Collect a Bushel of AITC's Favorite Apple Resources!

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*Agriculture in the Classroom's Apple Favorites Unit has been generously sponsored by the **Virginia Apple Board**. Visit virginiaapples.net to learn more about Virginia apples or find an orchard near you.*

The Apple Chain

Standards of Learning
Science: K.7, K.9, 2.4, 3.4, 3.8, 4.4

Objective
The student will be able to:
- create a model showing the stages of apple growth
- identify the steps in the life cycle of an apple

Materials
- Apples by Gail Gibbons (you may substitute another book on apples)
- red, green, or yellow paper plates (one per student)
- white paper plates (cut in half, one half per student)
- staplers
- tape
- crayons/markers
- scissors
- yarn (approximately one yard per student)
- template, attached

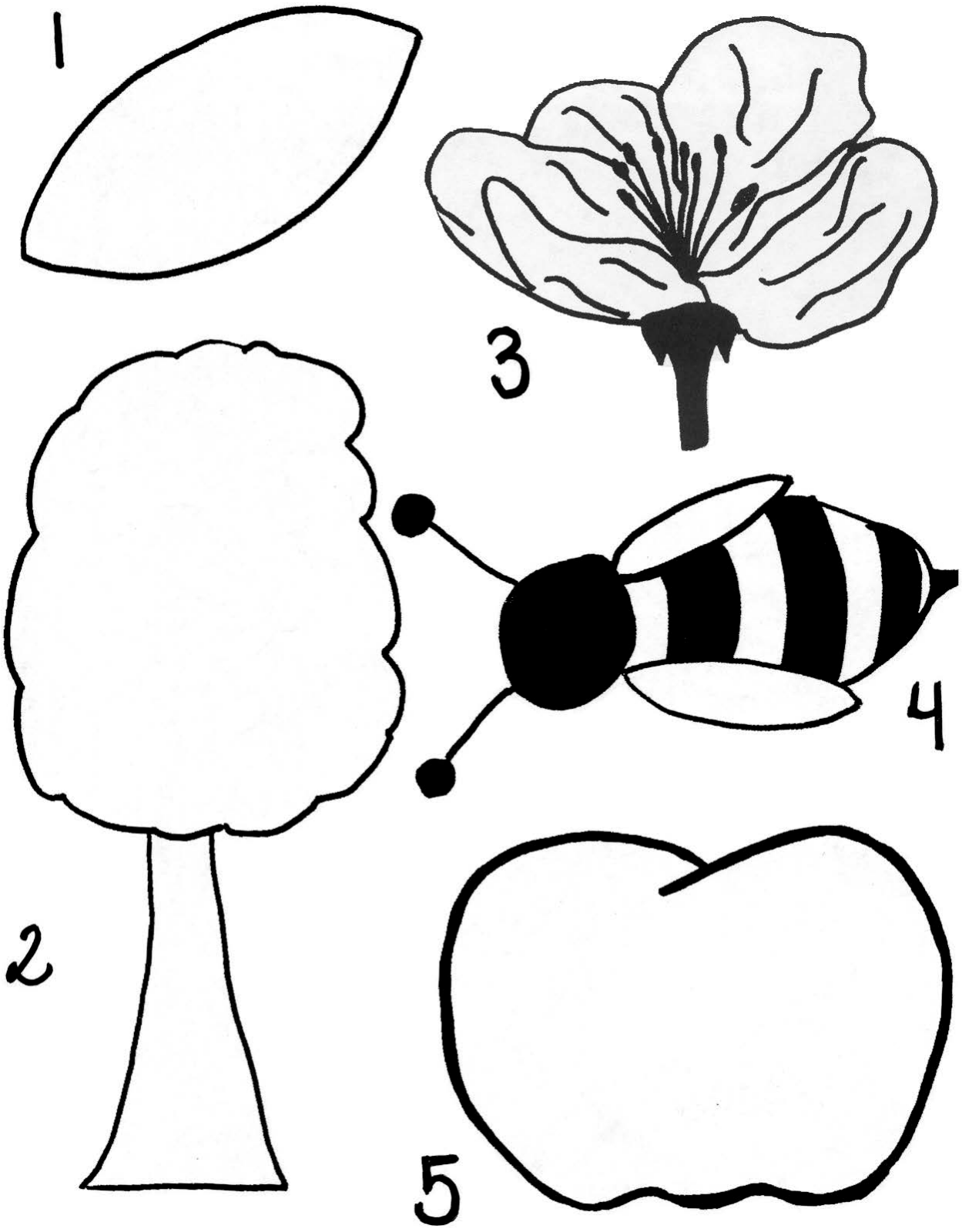
Background Knowledge
Virginia growers produce an average of 8 to 10 million bushels of apples per year. Apple varieties grown in Virginia include Red Delicious, Fuji, and Granny Smith. The majority of apples in Virginia are grown in the Shenandoah Valley area.

Procedure
1. Begin the lesson by asking students to brainstorm all of the products they enjoy which involve apples.
2. Next, read Apples (or another book on apples) aloud to students.
3. Ask students to identify the steps involved in apple growth. Write these on the board and put them in the correct order.
4. Now tell students that they are going to create a model for the life cycle of an apple.
5. Pass out one red paper plate and one half white paper plate to each student, as well as templates, yarn, and art supplies.
6. Staple the half plate to the back of the red plate, forming a pocket.
7. Color the template images (seed, tree, blossom, bee, and apple).
8. Cut out images and label them.
9. Place them in order on the desk.
10. Attach them in order to the yarn using tape or stapler.
11. Attach the yarn to the half plate by stapling the end closest to the apple. The seed should be the farthest away.
12. Place the chain in the pocket. Have students get into pairs and then take turns pulling each step out and explaining that stage to their partner.

Extension
"An apple a day keeps the doctor away." Have students research the nutritional value of apples to support this well-known phrase.

References

Lesson adapted from Illinois Agriculture in the Classroom.



Apple Story

Standards of Learning
Science: K.7, 1.4, 2.4, 2.8, 3.8, 4.4

Objective
The student will
- sequence the events in the life cycle of an apple.

Materials
- Apples, by Gail Gibbons
- handout, attached
- scissors
- construction paper
- glue

Background Knowledge
The book, Apples, provides an excellent overview of apples, including history and science concepts. Students will learn about the life cycle of apples, their origin in the United States, as well as their uses. Follow-up a reading of the book with a discussion of the life cycle of an apple.

Procedure
1. Read Apples to the class. Be sure to point out the stages the apple goes through before it is picked.
2. Pass out the sequencing handout to each student.
3. Have students cut out the sequencing strips and then rearrange them so that they are in the correct order.
4. Glue the strips in the correct order onto a piece of construction paper.
5. Students may then illustrate their pages with pictures of the apple's life cycle.

