LESSONS ABOUT FALL FRUITS: APPLES, CRANBERRIES AND PUMPKINS!

Lessons compiled by

The New Jersey Agricultural Society's

LEARNING THROUGH GARDENING

Program

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Table of Contents

APPLE INVESTIGATION

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Fall is the time to investigate apples! In this lesson, students learn that all apples (as well as all types of fruits and vegetables) are not the same. One variety of apple can be very different from another. In this apple investigation, students test different varieties of apples for nine characteristics – including weight, shape, color texture, and taste – and rank them. They graph results of their taste tests, read about the history of apples and how they are grown, and learn the parts of an apple.

GRADES: 3-5

OBJECTIVES

The student will be able to:

- Explain the meaning of a variety of a fruit or vegetable.
- List the parts of an apple and their functions.
- Compare different varieties of apples by nine criteria and rank them according to their preferences.
- Graph the results of a class taste test. Read about the history of apples and the cultivation process.

MATERIALS NEEDED

- Apples of four or five different varieties, including different colors (red, pink, green, yellow), one of each variety for each group of four students.
- Plastic knives for cutting apples
- Apple Testing sheet – one per student
- Apple Facts sheet – one per student
- Parts Of An Apple chart – one per student

ACTIVITY

Ask students in their small groups to brainstorm what they know about apples: their history, how they are grown, where they are grown, etc. Bring the whole class

together and ask the groups to report their apple facts. Ask a student to record the facts.

Cut up an apple to show the students the different parts:

- Calyx: what is left of the apple blossom on the bottom of the apple
- Flesh: the sweet part of the apple that you can eat
- Seeds: can be used to grow new apple trees, but it takes a long time
- Skin: covers and protects the apple's flesh and seeds
- Stem: attaches the apple to the apple tree, bringing water and nutrients to the apple

Next, explain to students that there are many different varieties of apple. There are more than 7,500 varieties or types of apples grown in the world and about 2,500 varieties grown in the United States. In New Jersey, 30 apple varieties are grown. Explain to students that they are going to investigate a few different varieties of apples.

Pass out the apples to each group and the Apple Testing sheets to each student. Explain that students are going to fill in the chart for each variety of apple. After tasting all of the apples, the students should then rate them for taste, with 5 being the best taste and 1 being the worst taste. Explain that students can use any number from 1 to 5 to rate an apple's taste.

Pass out the Parts Of An Apple chart to each student. Ask students in small groups to separate the parts of one apple onto a piece of paper and label them – calyx, flesh, seeds, skin, and stem. Students then describe the function of each part on the Parts Of An Apple chart. Pass out the Apple Facts sheet to each student. Ask students to read the sheet silently or aloud together as a small group. Ask the groups to discuss and list facts that were new and/or interesting to them.

Bring the whole class together. Ask each group to report on their thoughts on the Apple Facts sheet. Then ask the groups to report each student's results of the apple taste test. Tally the results on the board. Then ask each student individually or in their small groups to graph the taste test results.

EVALUATION:

Successful completion of Apple Testing sheet, Parts Of An Apple sheet, and apple taste test results graph. Students write a paragraph summarizing what they consider the most interesting information from the Apple Facts sheet.

EXTENSION:

Read books about the life cycle and the history of apples such as:
An Apple Tree Through The Year, by Claudia Schnieper
Apples, by Phyllis Limbacher Tildes
The Life and Times of the Apple, by Charles Micucci Make applesauce.

Tour a local apple orchard

NEW JERSEY LEARNING STANDARDS

Science: 3:LS1.B 4:LS1.A 5:LS2.A English Language Arts: 3:RI.3.1,2,4; W.3.2.A-D; W.3.4,8 4:RI.4.1,2,4, W.4.2.A-E, W.4.4,8 5:RI.5.1,2,4, W.5.2.A-E; W.5.4,8

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Parts of an Apple

Beside each word, write what this part does for the apple.

