring, moderately tart and very firm, this popular variety was discovered by "Granny" Anne Smith in Australia in 1868. All-purpose apple, especially good for eating out of hand or baking. Available nationwide year-round.

FUJI Named after the famous Japanese Mt. Fuji, U.S.-grown Fujis began appearing in markets in the 1980s. This striped yellow and red apple is sweet and firm. Excellent for snacking and salads, Fuji is also a good for pies, baking and sauce making. U.S. Fujis are available nationwide year-round.

MCINTOSH This popular old variety was discovered by John McIntosh in 1811. Mixed green and red coloring. Tart, tender and juicy flavor. Excellent for eating fresh, not recommended for baking. Available mainly in the East and Midwest, from September until late spring.

ROME BEAUTY Discovered near Rome Township, Ohio. Red and red-striped skin. Firm with medium-tart to sweet taste. Best for baking and cooking. Available nationwide from October until July.

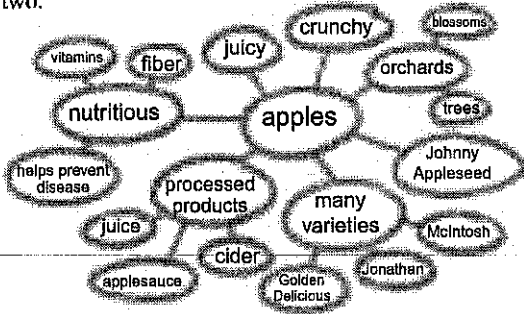
IDARED This Idaho native typically has a large shape, with bright red skin. Firm and tangy, this apple is good for snacking and holds its shape ideally for baking. Available from September through June.

JONATHAN Discovered in Woodstock, N.Y., in the 1920s. Light red stripes over yellow or deep red, darkening to purple in areas. Rich semi-tart flavor. All-purpose apple. Available September until spring, mainly in the Midwest.

YORK IMPERIAL Discovered in the early 1800s near York, Pa. Slightly tart, firm apple with lopsided shape. Deep red skin with green stripes. All-purpose apple, best for cooking and baking. Available mainly in mid-Atlantic region from October until late spring.

Basic Introductory Activities

1. BRAINSTORMING Ask students what words and ideas come to mind when they think about apples. Make a semantic map of student responses on the chalkboard (see sample below), showing relationships among ideas raised. At the end of the unit, make another semantic map of students' responses and compare the two.



On a separate chart, list the students' questions about apples as they arise during the brainstorming session. This list can become the starting point for library research. Add questions as studies progress.

2. APPLE FAVORITES Slice different varieties of apples into bite-sized pieces and distribute to students. (Place pieces on numbered cards at the students' desks to avoid confusion.) Do the varieties taste different? What words describe the differences? Which do they prefer? Have students make notes describing the different tastes.

With student assistance, make a graph showing the apples that the class likes the most.

VARIETY									
Red Delicious	X	X	X	X					
Cortland	X	X							
Empire	X	X	X						

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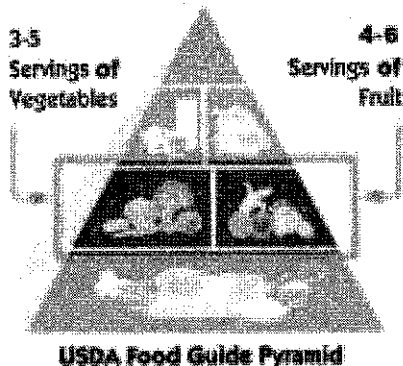
Health and Nutrition

BACKGROUND: Recent research is providing modern proof of the old adage about "an apple a day," proving that delicious, all-natural, high-fiber, antioxidant-rich apples can be an important part of a healthy diet.

The Food Guide Pyramid advises us on what types of food, and how much of each food type, we should eat each day for better health. It recommends that we eat at least five servings of produce each day – two servings of fruits like apples, and three of vegetables.

Talk with students about:

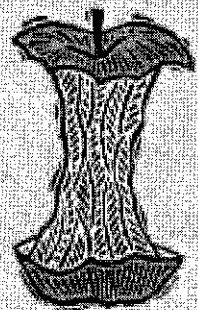
- What foods does the Pyramid recommend we should eat the most of? The least of?
- How do the foods we eat keep us healthy? e.g., controlling weight, having plenty of energy, reducing disease risk.
- What counts as a serving of apple? (one tennis-ball sized apple; 6 ounces of 100% apple juice or cider; ? cup of applesauce; ? cup of dried apples)
- How many different ways can we incorporate apples into our diet, at meal and snack time?