Extension
Students may use the book to create a timeline of the events that happen to take an apple from the orchard to applesauce in their homes (apple is picked, processed, shipped to stores, and bought by consumer).

Apple Sequencing Strips

Apple blossoms bloom.
Apple is picked and eaten!
Blossom dies.
Seed is planted.
Bees pollinate blossoms.
Baby apples appear.
Seedling grows into adult tree.
Apple grows and ripens.

Turn Apples into Applesauce

Content Area
Science: K1, 1.1, 2.1
English: K8, 1.13, 2.3
Math: K13, 1.14, 2.17

Objective
Students will: Using senses, investigate how heat changes apples into applesauce; record time apples become soft; put data into bar graph; write a paragraph using complete sentences and new vocabulary words to explain the process; organize process steps in correct order.

Materials
- Two pounds or about five apples (yields 3 cups sauce) from a baking variety like Empire, Gala or Golden Delicious
- Knife (adult)
- Cutting board
- Lemon juice or acidic acid
- Either a hot plate and heat proof dish (will take about 1.5 hours to complete) or crock pot to heat apples until soft (will take about 4 hours on High)
- Spoon
- Kitchen timer or stop watch
- Fork (or food mill or sieve if finer texture is desired)
- Vocabulary Words-copies for each student
- Time Chart- copies for each student
- Bar Graph-copies for each student

Background Knowledge

One bushel of apples weighs about 48 pounds.
An average of 5-6 million bushels of apples are produced annually by Virginia growers.

Virginia apple growers produce many popular varieties including Red Delicious, Golden Delicious, Rome, Stayman, Gala, Winesap, York, Granny Smith, Jonathan, Fuji and Ginger Gold.

The majority of apples trees are grown in the Shenandoah Valley.

Seventy percent of Virginia apples are sold for processing and made into popular products such as applesauce, apple juice, apple butter, slices and cider.

An average apple contains only 80 calories. Apples have five grams of fiber, 20% of the daily recommended fiber needs. Potassium, which is found in apples, is important in regulating blood pressure.

Apples have no fat, cholesterol or sodium.

Applesauce is a fat free substitute when cooking and can be used in place of oil or shortening. In addition to being healthy, applesauce makes baked goods taste moist.

Procedure

1. Peel, core and chop each apple into 1-inch cubes (adult). Save one apple quarter and leave whole. Discuss the safety of using a knife. Discuss whether the bigger piece of apple will make any difference in the time it takes to cook the apple to the soft stage.
2. Give each child one apple cube. Compare the color, smell, taste, and texture of the raw apple.
3. Discuss the vocabulary words and their meanings.
4. Put two raw apple cubes on plate. Dip only one in lemon juice or acidic acid. Compare the two as the color changes and talk about oxidation.
5. Put the raw apple cubes (including the whole quarter) and 1 cup water and cook over medium heat. Cover with lid. Note the time on the chart.
6. Set the timer or stop watch to check the apples every 10 minutes and stir. Add more water if needed to keep apples moist and from sticking to pan. Note the time on chart when the apples are soft and can be easily mashed with fork. Did it take longer for the bigger piece to cook?
7. Mash the cooked apples with a fork. Add sugar if desired. If a finer texture is desired use a food mill or sieve.
8. After the apples are mashed, cool and serve as a nutritious snack.
9. Look at the color, smell, taste and texture of the applesauce. How is it different than the raw apple?
10. Look at the cooking time chart and transfer the figures to the bar graph.
11. Discuss the order of the steps of the experiment and have students number them in order they occurred.
12. Have students write a short paragraph using complete sentences and each of the vocabulary words to describe the experiment.

Extension

1. Investigate a second variety that is best eaten raw, like Red Delicious. Compare to a cooking variety like Fuji. Select two pounds (about 5) of apples (yields 3 cups sauce). Cook at the same time as the cooking variety. Use the same type of heat source for a constant. Compare the color, smell, taste, and texture of both varieties at timed intervals. Record on chart. Make a bar graph for each and compare results. Did one variety cook quicker than the other variety?

2. Using the same time chart, make apple butter in crock pot and record the time. Discuss the length of time it takes to make applesauce vs. apple butter. Compare color, smell, taste, and texture of applesauce to apple butter. Use words like more, less, darker, lighter, longer, and shorter.

3. Read a story about Johnny Appleseed.

Recipe for Applesauce

2 pounds (about 5) cooking apples
1 1/2 cups water
Sugar to taste (optional) (about ¼ cup)

Wash, core and peel apples. Cut into 1-inch cubes. Add apples and water to pan and cover with lid. Cook over medium heat until water boils. Reduce heat to low and cook apples until are soft. On electric heat, process will take about one and half hours. In a slow cooker, process will take about 4 hours. More water may be added to keep apples from sticking and bottom of pan moist. Mash with a fork or press through sieve or food mill.

Recipe for Apple Butter in Slow Cooker
Cook Time –Total time 8 hrs

Slow Cooker- At least 5 quart cooker

Ingredients
8 cups cooking apples, peeled, thin-sliced
2 cups granulated white sugar
1/4 teaspoon ground cinnamon
1/8 teaspoon ground cloves
1/8 teaspoon salt

Directions:

1. Stir all ingredients in slow cooker. Cover; cook on High for 1 hour and then on Low for 7 hours, or until the apple butter is thick and brown. Stir occasionally throughout the day. Provides a delightful smell in the room.
2. Apple butter will thicken as it cools. Serve on biscuits.
3. Store in refrigerator.

Number the steps in the correct order to make applesauce

_____ Cook apples until soft

_____ Wash, peel, and core apples

_____ Mash apples

_____ Cut apples into one inch cubes

Date:	Apple Variety(for cooking):
Time	Description
	Raw apples put into pan over heat
	Apples are soft and can be mashed
	Total Minutes

Date:	Apple Variety(for eating raw):
Time	Description
	Raw apples put into pan over heat
	Apples are soft and can be mashed
	Total minutes

Bar Graph for Time Data
Minutes to cook 2 apple varieties

Minutes to cook		
120		
90		
80		
70		
60		
50		
40		
30		
20		
10		
0		

Variety 1- Cooking _____

Variety 2- Eating _____

Note: If using slow cooker, time should be changed to allow up to 5 hours for cooking.

Bar Graph for Time Data
Minutes to cook 1 apple variety

Minutes to cook		
120		
90		
80		
70		
60		
50		
40		
30		
20		
10		
0		

Variety 1- Cooking

_____

Note: If using slow cooker, time should be changed to allow up to 5 hours for cooking.

VOCABULARY

Oxidation- Process when oxygen combines with an element, changing the appearance of the element. In this experiment, air combines with the apple and turns it brown.

Fiber- Coarse, indigestible matter that helps the digestion system.