- Calyx
- Flesh
- Leaf
- Seeds
- Skin
- Stem

APPLE FACTS

The average American eats about 65 apples a year. There are more than 7,500 varieties or types of apples grown in the world and about 2,500 varieties grown in the United States. In New Jersey, 30 apple varieties are grown.

Apples are the fruit of apple trees. They have green, red, pink, or yellow skin and are used to make apple juice, cider, vinegar, applesauce, and many kinds of salads and desserts.

Apple trees grow in all 50 states, but for efficient fruit production they require a cold period called vernalization. Vernalization takes place during the cold winter months while an apple tree is dormant. Without this cold period, apple trees will not develop flower buds to produce a good crop of apples. The top three apple producing states in the United States are Washington, New York, and Michigan. All three of these states have a significant winter season.

Apple trees are not typically grown from seed because it takes about 15 years for an apple tree to grow from a seed and produce an apple. Instead, most apple trees are grown by budding or grafting onto root stocks – sections of tree roots still attached to a part of the tree trunk.

Budding involves taking one bud from an existing tree branch and attaching it under the bark of a root stock with special grafting tape or glue. Grafting is similar, but rather than a single bud, a section of a stem with multiple leaf buds is attached to the root stock with grafting glue and tape. Grafted or budded trees usually grow in a nursery for about one year before being planted in an orchard.

An apple can be divided into several parts. The skin covers and protects the apple's flesh and seeds. The flesh is the sweet part of the apple. The stem is what attaches the apple to the apple tree, bringing water and nutrients to the apple. The seeds

can be used to grow new apple trees. The calyx at the bottom of an apple is what is left of the apple blossom.

Honeybees are commonly used to pollinate apple trees. Almost all varieties of apples require cross-pollination, meaning that pollen from a different variety is needed to produce fruit.

Apple trees require full sunlight and well-drained soil. Most apples are ready to harvest in the late summer or early fall.

We've all heard the saying, "An apple a day keeps the doctor away." While eating apples does not guarantee good health, apples do have healthy benefits. Apples are naturally free of fat, sodium, and cholesterol, and are an excellent source of fiber and antioxidants. A medium apple contains about 80 calories and is loaded with vitamin C and beta-carotene. Be sure to eat the skin. Most of the fruit's antioxidants, vitamin C, and fiber are located in, or just under, the skin. Did you know?

On average, Americans eat more apples than any other fruit. It takes about 36 apples to create one gallon of apple cider. 25% of an apple's volume is air; that's why they float in water.

CRANBERRY GRAPHING

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

New Jersey is the United States' third largest producer of cranberries. In this lesson, students learn how cranberries are grown and harvested, sample three different cranberry juices, and predict and graph the ones they like best and least.
GRADES: 2-5, can be modified as a whole group activity for younger grades

OBJECTIVES

The student will be able to:

- Write a paragraph detailing some facts about cranberries and how they are grown and harvested.
- Create a graph detailing the class's likes and dislikes of three different cranberry juices, and express the results in fractions, decimals, and percentages depending on grade level ability.
- Younger students can write equations to determine the differences between the three cranberry juices.

MATERIALS NEEDED

- Three different cranberry drink flavors, such as cranberry juice, cranberry apple juice, and cranberry raspberry juice.
- Small paper cups
- Large paper to place cups on to create a graphing
- Permanent markers to mark cups

INTRODUCTION

Share these facts about cranberries with your students:

Cranberries are one of only three native American fruits. The other two are Concord grapes and blueberries. It's still debated whether or not cranberries were actually on the first Thanksgiving menu.

The Native Americans who lived on Cape Cod, where cranberries grew wild, were know to eat pemmican, a dried concoction made with cranberries, dried deer meat, and fat. They introduced pemmican to the early settlers. Cranberries were originally called crane berries because the pink flower of the plant looks like a crane.

New Jersey is the third top producer of cranberries in the United States. The first two are Wisconsin and Massachusetts. Cranberries are also grown in Washington, Oregon, and Canada. They are cultivated in so few places because they need a rare combination of sandy, boggy soil, sunshine in June, heavy spring rains, and a cold winter.