10 Core Facts About Apples

Apples are a very good fruit for building healthy bodies. A medium-sized apple (154 grams/5.5 ounces, about the size of a tennis ball).

1. **Is fat-free** – helps maintain a healthy weight, and reduces the risk of some types of cancers.
2. **Is saturated-fat free.**
3. **Is sodium-free** – may help reduce the risk of high blood pressure.
4. **Contains natural sugars** called fructose.
5. **Has only 80 calories.**
6. **Is cholesterol-free** – may help protect against cardiovascular disease.
7. **Contains no artificial colors or flavors.**
8. **Is an excellent source of fiber** – helps reduce blood cholesterol, and aids digestion.
9. **Is a convenient, satisfying snack** – You can take one with you anywhere.
10. **Is an easy way to get your recommended five servings of fruits and vegetables daily!**



Activities

1. AN APPLE A DAY Make a wall chart or copies of the "10 Core Facts." Elaborate on each fact, noting on the chalkboard the terms that the class needs to define. Note which systems of the body benefit from the nutrients found in apples (neurological, muscular, digestive, circulatory, etc.)

After brief discussion, arrange for students to work in pairs. Have students research the meaning of difficult terminology. For example:

- phytonutrients
- potassium
- complex carbohydrates
- pectin
- fiber
- boron
- fat

After the research period, bring the class together to share the information. Students can compare notes, filling in the information missing on their own lists. (An independent or homework assignment could be to make an illustrated glossary of "Apple Nutrition.")

2. DESIGN AN APPLE SNACK Arrange for the class to work in small groups (3-5 students). Each group creates a recipe for a nutritious snack that uses apples or apple products. (Discussion and modeling might center on the question: What is nutritious?) The group members write a recipe for their snack. The groups can volunteer to bring in their snacks for the class to enjoy.

3. NUTRITIOUS APPLE PRODUCTS Brainstorm with the class apple products that are both nutritious and tasty. (Apple juice, apple cider, applesauce... as well as family favorites, dishes that use apples.)

4. CONVINCING ARGUMENTS Ask students to write an essay convincing the audience that apples and apple products are indeed a healthy food.

Independent Projects:

- Make a poster advertising the benefits of eating apples and apple products.
- Make a semantic map of the information contained in "10 Core Apple Facts."
- Create a brief skit to illustrate the benefits of eating healthfully, including eating apples.
- Make a list of adjectives describing the taste of apples. Devise into a word search.

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U.S. Apple Association
8233 Old Courthouse Road, Suite 200
Vienna, VA 22182-3816
(703) 442-8850
www.usapple.org

Social Studies and Literature

BACKGROUND: Long before apples were cultivated, it is believed they grew wild in Central Asia and China, as well as in Southwest Asia, where biblical historians place the Garden of Eden. The Stone Age peoples of Europe cultivated apple trees. In 3000 B.C., the ancient Lake Dwellers of northern Italy and Switzerland also grew apples. The Greeks and Romans both cultivated apples. When the Romans conquered England (first century B.C.) they brought the art of apple cultivation with them. During the Age of Exploration, the apple was the most important cultivated fruit. The Spaniards brought apples to Mexico and South America. The Pilgrims of Massachusetts Bay Colony planted apple seeds in 1629. Pioneers brought apple trees west. Indians planted trees from seeds they had received at white settlements. John Chapman, better known as Johnny Appleseed, started many small orchards throughout Ohio and Indiana in the early 1800s. Today, the annual apple crop grown in 36 U.S. states averages well over 200 million bushels.

Mythology used apples as a symbol of love and beauty. In Greek mythology, Atlanta refused to marry unless a suitor could defeat her in a running race. One suitor, Milanion, accomplished this goal by dropping three golden apples (gift of Venus, the Goddess of Love) during the race. Atlanta stopped to pick them up, lost the race and became his wife.