Acid- Sour or sharp in taste. The lemon juice is an acid. It slows oxidation.

Nutrition- provides the body what it needs to grow and stay healthy.

KEY

Number the steps in the correct order to make applesauce

__3___ Cook apples until soft

__1___ Wash, peel, and core apples

__4___ Mash apples

__2___ Cut apples into one inch cubes

Apple Counting

Content Area
Math: Number Sense

Objective
Students will:
- Count and recognize numbers

Materials
- Paper plate
- Red and black markers
- Book about apples, such as Apple Countdown by Joan Holub or Apple Here! by Will Hubbell

Background Knowledge
One-to-one correspondence can develop through counting objects and determining the number they represent. This lesson provides students with the opportunity to count seeds and see the written number. Also, Virginia growers produce an average of 8 to 10 million bushels of apples per year. Apple varieties grown in Virginia include Red Delicious, Fuji, and Granny Smith. The majority of apples in Virginia are grown in the Shenandoah Valley area.

Procedure
1. Prepare the following materials prior to the lesson:
    a. Apple cores made out of paper plate: cute 2 half circles to create a core
    b. Draw the number of apple seeds you want and write the corresponding numeral underneath.
2. Read a book about apples.
3. Practice counting the seeds with the students using the apple cores.

Extension
Provide apple seeds and allow children to glue them on to a paper apple and write the numeral that corresponds.

National Agriculture in the Classroom

Relevancy and Engagement: agclassroom.org

Apple Genetics

Grade Level(s)

6 - 8

Estimated Time

60 minutes

Purpose

Students learn about apple genetics related to production through a hands-on activity exploring the characteristics of apple varieties. Students will apply their knowledge of heredity and genetics to discover how new varieties of apples are developed through cross-breeding techniques.

Materials

- *Apple Genetics* PowerPoint
- *Apple Genetics* worksheet, 1 per student

Per Group of 2 or more:

- 1 Paper Plate
- 1 Whole Braeburn Apple
- 1 Whole Royal Gala Apple
- 1 Whole Jazz Apple
  - *Do not substitute the apple varieties. Jazz apples can be found at most grocery stores.*
- 1 Knife (to cut apple)
- 1 Sheet of Paper (Printer or Notebook paper)

Essential Files (maps, charts, pictures, or documents)

- SpongeBob Genetics worksheet (optional Enriching Activity)
  [https://naitc-api.usu.edu/media/uploads/2016/08/01/SpongeBob_Genetics.pdf]
- Apple Genetics worksheet
  [https://naitc-api.usu.edu/media/uploads/2016/08/01/Apple_Genetics_worksheet.pdf]
- Apple Genetics worksheet: Teacher Key
  [https://naitc-api.usu.edu/media/uploads/2016/08/01/Apple_Genetics_worksheet_key.pdf]
- Apple Genetics PowerPoint
  [https://naitc-api.usu.edu/media/uploads/2016/08/01/Powerpoint_-_Apple_Genetics.pptx]

Vocabulary

Punnet Square: a diagram used to predict an outcome of a particular cross or breeding experiment

allele: a variant of a gene

dominant allele: an allele whose trait always shows up in the organism when the allele is present (written as uppercase letter)

gene: a section of DNA that codes for a certain trait

genotype: an organism's genetic makeup or allele combinations

heredity: the passing of traits from parents to offspring

heterozygous: having 2 different alleles for a trait.

homozygous: having two identical alleles for a trait.

phenotype: an organism's physical appearance or visible trait

probability: a number that describes how likely it is that an event will occur

recessive allele: an allele that is masked when a dominant allele is present (written as lower case letter)

trait: a characteristic that an organism can pass on to its offspring through its genes

Interest Approach – Engagement

1. Ask students what their favorite apple is. Ask them why that is their favorite apple and lead into a discussion about various apple traits such as sweetness, tartness, flavor, crunchiness, color, etc. You may even consider having students bring their favorite apple to class.
2. Play the first minute from the podcast "The Miracle Apple."
3. Use slide 2 of the attached *Apple Genetics* PowerPoint to give students a brief background on apple production in the United States and world.
4. Share interesting facts about apples (slide 3) with students to give them some general background about this agricultural product.
5. Highlight the nutritional benefits of apples (slide 4). Encourage students to eat an apple as a snack.
6. Bring up the original question about students' favorite apples. Using slide 5, show students a few different varieties of apples. Ask students if they prefer their apples to be sweet or tart.
7. Continue playing the "The Miracle Apple" podcast from the one minute mark to the six minute mark.
8. Introduce the concept of grafting. Make sure students realize that most apple trees are not grown from seed. (slide 6.)
9. Ask your students, "How were multiple varieties of apples developed... each with a different color, texture, and taste?" Allow students to offer their ideas using their prior knowledge and inform them that they will be learning the answer to this question.

Did you know? (Ag Facts)

- Apples are a member of the rose family.[1]
- More than 2,500 varieties of apples are grown in the United States, but only the crabapple is native to North America.[1]
- The average person eats 65 apples a year.[1]
- Apples are 25% air, which is why they float in water.[1]

Background - Agricultural Connections

Prior to this lesson, students should know that all cells of an organism have DNA. DNA is the blueprint providing the organism with coded instructions for proper function and development. Students should understand that **genes** are sections of DNA that are responsible for passing specific **traits** from parent to offspring. Students will need to be familiar with vocabulary such as **phenotype**, **genotype**, **homozygous**, and **heterozygous** to successfully complete the lesson and student worksheet and determine probabilities associated with possible offspring using a **Punnett Square**. Students will be introduced to several varieties of apples and discover how new varieties can be created through crossbreeding.

Key STEM Ideas

Genetics is the study of heredity, while **heredity** is the passing of traits from parents to offspring. This lesson will help solidify key genetics vocabulary words.

The main idea of this lesson is to show the application of genetic crossing for the benefit of agriculture by producing apples with a variety of traits.

Gregor Mendel was a priest who worked with the genetic crossing of pea plants. He would cross purebred short pea plants with purebred tall pea plants. Through his experiments he determined that some traits were visible in the plant (dominant traits) while others were not, but were still able to be passed on to future generations (recessive traits). Understanding what we see and what the genetic makeup of an organism is can be quite different. When you look at an organism, its physical characteristics are all dependent on a specific **allele** combination. This is the difference between phenotype and genotype. Students will use Punnett Squares in this lesson to help determine all the possible allele combinations in a genetic cross and their probabilities.

Crossbreeding allows breeders to create better quality apples by incorporating traits from two parent plants into the seeds of a new generation of plants. Breeders must understand both genotypes and phenotypes to accomplish this task. Breeders must also decide which traits are desirable and should be selected. This is an intensive process that involves breeding successive generations of apples with the preferred traits in order to get the final product.