Contrary to popular belief, cranberries are not grown in water. In mid-summer while the berries are growing, the bogs are dry. In winter, the bogs are flooded to prevent wind damage, and at harvest time, most growers flood the bogs to make harvesting easier.

Although the early Cape Cod settlers ate wild cranberries, it wasn't until the late 1800s that cranberries were grown on farms.

Sailors ate cranberries because their high vitamin C content helped prevent a disease called scurvy.

Before 1963 when a sweetened cranberry juice began to be marketed in the United States, 95 percent of the world's entire cranberry crop was sold in this country between Thanksgiving and Christmas.

ACTIVITY

Show the YouTube video: How Does It Grow: Cranberries, www.youtube.com/watch?v=XZPXQ7nw_9Y or go to howgrow.org and click on videos. Discuss the video with the class. What did they learn about cranberries? How are cranberries harvested? What in the video surprised them?

Show students the three different cranberry juices and tell them they will be sampling each one. Have the students predict in secret on a piece of paper which juice they think will be the class favorite, and which juice the class will like the least. Give each student a cup and have them write his/her name on it with a permanent marker. The students then sample the three different juices and then place their empty cup on the graph paper over the name of their favorite flavor. The whole class observes and discusses the results of the finished graph.

Make a second graph of the students' predictions and compare the two graphs. Ask the students to show the results of both the taste test and the predictions in fractions or decimals according to their grade level ability.

EVALUATION:

Student recreates the graph of cups in a bar graph on graph paper, and expresses the results in fractions, decimal, and percentages depending on grade level. Student writes a paragraph or paragraphs about what they learned about cranberries and how they are harvested.

EXTENSION:

Read the book Cranberries Fruit of the Bogs by Diane Burns

NEW JERSEY LEARNING STANDARDS

Math: 2.MD.D 3.NF 3.MD.B 4.MD, 4.NF.C 5.MD.B Science: 2:LS2.A 3:LS1.B 4:LS1.A 5:LS2.A Social Studies: 2: 6.1.2.Geo.GI.1; 6.1.2.EconEM.1,2; 6.1.2.EconNE.1 3-5: 6.1.5.GeoHE.2; 6.1.5.EconEM.1, 2 English Language Arts: 2:W.2.2,4,8 3:W.3.2.A-D, W.3.4,8 4:W.4.2.A-E, W.4.4,8 5: W.5.2.A-E; W.5.4,8

DISAPPEARING PUMPKINS

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

October is the month for pumpkin lessons! Pumpkins can be used for so many classroom activities. Compare them, measure them, graph them, study their life cycle, cut them open and count the seeds. Then carve them into a jolly Jack O'Lantern. But when Halloween is over, don't throw out that pumpkin! Do one more experiment that will last for months. Allow your students to watch how the pumpkin decomposes, one week at a time.

GRADES: PreK-5

OBJECTIVES

Science:

- The student will be able to define decompose and decomposition.
- The student will be able to describe the decomposition process and explain why it happens.

Language Arts: (For older grades)

- The student will be able to keep a weekly journal describing the decomposition of a pumpkin.

MATERIALS NEEDED

MATERIALS:

- One used Jack O' Lantern (or one whole pumpkin)
- Journals or notebooks for students' written and drawn observations.
- Optional: Pumpkin Jack, by Will Hubbell and/or Pumpkin Circle, by George Levenson

PREPARATION

NOTE: If you plan to do the decomposition experiment indoors you will need:

- One sealed, clear container such as a plastic storage container with a top or an aquarium sealed by tape with plastic wrap or aluminum foil
- Soil to line the bottom of the clear container. This soil should be taken from your garden or another place outside. Do not use potting soil.

This experiment can be conducted in two ways. First, the pumpkin can be placed outside in your school garden or another place on school grounds where it won't be disturbed. If you choose this method, you must bring your students outside to observe the pumpkin once each week.