In another Greek myth, Eris, the Goddess of Discord, was enraged because she had not been invited to the wedding of a fellow god and goddess. She tossed among the guests a golden apple with the inscription, "For the fairest." three goddesses felt they were worthy. In order to put an end to their squabbling, Paris, a mortal, was called upon to judge the fairest. He chose Aphrodite. Hera and Athena, the rejected goddesses, were furious and caused great devastation to Paris and his family. According to the legend, the clamor eventually led to the Trojan War.

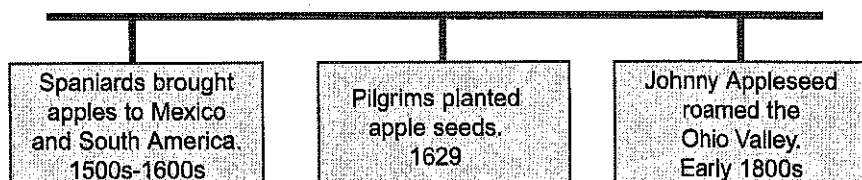
In Teutonic mythology, Bragi was distinguished for his nobility and wisdom. He married Idun, who was the goddess of eternal youth and the guardian of the "golden apples." Her magic prevented the gods from aging.

To the Iroquois Indians, the apple tree is the central tree of heaven.

Activities

1. APPLE HISTORY TIME LINE Present the information about the history of apples to students. Brainstorm with students about how to create a time line that shows the important information relevant to apples' history.

Make a time line on the chalkboard with string and index cards. (Apples cut out from construction paper ahead of time could also be used for writing the descriptions of the dates.) Students may design their own time lines illustrating apple history using adding machine tape or long narrow strips of paper.



2. RESEARCHING MYTHS AND FAIRY TALES Divide the class into research teams of 4-5 students. Direct students to find and read stories from mythology and fairy tales in which the apple plays a role in the plot. (Notify the librarian ahead of time so that he or she can show children how to conduct a search like this one.) Keep a class list of the titles of the myths and fairy tales. As a grand finale, each group can read or tell the class their favorite "apple tale." The groups can create murals depicting scenes from the tales. Some might enjoy doing a skit based on their "apple tale."

3. CREATING AN ORIGINAL APPLE TALE Students write an original fairy tale or myth in which the apple plays an important role. (Or they might take a well-known fairy tale and change the action by adding the twist of a new magic apple.)

4. JOHNNY APPLESEED: FACT VS. FICTION Have children bring in books about Johnny Appleseed. After reviewing the books, make a chart of facts about Johnny Appleseed, the legend. Have a research "team" investigate the life of John Chapman, the "real" man behind the legend. Compare the real life of John Chapman to the folk stories about Johnny Appleseed.

Independent Projects:

- William Tell was a national hero of the Swiss in their struggle against the Duke of Austria. Find out what role he played in the struggle for Swiss independence and why he is associated with the apple.
- Isaac Newton was supposedly sitting under an apple tree when he thought up the law of gravity. Find out about Newton's life and write a one-page biography.
- Research folklore about apples. Look for apple remedies and find out about apple paring bees. (In the early settlement days of America, apple paring bees were major social affairs.)
- Find out if apples are grown commercially in your state. Identify which states are the major apple producers in our country.

Math Activities

1. APPLE FRACTIONS Arrange for students to work in pairs. Give each pair a piece of drawing paper, an apple and a knife. Ask students to think of how many different ways they slice or cut up an apple so that all pieces are of equal size and shape. Students first draw several different ways and then choose one way and actually cut their apples.

Discuss with the class the variety of ways that apples can be divided into equal parts. On the chalkboard list the fractions that show the different ways that children divided their apples.

Students can also write apple problems using the fractions that were listed on the board after the activity. For example, Sara divided an apple into eighths. She gave $\frac{3}{8}$ to Mary. How much of her apple did she have left?