Connections to Agriculture

Apples are an important agricultural crop. There are about 7,500 apple producers in the United States. Washington, New York, and Michigan are the leaders in apple production. Growers produce a variety of different kinds of apples. Some apples are used for baking while others are used for eating. Apples are a good snack choice as they contain no fat and relatively few calories while being high in fiber and vitamin C.

Apples are grown through a process called grafting rather than being grown from seed. This is done because most apple varieties are self-unfruitful, which means their blossoms must be fertilized with the pollen of a separate variety in order to produce fruit. The fruit has traits from the parent tree, but the seeds inside will be a cross of the two varieties. This mixture of genetic material in the seeds means the grower won't know what traits a tree grown from these seeds will have and what the resulting fruit will taste like.

To avoid this uncertainty apple growers do not grow new trees from seed. Instead, new apple trees are propagated through a process called grafting. In this process a special cut is made into the rootstock of a tree. Then, they graft or transplant a section of a stem with leaf buds called a *scion* from a variety that has desirable traits into the cut. In time the two pieces fuse together allowing for growth of the scion. Eventually, blossoms on the scion will be pollinated and will produce a consistent variety of fruit with the desired traits. For more information and pictures of the grafting process, please visit the website Apple Tree Propagation: Grafting.

The goal of apple breeding is to continuously produce quality apples with desirable traits. Cross breeding and genetic engineering are two methods that have allowed breeders to produce better quality apples.

Procedures

Explore:

1. Give each student a copy of the *Apple Genetics* worksheet.
2. Be sure to wash all apples prior to distributing them to the students.

3. Per group of 2 or more students, hand out:
   - 1 paper plate (this will be the cutting board as well as an area to keep the apples)
   - 1 Braeburn Apple and 1 Royal Gala Apple (Note: DO NOT hand out the Jazz apple).
   - 1 knife (or have apples already pre-sliced)
   - 1 sheet of paper (This is where students are able to place seeds or other apple particles).
4. Have students draw a line down the center of their paper plate and label each side with "Gala" or "Braeburn." The apples will look similar, so it will be important to avoid confusing the two apples.
5. Have students complete "Part 1" of the worksheet by making observations and recording them for both the Royal Gala and Braeburn apples in the following order (slide 8):
   a. Look, Smell, Touch OUTSIDE of the apple
   b. Cut open and Look, Smell, Touch the INSIDE of the apple
      - To cut the apple: Have students hold their apples so the stems are pointing towards them (laying on their side) slice open the apples with a crosscut. Then, have students cut their apple again so that it is now quartered.
   c. Finally, Taste the apple
6. After Students have recorded their observations in "Part 1," they should move onto "Part 2: Analyzing the Data" where students will find the similarities and differences found between the 2 apples. Facilitate a group discussion using slide 9 so students can share their findings.
7. Review basic genetics vocabulary with students using slide 10. Make sure students are familiar with terms. Instruct them that they will be applying genetics knowledge to apple situations.

Explain:

8. In "Part 3" of the worksheet, students will review the possible genotypes of the Gala and Braeburn apples. These genotypes can be found on the worksheet and slide 11 of the PowerPoint.
9. Assign students to complete the Punnett Squares on page three of the worksheet. Students will determine the possible probabilities for the genotypes of six apple traits.
10. Continue playing the "The Miracle Apple" podcast from the six minute mark to the 7:16 minute/second mark.

Extend:

11. Hand out the Jazz apple. Students will follow the same procedure and complete "Part 4" of the worksheet.
12. Once completed with the observations for the Jazz apple have students use their previous data from the Royal Gala and Braeburn apples and the observations from the Jazz apple to find out how they are connected through genetic crossing. Facilitate a class discussion using slide 14. Students will record findings on "Part 5" of worksheet.
13. Reveal to the students that the Jazz apple is a cross between the Gala and Braeburn apple. Using slide 15, share a few more facts about the Jazz Apple.
14. Talk about the concept of crossbreeding and how it is used to produce better quality organisms on slide 16.
15. The Honeycrisp apple was also developed by crossbreeding, and it is a competitor of the Jazz apple. Share some facts from slide 17 with students.
16. Continue playing the "The Miracle Apple" podcast from the 7:21 minute mark to the end of the story, 10:06 minutes.

Concept Elaboration and Evaluation:

After completing these activities, review and summarize the following key concepts:

- Apples are a healthy snack containing fiber and vitamin C.

- In apples, characteristics such as color, texture, sweetness/tartness, juiciness, and crunchiness are determined by the genetic make-up of the apple.
- Scientists use a knowledge of genetics and heredity to cross breed apples to produce new varieties of apples. The Jazz apple is an example.
- Continue playing the "The Miracle Apple" podcast from the 7:21 minute mark to the end of the story, 13:57 minutes.

We welcome your feedback! Please take a minute to tell us how to make this lesson better or to give us a few gold stars!

Enriching Activities

- Show the 4-minute video clip, Have We Engineered The Perfect Apple? to see the science behind the taste of the Honeycrisp apple.
- If students need additional practice with completing Punnet Squares, complete the attached SpongeBob Genetics worksheet found in the Essential Files.
- If cut apples are in the room at the end of the lesson, ask students if they see any browning occurring. Discuss what causes this. Teach students about Arctic apples, a genetically modified apple which does not brown.

Suggested Companion Resources

- Selectively Breeding Sheep: Punnet Square Practice (Activity)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=637]
- Crop Modification Techniques (Poster, Map, Infographic)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=768]
- Have We Engineered the Perfect Apple? video (Multimedia)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=839]
- Garden Genetics: Teaching With Edible Plants (Teacher Reference)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=718]
- All About Apples (Website)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=664]
- Producepedia (Website)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=528]
- Genetic Science Learning Center (Website)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=255]
- DNA Learning Center (Website)
  [https://www.agclassroom.org/teacher/matrix/resources.cfm?rid=313]

Sources/Credits

Author Affiliations:

- Kevin Atterberg: Culler Middle School, Lincoln, NE
- Erin Ingram: University of Nebraska-Lincoln, IANR Science Literacy Initiative, National Center for Agricultural Literacy

- Molly Brandt: University of Nebraska-Lincoln, IANR Science Literacy Initiative, National Center for Agricultural Literacy
- NPR - Planet Money: The Economy Explained. Episode 627: The miracle Apple. Retrieved from http://www.npr.org/sections/money/2015/05/27/410085320/episode-627-the-miracle-apple

Ag Fact Sources:

1. http://www.care2.com/greenliving/22-fun-facts-about-apples.html

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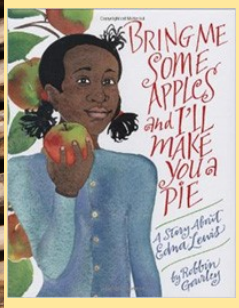
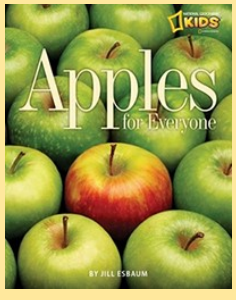
Organization Affiliation

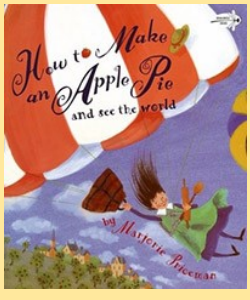
University of Nebraska-Lincoln

Fill your basket with these awesome apple favorites!