Second, the experiment can be done inside by placing the pumpkin in a clear, sealed container. A clear, plastic storage container big enough to hold the pumpkin works well or you can use an old aquarium sealed tightly at the top with plastic wrap or aluminum foil. The seal is important to prevent the smell of the decomposing pumpkin from invading your classroom.

ACTIVITY

Begin a conversation about decomposition. Tell the students that you walked through a forest in the fall when the ground was filled with fallen leaves. Then say you visited the same forest in the spring and the leaves had mostly disappeared. Ask: what happened to the leaves?

When any living thing dies, fungi and bacteria get to work breaking it down. Put another way, they decompose things. Some decomposers live inside plants or hang out in the guts of dead animals. These fungi and bacteria act like built-in destructors. Soon, more decomposers will join them. Soil contains thousands of types of single-celled fungi and bacteria that take things apart. Mushrooms and other multi-celled fungi also can get into the act. So can insects, worms and pill bugs (roly polies). Rotting can be yucky and disgusting. Still, it is vitally important.

Decomposition aids farmers by putting back into the soil essential nutrients that plants need to grow. The teacher can read and discuss the book Pumpkin Jack by Will Hubbell, and review the life cycle of a pumpkin by reading Pumpkin Circle by George Levenson.

Tell the students they are going to observe what happens to their class pumpkin over time. Set the pumpkin in a place outside where it will not be disturbed or inside a clear container lined with soil taken from outside. Leave a few seeds inside the pumpkin to see what will happen to them. Students observe the pumpkin at the same time each week, and record in their journals what is happening to the pumpkin.

If you are doing the indoor experiment, at least once, the teacher should remove the top of the container so students can experience the smell that accompanies decomposition and describe it in their journals. Continue to observe what happens to the pumpkin until the decomposition process is complete.

EVALUATION:

The student can define decompose and decomposition, describe the decomposition process, and explain why it happens. Completed student journals.

EXTENSION:

Extend your discussion of decomposition by discussing what decomposes and what doesn't. Place some other items, such as an aluminum can, a plastic bottle, and a piece of newspaper, outside with the pumpkin or inside the clear container. Compare what happens to the pumpkin and the other items.

NEW JERSEY LEARNING STANDARDS

Science: PreK:5.1.1-5, 5.3.1.4 K:ESS3.A, C 1:LS2.A 2:LS4.D 3.LS1.B 4:LS1.A 5:LS2.A English Language Arts: PreK: RL.PK.1-3 K:RL.K.1-10 1:RL.1.1-4,6 2:RL.2.1-7 3:RL.3.1-7 4:RL.4.1-7 5:RL.5.1,2,4,5

FIVE SENSES APPLE INVESTIGATION

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Fall is the time to investigate apples! In this lesson, students learn that all apples are not the same. One variety of apple can be very different from another. In this apple investigation, students use their five sense to investigate different varieties of apples. They brainstorm adjectives to describe the apples using each sense. Then younger students write a class poem or older students write their own poem, using their apple adjectives in sentences. They vote on their favorite apple and create a graph of the class preferences.

GRADES: K-2

OBJECTIVES

The student will be able to:
• Use their five senses to investigate different varieties of apples and suggest adjectives to describe them.
• Assist in writing a class poem or write an individual poem about apples using adjectives they selected from the apple investigation.

MATERIALS NEEDED

- The Apple Orchard Riddle by Margaret McNamara,
- How Do Apples Grow? by Betsy Maestro, or other book about apples.
- For Five Senses Apple Investigation: Red, yellow, and green apples, one for each group of four students
- Cutting board
- Knife
- Chart paper and marker
- 5 Senses Chart, 1 per student (optional for older grades)
- One-inch squares of red, yellow, and green construction paper or red, yellow, and green interlocking cubes

ACTIVITY

Before beginning the lesson, write a chart with five columns for each of the five senses on the board or on chart paper. Read the book The Apple Orchard Riddle, by Margaret McNamara, How Do Apples Grow? by Betsy Maestro or another book about apples. (See list under extensions.)