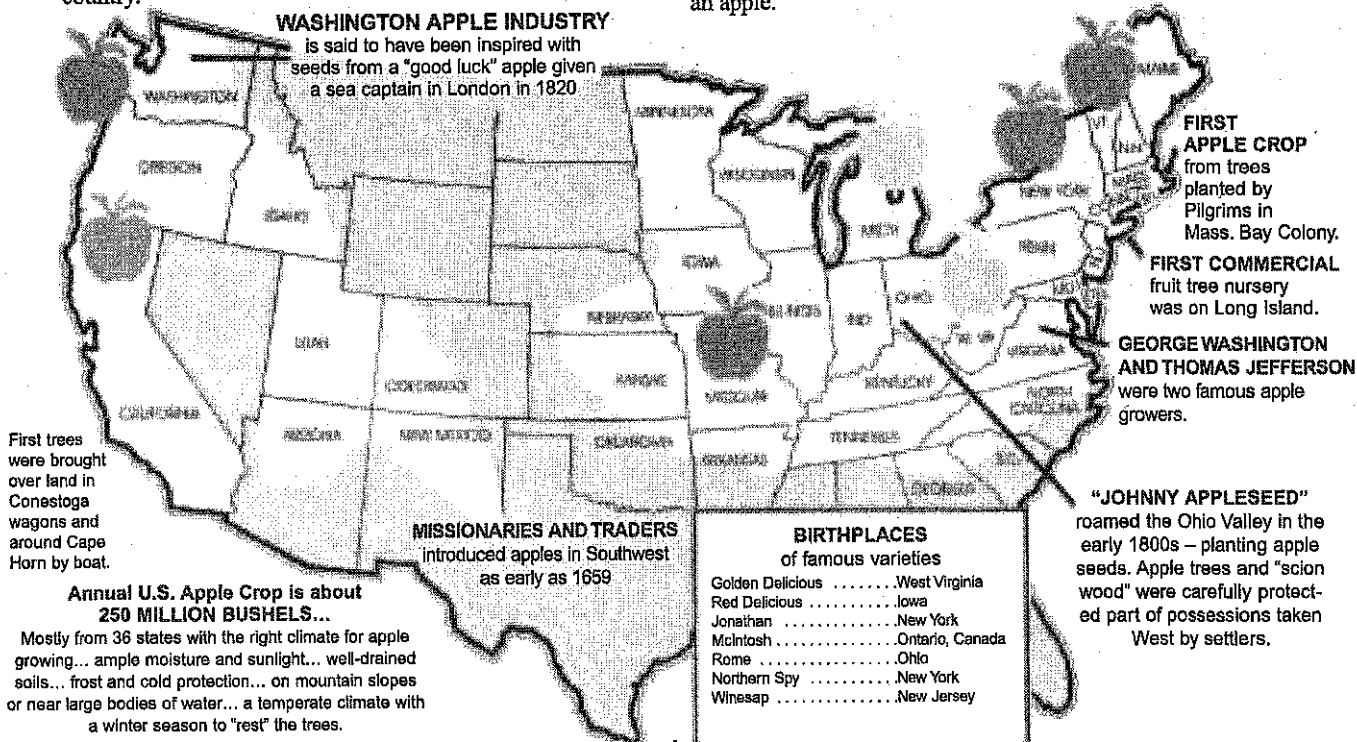
2. SYMMETRY Direct the students to cut an apple in half and compare the halves. Are the halves symmetrical? Ask children to draw the inside halves of their apples, taking care to include details.

3. ESTIMATING Have children estimate how many apples would be needed to fill in an outline of their bodies. Ask for a volunteer to be traced on the bulletin board paper. Have other volunteers cut out apples of approximate actual size from construction paper. After students make their estimate, see how many apples it takes to "fill in" the shape of the body.

4. WRITING MATH PROBLEMS Students can write word problems using apples as the topic. The problems can involve many different kinds of computation, depending on what the class is currently studying, for example: multiplication, division, addition, subtraction, fractions, percentages and ratios.