- Amazing Apples by Consie Powell
- An Apple Tree Through the Year by Claudia Schnieper
- Apples by Jacqueline Farrar
- Apples by Gail Gibbons
- Apples for Everyone by Jill Esbaum
- Apple Fractions by Jerry Pallotta
- Applesauce Day by Lisa Amstutz
- Bring Me Some Apples and I'll Make You a Pie by Robbin Gourley
- First Apple by Ching Yeung Russell
- From Apples to Applesauce by Kristin Thoennes Keller
- Golden Delicious: A Cinderella Apple Story by Anna Egan Smucker
- How Do Apples Grow? by Betsy Maestro
- How to Make an Apple Pie and See the World by Marjorie Priceman
- The Apple Orchard Riddle by Margaret McNamara
- The Apple Pie Tree by Zoe Hall
- The Season's of Arnold's Apple Tree by Gail Gibbons
- Up, Up, Up! It's Apple-Picking Time by Jody Fickes Shapiro







Apple Giggles

Virginia apples are grown in the Valley and Ridge, Blue Ridge and Piedmont regions of the state, but primarily in the Shenandoah Valley. Apples are used to eat whole, sliced, or processed into apple juice and applesauce. Making Apple Giggles with children is a great way to teach children about this tasty fruit.

You will need:

1 package (3 oz.) gelatin, any flavor
1 cup boiling water
1/2 cup cold water
Apple corer
Virginia Apples
Up, Up It's Apple Picking Time by Jody Fickes Shapiro
(or your own favorite apple book)

How to:

1. Read your favorite apple book to a group of children.
2. Dissolve gelatin in boiling water; stir in cold water and set aside.
3. Core apples leaving bottom of apple intact.
4. Hollow out some of the apple flesh to make room for gelatin.
5. Pour gelatin in apple and place apples in individual bowls to keep them upright.
6. Chill until gelatin is firm.
7. Cut in wedges to serve.

Suggested Books:

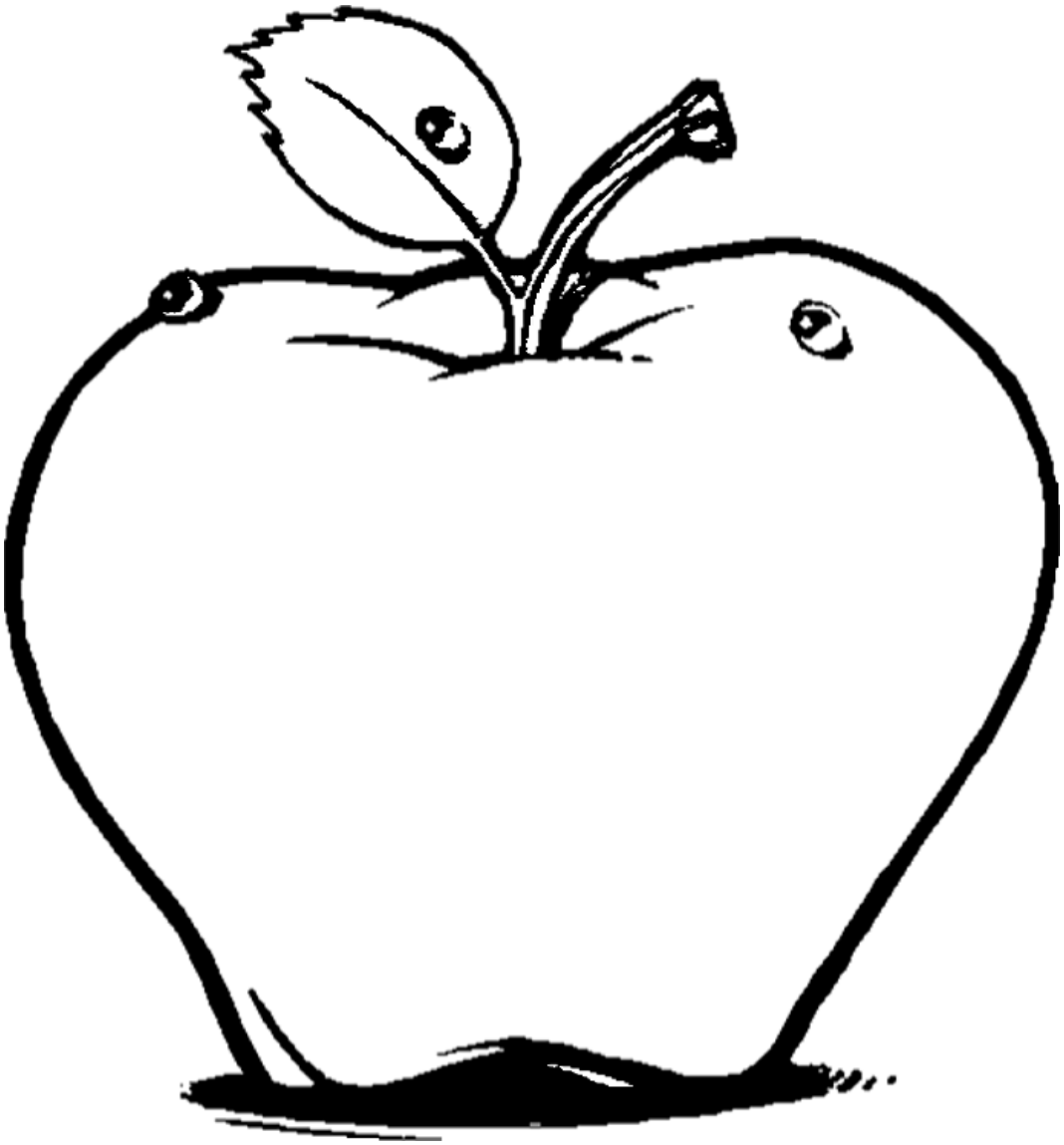
Up Up It's Apple Picking Time by Jody Fickes Shapiro
Apples by Gail Gibbons
Amazing Apples by Consie Powell

DID YOU KNOW:

The average person eats about 700 pounds of fruits and vegetables a year.

Over 200 million pounds of apples are grown in Virginia each year.