Discuss the following questions with the students: Where do apples grow? What colors can apples be? What are apples used for? Tell students they will be learning more about apples and their senses. Before beginning the Five Senses activity, students should wash their hands. Ask students to identify their five senses—sight, smell, feel, hear, taste. Explain that they will be using their five senses to observe apples. (Optional, if students are writing individual apple poems, give each student a Five Senses Chart.)

Show students the three different types of apples and name them. Ask them to describe what they see. Write their descriptive words on chart paper or the board under the "See" column. Explain that descriptive words are called adjectives. (Optional: If students are writing individual apple poem books, they should each choose at least two adjectives to write on their own 5 Senses Chart. At the end of the activity, they will use the adjectives on their chart to write a poem about apples.)

Cut each apple into slices. Give a green, red, and yellow slice to each student. Ask them to smell the apples and describe what they smell. Write their adjectives on the class chart under the "Smell" column (and on their own 5 Senses Chart if you are using them.) Ask the students to feel the apple slices and describe what they feel. Write their adjectives on the class chart under the "Feel" column (and on their own 5 Senses Chart if you are using them.) Ask the students to take a bite out of one apple slice and describe what they hear. Write their adjectives on the class chart under the "Hear" column and on their own 5 Senses Chart if you are using them.) Ask the students to taste each slice of apple and describe what they taste. Write their adjectives on the class chart under the "Taste" column (and on their own 5 Senses Chart if you are using them.)

Ask the students to vote on whether they like red, green, or yellow apples best by choosing a red, yellow, or green one-inch paper square or interlocking cube. Use the one-inch squares on chart paper, or stack the cubes together by color, to create a bar graph to show the preferences of the whole class.

If you are working with very young students, work together with the whole class to create a class poem about apples. Or if you are working with older students, have the students write individual books. To create the poem as a class, ask students for suggestions to write a sentence for each of the five senses about the apples they were able to see, smell, feel, hear, and taste, selecting adjectives from the class five sense chart. If students are working individually, each student should choose adjectives from their own 5 Senses Chart to create a sentence describing apples with each of the five senses.

To create a class or individual apple poem book, glue the Apple Book cover template onto a piece of red, yellow, or green construction paper. Write a sentence describing the apples by each sense using the five lined pages. Use a second piece of construction paper for the back. Secure the book using a hole punch and ribbon.

Review these apple facts with the class: Apples are a fruit that can be eaten fresh or after being made into applesauce, apple cider, or apple juice. Apples grow on trees. An area where apple trees grow is called an orchard. There are different types or varieties of apples. The five senses are sight, smell, hearing, touch, and taste.

EVALUATION:

Students read the class book together or each student reads his/her own apple book to the class.

EXTENSION:

Read some other apple books such as:
The Apple Pie Tree, Zoe Hall
Apples, Gail Gibbons
Up, Up, Up, It's Apple Picking Time, Jody Fickes Shapiro
How To Make An Apple Pie And See The World, by Marjorie Priceman
Make applesauce.
Tour a local apple orchard.

NEW JERSEY LEARNING STANDARDS

Science: K.LS1.C 1.LS1.A 2.LS2.A English Language Arts: K:W.K.2,3 1:W.1.2,7 2:W.2.2,4,8

PUMPKIN BOOKS

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

There is an abundance of wonderful children's literature about pumpkins, both fiction and nonfiction, enough to allow you to read a different book each day of your pumpkin unit. Some of these include:

How Many Seeds in a Pumpkin? by Margaret McNamara

Here is an adorable picture book for curious kids, which explores skip counting and estimation in a fun pumpkin-themed classroom experiment. "How many seeds are in a pumpkin?" Mr. Tiffin asks his class. The children all have different guesses, but the answer surprises them all.