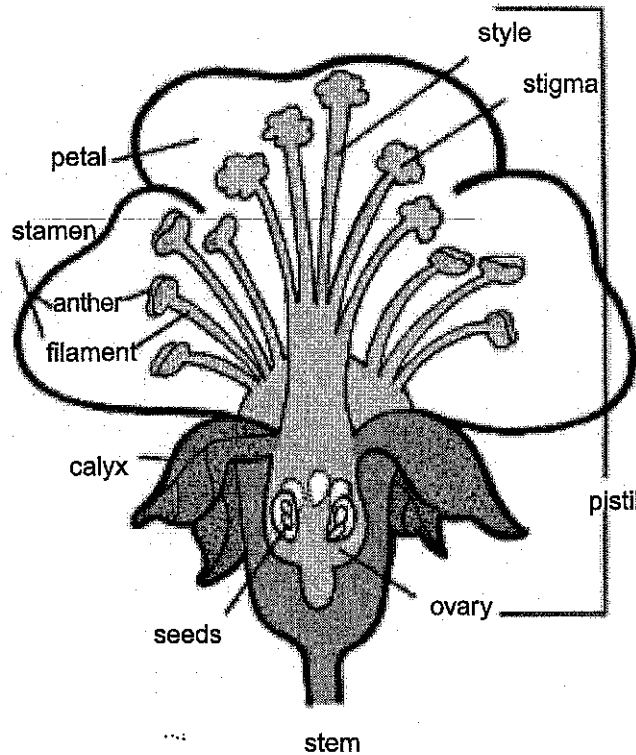
5. GRAPHING Ask students to bring in their favorite kind of apple. (Tell them to make sure they know what variety they have.) Make a bar graph listing each apple variety that was represented in the activity and how many times each variety was chosen as the favorite. (This activity can be done in conjunction with the APPLE FAVORITES activity described in the Basic Introductory Activities section.)

6. CIRCUMFERENCE Using string, find the circumference of an apple.



Life Cycle of Apple Trees

BACKGROUND INFORMATION: In winter the apple tree rests. On the branches are buds, some of which contain leaves and others that contain five flowers. With warmer spring weather, the leaf buds unfold and flower buds begin to grow on the ends of the twigs.



The flowers have many parts that are crucial to the formation of apples:

- **Sepals** – five green, leaflike structures that make up a flower's calyx
- **Petals** – the part of a flower that attracts insects by their color and scent
- **Stamens** – the male reproductive part made up of an anther and filament
- **Anther** – the part of the stamen that produces pollen
- **Filament** – the stalk of the stamen
- **Pistil** – female part of the flower, made up of stigma, style and an ovary
- **Stigma** – the top of a flower's pistil
- **Style** – the part of a pistil that connects the stigma and the ovary
- **Ovary** – the rounded base of the pistil, inside of which are five compartments each containing two ovules, female reproductive cells that can become seeds

Honeybees are attracted to apple flowers by nectar and the scent of the petals. As the bee collects nectar, it also picks up pollen. When the bee lands on a flower on another tree, it brushes against the pistil of the flower, leaving pollen grains on the sticky stigma. The pollen grains send tubes down through the styles to reach the ovary (pollination). Through the filament, the sperm's pollen can reach the ovules that are in the ovary. The fertilized ovules will become seeds.

The outer wall of the ovary develops into the fleshy white part of the apple. The inner wall of the ovary becomes the apple core around the seeds.

In summer, the apples grow bigger and gradually change color, and the tree produces new growth. In fall, the apples ripen. About two weeks before the harvest, the apples' food supply from the tree is cut off and the apples become sweeter. Most apples are harvested by hand, primarily in September and October.

Activities

1. **PICTURE BOOKS** Students can make picture books explaining the life cycle of an apple tree. They may enjoy creating the books for younger students.
2. **ILLUSTRATED GLOSSARY** Students make an illustrated glossary in booklet form defining the key words for the apple tree's life cycle.
3. **APPLE TREE THROUGHOUT THE SEASONS** Students paint or use colored chalk to show the changes the apple tree goes through each season.
4. **DRAWING DIAGRAMS** Students draw detailed diagrams of the parts of the flower of the apple tree.
5. **DISSECTING APPLE BLOSSOMS** If apple trees grow nearby, clip some blossoms and let the students dissect them to find the flower parts.
6. **HELPFUL BEES** Ask for volunteers to research how commercial growers utilize bees in their orchards.



Art Activities

1. **PRINTING WITH APPLES** Cut apples in half. With different colors of tempera paint, make apple prints. Students can print with the apples on different colors of construction paper. They may want to design their own greeting cards using the apple print motif.
2. **APPLE DOLLS** Native Americans used apples to make apple-head dolls. To make these shriveled-faced dolls, peel an apple and cut away the lower sides to form a chin. Carve a nose and a mouth and scoop out eyes. Carefully scoop out the core of the apple and sprinkle salt inside. Stuff it with cotton. Insert a pencil of stick into the bottom of the apple, and use beads or beans for eyes. Sprinkle the apple with lemon juice and salt and let the applehead dry for at least two weeks. When dry, add yarn for hair and scraps of material for clothes.
3. **APPLE CREATURES** Although young students like this activity, older ones still enjoy it, too. Ask students to create apple creatures using apples, toothpicks, marshmallows and raisins. They might also use construction paper to add feathers, curly tails or other interesting characteristics.