Vegetables are grown on more than 18,000 acres of land each year in the Commonwealth.



Color the Virginia Apple

Healthy Tip: Always wash your hands before and after preparing food.
20 second with warm soapy water works best that is the time it takes to sing Twinkle Twinkle Little Star.

Apple Globes

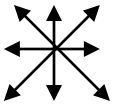
Apples are a nutritious fruit grown in Virginia. Virginia growers produce an average of 8 to 10 million bushels of apples per year. Apple varieties grown in Virginia include Red Delicious, Fuji, and Granny Smith. The majority of apples in Virginia are grown in the Shenandoah Valley area.

You will need:

Apples by Gail Gibbons
4, ½" x12," red strips of construction paper per student
Tape
Stapler
Scissors
Green Construction paper

How to:

1. Read *Apples* to a group of children.
2. Discuss new facts that children learned from the book.
3. Pass out 4 red strips of construction paper to each child.
4. Older children may wish to cut their own strips of construction paper.
5. Lay the strips on a flat surface so that they form a star. See diagram below.
6. Tape the strips together at the middle meeting point (you may also use a stapler).
7. Gather the ends to form an apple shape. Staple strips together at the top.
8. Draw and cut out a leaf from the green construction paper.
9. Staple or glue leaf to top of apple.



Suggested Books:

Apples by Gail Gibbons
Apples by Jacqueline Farmer

Apple Shakers

When teaching children about how to be healthy, it is important to talk with them about fruits and vegetables and how they are good for them. Children should have the opportunity to touch, taste, and smell the foods they are learning about, and they will get a sense of their state's agriculture, as well. When discussing the process of plant life, talk with children about the growth of apples because they can relate to something they eat or see almost every day.

You will need:

Paper plates (2 per child)
Red paint, markers, or crayons
Green pipe cleaners (1 per child)
Beans (we also recommend using apple seeds if you have them available)
Stapler with plenty of staples
Hole punch

How to:

1. Discuss with children the importance of fruits and vegetables to our diet. Talk with students about the growth process of apples.
2. As you explain the activity to students make sure you do the steps with them so that everybody is on the right track. Have the materials passed out to students so that they are in reach.
3. Paint or color the back of the paper plates red.
4. After they dry (if you used paint), staple the plates together with the red facing out; leave about 1/3 unstapled so that you can add the seeds later (see next step).
5. Put a handful of beans (or apple seeds) inside and finish stapling.
6. Punch a hole at the top of the plates and attach a green pipe cleaner through the holes to make a stem and/or leaf.
7. Create music with the apple shakers!

Suggested Books:

Apples by Gail Gibbons
Amazing Apples by Consie Powell
Apples Here! By Will Hubbell
Apple Countdown by Joan Holub
Apples by Jacqueline Farmer

What's Growing On In Virginia?
Virginia Foundation for Agriculture in the Classroom
P.O. Box 27552, Richmond, Virginia 23261

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For additional information and activities, visit our Web site at **www.agintheclass.org** or call **804-290-1141**

What's Growing On In Virginia?

The Virginia Foundation for **AGRICULTURE IN THE CLASSROOM**

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THIS ISSUE

Virginia apples: Healthy, tasty and good for the economy

CRISPY, CRUNCHY, JUICY AND SWEET–VIRGINIA APPLES ARE A TASTY TREAT.

And with only 80 calories, no fat, 20 percent of the daily recommended intake of dietary fiber, and vitamins A, C and iron, apples are a healthy treat as well.

Virginia apples are grown in the Valley and Ridge, Blue Ridge and Piedmont regions, but primarily in the Shenandoah Valley. Warm days, cool nights, consistent rainfall and rich soil create ideal conditions for growing a wide variety of apples.

From Gala to York, Virginia apples provide consumers lots of healthy options. And the state's apple producers contribute an estimated $235 million to the economy each year, according to the Virginia State Apple Board.

There are apples grown in more than 100 commercial orchards statewide, on about 16,000 acres of land. Virginia orchards produce an average of 5 million to 6 million bushels of fruit each year.

Apples are harvested in the late summer and fall, and there are more than 30 orchards, farm stands and farmers' markets in Virginia where you can find fresh apples. If you want to pick your own, visit www.virginiaapples.org/pick-your-own/index.html for a list of places to visit.

But not all picked apples are eaten whole. About 70 percent of Virginia apples are used for processing. That means they are made into products like applesauce, apple juice, apple butter, pre-packaged slices and cider.

Virginia apples are sold to 15 other states and exported to more than 20 countries. All of those sales generate an estimated $235 million for the state's economy each year, ranking Virginia sixth nationwide among apple-producing states.

While apples are a pretty important business, they also significantly contribute to people's health.

Numerous studies have linked eating apples to possibly reducing the risk of cancer and helping prevent heart disease, stroke, Alzheimer's disease and asthma symptoms.

So, as the old adage advises, eat an apple a day to keep the doctor away– and keep Virginia's apple growers in business.

GRANNY SMITH

RED DELICIOUS

FUJI

ROME

WINESAP

GALA

Apple varieties grown in Virginia:

Fuji – a cross between Red Delicious and Virginia Rawls Jennet apples; blush color with green and yellow stripes; the best sweet apple available after Nov. 1; good for baking, applesauce, salads and snacks

Gala – originally developed in New Zealand; red/orange color with yellow stripes; one of the first Virginia apple varieties available; crunchy, juicy, tart taste; good for snacking

Ginger Gold – discovered in the foothills of the Blue Ridge Mountains, growing among twisted, uprooted trees; greenish gold skin with a slight blush; available mid-August through October; doesn't discolor when cut

Golden Delicious – lightly textured green/gold skin; available mid-September through April; has an extended shelf life; sweet taste and crisp texture

Granny Smith – green with a slight pink blush; available late fall through spring; doesn't brown when cut; tart and crisp, it's ideal for pies or frying

Jonathan – first red apples available in the fall; light red stripes over yellow or deep red; sweet-and-tart flavor makes them the perfect all-purpose apple

Red Delicious – striped to solid red; available in mid-September; crisp, sweet flesh; perfect for adding to pancakes, muffins and crisps

Rome – deep, solid red and perfectly round; available in mid-October; ideal for baking because of its firm texture and mildly sweet taste

Stayman – discovered in 1866; crimson with a firm texture and sweet-tart taste, it is a perfect all-purpose apple

Winesap – rich red color that is perfect for holiday eating and decorating; tart, tangy, juicy and extra firm; perfect cut into salads

York Imperial – discovered early in the past century near York, Pa.; deep red with green streaks and a distinctive shape; available mid-October; intense tart/sweet flavor

APPLES

Nutrition Facts

Serving Size 1 medium apple (154g / 5.5 oz.)