From Seed to Pumpkin, by Wendy Pfeffer

With clear text and detailed, colorful illustrations, this book explains what a pumpkin seed needs to help it grow. This book also includes delicious pumpkin recipes and easy experiments to do with pumpkin seeds.

The Runaway Pumpkin, by Kevin Lewis

A bumpin' thumpin' rhyming picture book about the delicious fate of a gigantic pumpkin on the run.

Big Pumpkin, by Erica Silverman

The witch has grown the biggest pumpkin ever, and now she wants to make herself a pumpkin pie for Halloween. But the pumpkin is so big she can't get it off the vine.

Pumpkin Circle: The Story of a Garden, by George Levenson

We can be sure of this: It's a circle without end. We go from pumpkin seeds to pumpkins to pumpkin seeds again. An author's note explains how to grow your own pumpkin.

Pumpkin Jack, by Will Hubbell

The first pumpkin Tim ever carved was fierce and funny, and he named it Jack. When Halloween was over and the pumpkin was beginning to rot, Tim set it out in the garden and throughout the weeks he watched it change.

It's Pumpkin Day, Mouse, by Laura Numeroff.

Join Mouse from If You Give a Mouse a Cookie as he decorates all the pumpkins in the patch! Too Many Pumpkins, by Linda White. With countless unwelcome pumpkins to deal with, Rebecca Estelle turns disaster into a celebration.

Pumpkin Soup, by Helen Cooper

Three friends make their pumpkin soup the same way every day. The Cat slices up the pumpkin, the Squirrel stirs in the water, and the Duck tips in just enough salt. But one day the Duck wants to stir instead, and then there is a horrible squabble.

Pumpkin Pumpkin, by Jeanne Titherington

Jamie plants a pumpkin seed in the spring, and after watching it grow all summer, carves a face in it for Halloween! But best of all, he saves some seeds that he will plant again next spring.

The Biggest Pumpkin Ever, by Steven Kroll.

Two mice, Desmond and Clayton, must work together to win the Biggest Pumpkin competition.

The Pumpkin Book, by Gail Gibbons.

How they grow, their traditional uses.

NEW JERSEY LEARNING STANDARDS

English Language Arts: PreK: RL.PK.1, 2, 4, 7 K:RL.K.1-10 1:RL.1.1-4,6 2:RL.2.1-7

PUMPKIN CIRCLE

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

The fabulous photographs in George Levenson's book Pumpkin Circle are the basis for this lesson on the life cycle of a plant.

GRADES PreK-2

OBJECTIVES

The student will be able to:

- Demonstrate the life cycle of a pumpkin from seed to leaf to blossom to green pumpkin to orange pumpkin.
- Describe the life cycle as a circle that happens again and again.

MATERIALS NEEDED

- The book Pumpkin Circle by George Levenson
- Green yarn
- Pumpkin life cycle patterns (seed, leaf, blossom, small pumpkin, large pumpkin)

ACTIVITY

Read the book Pumpkin Circle. Discuss the life cycle of a pumpkin and why it is a circle. Give each child a seed, leaf, blossom, small pumpkin and large pumpkin pattern to cut out and color.

Discuss what color each piece should be. Each child arranges the pieces in the proper order of the pumpkin life cycle. Staple the pieces in order on a long piece of green yarn.

EVALUATION:

The student can correctly arrange the pieces symbolizing the parts of the pumpkin life cycle. The student can explain why the book is called pumpkin "circle."

EXTENSION:

Have students research other plant tropisms, such as gravitropism or hydrotropism.