Science and Writing

BACKGROUND: This portion of the unit encourages students to conduct simple investigations of apples. Students experiment, observe and keep records as they become "immersed" in a multi-sensory study of apples. Students will make notes in learning logs as they investigate and discuss the activities. In the learning logs the students simply record what happened during the activities and their reactions to what happened. Students may later use their notes as the basis for language arts activities, such as writing poems. Writing first serves as a tool for learning, and later becomes one of the possible end products of the lessons.

Activities

1. WHICH APPLE IS YOURS? DESCRIBING APPLES

Each student needs an apple for this activity. Ask students to take 10 to 15 minutes to examine their apples and write a detailed description in their learning logs. Students should note the distinctive characteristics of their apples, paying close attention to color, texture, shape and variations from one side to another. After the students have had time to write, collect all the apples and put them in a big pile. Challenge the students to find their own apples, using their notes as proof that they are choosing the correct apple!

2. LISTENING TO APPLES

Arrange for students to work in pairs or small groups. Each group needs an apple.

Ask students to listen to what an apple sounds like...

- when you tap it with a pencil
- when you polish it with a rough paper towel
- when you bite into it
- when you chew it
- when you roll it on your desk

Encourage students to use comparison such as "It sounds like ... a woodpecker tap-tap-tapping ... drummers drumming softly ... a noisy squirrel chewing up a snack..." (This is a good time to explain what similes and metaphors are, and why poets use them.)

Later, the pairs can take their notes and write a poem using the descriptions of the sounds for a book or bulletin board project.

3. APPLE AROMA Slice different varieties of apples into bite-sized pieces. Have students blindfold a partner, then write down the words their blindfolded partner uses to describe the smell of each apple. Remove the blindfold and see if the student can correctly match the variety with its smell.



4. OTHER SENSES Describe in writing what an apple looks and feels like. Use similes.

- smooth as ... nice leather
- shiny as ... a polished car

The phrases can be rearranged and revised to make a poem. Students can also use the similes that they wrote for the LISTENING TO APPLES activity and the descriptions for APPLE AROMA in their poems.

5. WATER CONTENT OF APPLES Apples, like many other fruits and vegetables, contain a significant amount of water. This experiment focuses on the apple's water weight.

Each student needs an apple slice. Students tie a piece of string around their slices, weigh them on a small scale, and record the weight in their learning logs. The apple slices should be hung to dry. Students weigh the slices every several days and note the weight in their logs. In their logs, students hypothesize why there are changes in the weight. (As apples dry out, the weight decreases.)

6. USING MICROSCOPES Slice an apple into very thin pieces. Put each under a microscope. Have students work in pairs, and discuss the appearance of the apple slice under the microscope. Ask students to draw what they see, and write down as many words as they can to describe it.

7. LITMUS TEST Test a sliced apple to find out if it is an acid or a base. Press litmus paper against the slice of apple so the paper can soak up the juice in the apple. Discuss with the class the meanings of the words acid and base. (Background information: acids have a sour taste. They will react with some metals to give off hydrogen gas. Bases taste bitter and feel slippery. They are also called alkalies.) This can be done as a demonstration lesson, or as a small group or paired activity.

APPLE CELEBRATIONS YEAR ROUND!

January – National Oatmeal Month. Apples and oatmeal are a great twosome!

February – Great American Pies Month. Make your favorite apple pie.

March – National Nutrition Month. Create healthy, delicious apple snacks.

April – National Applesauce Month. Try adding interesting spices to applesauce for a new flavor.

May – Mother's Day. Design stationery for Mom using apple prints.

June – National Dairy Month. Serve applesauce and vanilla yogurt mixed together.

July – National Picnic Month. Design the ideal picnic lunch with apples.

August – National Smile Month. How do apples help dental health?

September – National 5 A Day Week. Get on your way to 5 A Day with apples! Johnny Appleseed's birthday. Research the life of John Chapman.

October – National Apple Month. Celebrate with a month-long study of apples.

November – Thanksgiving. Include apples and apple products in classroom feast.

December – Hanukkah and Christmas. Leave a healthy apple for Santa, instead.