Amount per Serving

Calories 80 Calories from fat 0

	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Potassium 170mg	**5%**
Total Carbohydrate 22g	**7%**
Dietary Fiber 5g	**20%**
Sugars 16g	
Protein 0g	

Vitamin A 2% * Vitamin C 8%

Calcium 0% * Iron 2%

* Percent of Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your caloric needs.

		2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium		2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:

Fat 9 * Carbohydrate 4 * Protein 4

LESSON PLAN >> ELEMENTARY SCHOOL

Weighing apples

SOL:
Math 3.14, 4.10, 5.11
Science 3.1, 4.1, 5.1

Objective:
to be able to make observations, create inferences and draw conclusions about apples. Students will observe and find the weight of apple slices before and after drying.

Materials:
- apples (cut into slices – one slice per student)
- string
- a place to hang string (to allow apple slices to hang dry)
- scales
- science notebooks (to record data)

Background Knowledge

Virginia growers produce an average of 8 million to 10 million bushels of apples a year, making apples the state's 17th largest agricultural commodity. The majority of Virginia apple orchards are in the Shenandoah Valley.

Apples are one of the many fruits that contain water, which contributes to the weight of the fruit. As apple slices are dried, their weight decreases due to the release of the water. This investigation will allow the students to make distinctions among observations, inferences and conclusions; make notes of their observations; and appropriately measure and record their data.

Procedure

1. Ask the students to think about what an apple tastes like. As they share their descriptions, make a list on the board. See if the students will come up with the fact that apples taste juicy/watery.
2. Ask the students to get out their science notebooks so they can write down observations and data.
3. Distribute an apple slice and a small piece of string to each student.
4. Ask the students to write observations of their apple slice down in their science notebooks. They also can draw a picture to help detail what the apple slice currently looks like.
5. After the students have completed their observations, have them tie their strings around their apple slices.
6. Have the students take turns finding the weight of their apple slices (including the strings) using the scales.
7. The date and the weight should be written in their science notebooks.
8. After all the data has been collected and recorded, hang the apple slices to dry.
9. Ask students to make a prediction/hypothesis about what will happen to the apple slices as they are hung to dry.
10. About three days later, have the students take down their apple slices and record their observations in their science notebooks. Again, they should draw pictures to help detail what the apple slices now look like.
11. After recording their observations, ask the students to make a hypothesis regarding whether they think the apple slices' weight will have changed in comparison to the first time the slices were weighed.
12. After predictions have been made, have the students take turns finding the new weight of their apple slices (including the strings) using the scales.
13. The date and the new weights should be written in their science notebooks and compared to the first weights.
14. After the data has been collected and recorded, hang the apple slices back up to dry.
15. About three days later, have the students take down their apple slices and record their observations in their science notebooks.
16. Repeat steps 11 through 14 to finish the investigation.

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17. After all the data has been collected, discuss with the students why the apple slices' weight decreased over the period of time. Lead the discussion to the fact that, as the slices dried, they lost water and, therefore, the weight decreased due to the decrease in water weight.

Extension

- Put the dried apple slices under a microscope to allow the students to observe their appearance.
- Create a line graph using the weights of the apple slices.
- Try this experiment with other types of fruit grown in Virginia, like peaches or grapes.

References

- www.urbanext.uiuc.edu/apples/edu-projects_5B.html
- www.virginiaapples.org
- www.atozteacherstuff.com/Themes/Apples

LESSON PLAN >> MIDDLE SCHOOL

Mummifying apples

SOL:
Math 6.10, 6.18
Science 6.1, 6.5, PS.1, PS.2

Objective:
to conduct a scientific investigation to validate a hypothesis using a control and variables. This lesson focuses on conducting an experiment using different salt compounds to determine which will best mummify an apple.

Materials:

- 2 fresh apples per group, each cut into quarters
- large box of table salt
- large box of Epsom salts
- large box of baking soda
- knife (for the teacher)
- eight 12-oz. disposable plastic cups – per group
- measuring cup – one per group
- large mixing bowl
- permanent marker
- masking tape
- scale
- graph paper

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Background Knowledge

Throughout history, people have used mummification as a way to preserve family members who have died. In order for mummification to occur, all the water must be removed from the body. Although the mummification process evolved over time, body preparers used a natural salt, natron—now called baking soda, to help dry out the body. This investigation will allow students to experiment with different minerals to determine which best dries out an apple.

Procedure:

1. Distribute the apple slices (eight slices), eight cups and pieces of tape to each group of students.
2. Ask the students to copy the table below into their science notebooks.
3. Have the students write "starting weight" on eight pieces of tape, leaving room to write the weight of the apple slices on the tape. Students should then tape one of these pieces to each cup.
4. Select one apple slice, weigh it and record the slice's weight on the piece of tape on Cup #1. Place the apple slice in the cup.
5. Select the other apple slices, one at a time, and weigh them. As each apple is weighed, place it in a cup and write its corresponding weight on the tape on the cup. Have the students record the data on their data tables.
6. After all the apple slices have been weighed and the cups labeled appropriately, get out the measuring cups, table salt, Epsom salts and baking soda.
7. Add ½ cup of baking soda to Cup #1, completely covering the apple slice. Label this cup as "baking soda only."
8. Add ½ cup of Epsom salts to Cup #2, completely covering the apple slice. Label this cup as "Epsom salts only."
9. Add ½ cup of table salt to Cup #3, completely covering the apple slice. Label this cup as "table salt only."
10. Add ¼ cup of table salt and ✣ cup of Epsom salts to Cup #4, completely covering the apple slice. Label this cup as "table and Epsom salts."
11. Add ¼ cup of table salt and ¼ cup of baking soda to Cup #5, completely covering the apple slice. Label this cup as "table salt and baking soda."
12. Add ¼ cup of baking soda and ¼ cup of Epsom salts to Cup #6, completely covering the apple slice. Label this cup as "baking soda and Epsom salts."
13. Add ⅓ cup baking soda, ⅓ cup table salt and 1/3 cup Epsom salts to Cup #7, completely covering the apple slice. Label this cup as "baking soda, table and Epsom salts."
14. Leave Cup #8 with only the apple slice, and label this cup as the control.
15. Place all eight cups on a shelf in direct sunlight and let them sit for seven days.
16. Ask the students to make a hypothesis about which mineral mixture will work best to dry out (or mummify) the apple slices. Have the students write down their hypothesis in their science notebooks.

17. After seven days, take down the cups from the shelf. Take each apple slice out of the cup, one at a time, and try to brush off as much salt and baking soda as possible. Do not rinse off the slices, as they will become rehydrated.
18. Have students weigh each apple slice and record the data on their data tables.
19. Have the students compare the starting weight of each apple slice with its ending weight. Have the students record their conclusions in their science notebooks and create a graph comparing the different weights of the apple slices.