NEW JERSEY LEARNING STANDARDS

Science: PreK: 5.1.1-5, 5.3.1-4 K.LS1.C 1.LS1.A 2.LS2.A English Language Arts: PreK:RI.PK.1-3 K:RI.K.1-4,6 1:RI.1.1-4,6 2:RI.2.1-7 3:RI.3.1

PUMPKIN CIRCLE: THE STORY OF A GARDEN

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Students read an informational text about the life cycle of the pumpkin and construct a model of it.
Grades: 3-5

OBJECTIVES

• Students will

- build a model of the life cycle of a pumpkin
- Describe the function of each part of a pumpkin's life cycle

MATERIALS NEEDED

- Book, Pumpkin Circle: The Story of a Garden by George Levenson
- Paper plates, 2 per student
- Pattern for seed, leaf, blossom, small pumpkin and large pumpkin
- Construction paper: brown(seed), dark green(leaf), yellow(blossom) , light green(small pumpkin), and orange(large pumpkin)
- Brown or green yarn, 5 pieces 6-8 inches long per student
- Tape
- Scissors
- stapler

ACTIVITY

Read the story Pumpkin Circle, focusing on the various things that happen as a pumpkin seed grows into a pumpkin. Discuss the function of each plant part.

Making the pumpkin model:

1. Have students trace and cut out patterns on construction paper.
2. Tape a piece of yarn to the inside(eating side) and hang over edge towar the plate back. Place this plate face to face with another plant and staple them together at their edges. Leave about ⅓ of the diameter unstapled.

3. Decorate the plate to resemble a pumpkin or a jack-o-lantern.
4. Staple and tape each shape in order with yarn between each piece.
5. When assembled, stack in shapes neatly and place in the opening of the paper plate pumpkin.

EVALUATION:

Starting with seed shape, student can slowly pull out each shape telling how the pumpkin grows. Teacher will be able to see if the student got the order correct.

EXTENSION:

Students can bring old pumpkins to school to begin a compost pile. As the pumpkins rot through the winter, they enrich the soil and if saved seeds are planted, the life can begin again in the spring.

NEW JERSEY LEARNING STANDARDS:

Science K-3 LS1.A,B

PUMPKIN MATH AFTER A TRIP TO THE PATCH

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Pumpkins are definitely not just for Halloween. These vibrant-colored squash that are a symbol of autumn can be used in a wide array of pumpkin-related curriculum with links to math, science, language arts, and social studies. Take advantage of the ubiquitous fall vegetable and bring it into your classroom for a multitude of activities.

GRADES: PreK-2

PREPARATION

If you are able to visit a pumpkin patch with your class and every child brings back a pumpkin, don't send them home immediately. There are many mathematical activities you can do with the pumpkins. Write each child's name in marker on the bottom of his or her pumpkin so that there are no disputes over whose pumpkin is whose. Or if you cannot visit a pumpkin patch, see if a local nursery or farm market will donate a few pumpkins to you – three or four will do – so you can do these activities with your class.

ACTIVITIES

1) **Which Weighs More**

For this activity you'll need a scale to weigh the pumpkins. Prepare a class graph that can be used to record the information gathered during this lesson, and some cards reading 1 pound, 2 pounds, 3 pounds, and so on, going as high as necessary for your particular collection of pumpkins. Spread these cards on the floor during the weighing. Arrange the pumpkins by size order in a straight line. When they are all arranged, ask the children, “Which pumpkin do you think weighs more, the first pumpkin or the last pumpkin?”

Note: The height of pumpkins does not necessarily correlate with weight. Some children may assume that the biggest pumpkin will weigh the most. Cutting open some pumpkins to examine the differences INSIDE will help the children account for this apparent paradox, but only do this if you have extra pumpkins. Each child will want to take home a complete pumpkin. Tell the children to make an estimate of which pumpkin would weigh more, then weigh the two pumpkins. After weighing a few of the pumpkins, when the children have an idea of what a one-,

two-, or three-pound pumpkin feels and looks like, have them one at a time, pick up their own pumpkins, make a guess/estimate of its weight, and then actually weigh it.

Read the scale with each child and then direct him or her to put the pumpkin behind the correct weight card on the floor. Continue this process until all children have placed their pumpkins on the floor graph showing the weight of their pumpkins. When the floor graph is complete, ask the children questions about it, such as: Do we have more pumpkins that weigh 1 pound or 2 pounds? How many pumpkins weigh 3 pounds? Are there any pumpkins that weigh 4 pounds? Be creative when asking these questions.