Cup Number	Starting Weight	Mineral Used	Ending Weight
1			
2			
3			
4			
5			
6			
7			
8			

Extension:

- Put the dried apple slices under a microscope to allow the students to observe their appearance.
- Try this experiment with other types of fruit.

References

- www.newtonsapple.tv/TeacherGuide.php?id=1422
- www.virginiaapples.org

LITERARY CORNER

From seed to fruit: Books about how apples grow

Apples, Jacqueline Farmer, Charlesbridge Publishing Inc., ISBN-13: 9781570916946

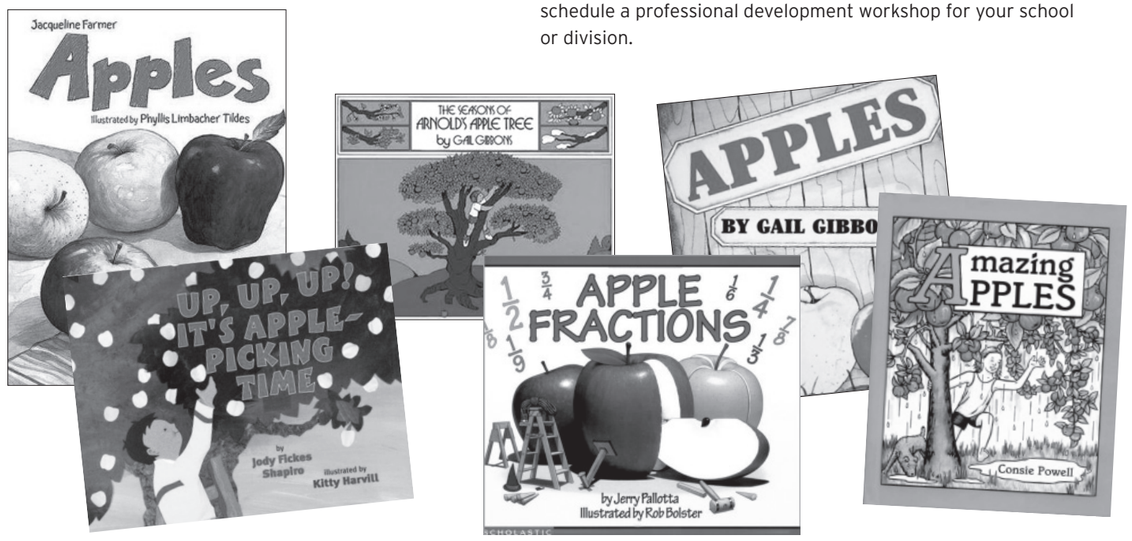
Amazing Apples, Consie Powell, Albert Whitman, ISBN-13: 9780807503997

Apples, Gail Gibbons, Holiday House Inc., ISBN-13: 9780823416691

Apple Fractions, Jerry Pallotta, Scholastic Inc., ISBN-13: 9780439389013

The Seasons of Arnold's Apple Tree, Gail Gibbons, Harcourt Children's Books, ISBN-13: 9780152712457

Up, Up, Up! It's Apple Picking Time, Jody Fickes Shapiro, Holiday House Inc., ISBN-0-8234-1610-0



AITC Program Highlights

WebQuests coming soon

New classroom lessons that follow the Virginia Standards of Learning are posted on the updated Web site for Agriculture in the Classroom—www.agintheclass.org.

Information on the site includes program highlights, lesson plans and literacy connections, as well as an updated schedule of teacher workshop opportunities. Coming soon are WebQuests, which are student-centered, inquiry-based lesson plans in which most or all of the information with which students work can be found online.

Regional teacher workshops scheduled

Agriculture in the Classroom will offer two free professional development workshops this winter for K-7 educators.

The first workshop will be held from 10 a.m. to 3 p.m. on Jan. 16, 2009, at Lewis Ginter Botanical Garden in Richmond. To register, call 804-262-9887. Registration deadline is Jan. 5.

The second workshop will run from 9 a.m. to 2 p.m. on Feb. 13 at the Featherstone Professional Center in Midlothian. Register by calling 804-290-1025. Registration deadline is Feb. 2.

Both workshops will feature hands-on activities and resources designed to bring Virginia's Standards of Learning to life. Additionally, each teacher will receive a resource kit with curriculum and activity books, posters, CDs and much more!

Remember, AITC will also come to you. E-mail aitc@vafb.com to schedule a professional development workshop for your school or division.

Enhancing the AITC Literacy Project: Apple Songs

Sing with your students about apples. These songs are engaging and easy to learn. They are a great match to the book *Apples to Oregon!*

Eat an Apple
Eat an apple; (Bring right hand to mouth)
Save the core. (Close right hand in fist)
Plant the seeds. (Bend down touch hand to ground)
And grow some more. (Extend both arms out)

Two Red Apples
Sung to: "This Old Man"
Way up high, in a tree (raise hands over head)
Two red apples smiled at me (smile)
So I shook that tree as har-r-d as I could (Pretend to shake tree)
Down came the apples, Ummm, they were good!!!! (Rub tummy)

A Little Apple Seed
Sung to: "Itsy, Bitsy Spider"
Once a little apple seed was planted in the ground
Down came the raindrops, falling all around.
Out came the big sun, bright as bright could be
And that little apple seed grew to be an apple tree!

The Farmer Plants the Seeds
(tune: Farmer in the Dell)
The farmer plants the seeds,
The farmer plants the seeds, Heigh-o-the-derry-o,
The Farmer plants the seeds. *(Each child stoops down when planted).*

2. The sun begins to shine.
3. The rain begins to fall.
4. The plant begins to grow.
5. The roots begin to grow.
6. The stem begins to grow.

Take a bite out of these multimedia resources from Agclassroom.org

- **Apples**

http://debeck.com/apples.html

This 30-minute video begins with the legend of Johnny Appleseed and then goes on to explore apples in pioneer times with the story of the McIntosh apple. An orchard is visited over the seasons from winter pruning, spring blossoms with bees and pollination, spring planting, summer thinning to fall harvesting. Viewers even get to see apple cells through an electron microscope and learn how to clone an apple tree.

- **Connecting to Agriculture**

This 17-minute video is a great way for students to learn about how agriculture connects to their lives. Animation, fun facts, and farmers tell the story of agriculture and how it relates to economics, science, and business. Interwoven through the commodity stories of corn, cotton, apples, dairy, and soybeans are important concepts such as: biodegradable properties, renewable resources, biotechnology, foreign trade, pest management, conservation practices, and food quality. Order this DVD online from agclassroomstore.com.

- **Have We Engineered the Perfect Apple?**

https://www.youtube.com/watch?time_continue=10&v=2rLigq0jhGY

It took over 30 years to create the perfect apple. Find out how scientists designed the Honeycrisp to be the best.