Encourage the children to ask their own questions about the data on the graph. Children can record the information from the pumpkin floor graph to make individual graphs to take home and share with parents.

2) **The Great Pumpkin Line-Up**:

This activity reinforces the concept of shortest to tallest. Before the children begin this activity you will need to create a line on the rug with chalk or masking tape. Have the children bring their pumpkins to a group meeting. Explain to the children that they will be placing their pumpkins on the line according to height. If you are working with children who are in kindergarten or first grade you may want to use some children to visually explain what you are asking.

Start by having one child place the pumpkin on the line, and then ask the next child to bring up her pumpkin and measure to see if it is shorter or taller. Continue this process until all the children have had an opportunity to place their pumpkins in the correct position on the line. You could count the pumpkins using ordinal numbers to reinforce the use of these numbers.

3) **Attribute and Comparison Graphs**:

Ask the students to sit on the rug in a circle and place all the pumpkins in the center of the group. During this activity you'll be trying to elicit as many different categories or attributes for the pumpkins as possible. These should be recorded on chart paper or in any spot where they can easily be seen.

Start the discussion by encouraging the children to compare the likenesses and differences of the pumpkins such as size, shape, type of stem, texture, color, and weight. Over a period of days, select a different attribute each day to graph using picture graphs, bar graphs, or even post-it notes.

4) **How Big Around is My Pumpkin?**

This activity engages the children in estimating the circumference of their pumpkins. It is easiest to explain the circumference as the distance around the fullest part of a pumpkin, like putting a belt around the pumpkin.

Prepare a graph for use with this activity with columns labeled “too long,” “too short,” and “just right.” For each student you will need a small square or sticker to put up in the correct category. Or use a standard pocket chart with name cards or pumpkin cut-outs for recording the graph.

Provide pairs of students with lengths of string and scissors. Each child guesses how much string it will take to go around the circumference of the pumpkin and then cuts the string to that length. Then they “try on” their string around the pumpkin's middle to see how close their estimate comes. Each student has a turn to record the outcome of his estimate on the class

graph. A good follow-up for class or home is to challenge the students to find five things that are as long as their pumpkin was around.

5) **Additional Experience with Estimation and Graphing:**

Children will enjoy estimating and graphing the number of vertical lines on a large pumpkin or the number of seeds within. Children can write their guesses on a small post-it, and arrange them on a graph in categories such as: 0-5 lines, 6-10 lines, etc. or 25-50 seeds, 51-100 seeds, etc. Allow plenty of time for questions: Which number category was chosen most? Least? Were there any number categories not chosen at all? How many more/fewer children chose 0-5 lines than 6-10 lines?

6) **Story Problems**:

Challenge your young mathematicians by presenting them with some pumpkin facts to incorporate into original word problems they can write together in cooperative groups. Some suggested facts: a) Pumpkins grow on vines that sometimes reach 100 feet long. b) Pumpkins are planted in little hills, with three seeds to a hill. c) Seed hills are 6 to 8 feet apart. d) Each vine produces 2 to 3 pumpkins. e) Most pumpkins weigh 10 to 40 pounds each and measure 1 to 2 feet in diameter.

7) **Rolling Pumpkins**:

Find a piece of wood or plexiglass big enough for two pumpkins to roll down. Perhaps the custodian at your school can help with this. (Or use a small hill outside if your schoolyard has one.) Place one end of the piece of wood on a box to make a slant. Show the students two pumpkins and tell them you are going to roll two pumpkins down the ramp at the same time. Ask students to predict which pumpkin will roll the fastest and farthest. Set two pumpkins at the top of the ramp with two students holding them. Count to three so both children release their pumpkins at the same time. Observe which pumpkin rolls fastest and farthest. Ask students why they think this happened. Measure the distances each pumpkin rolled. If students have individual pumpkins picked at a pumpkin patch, you can have a class race to determine which pumpkin can roll the farthest.

NEW JERSEY LEARNING STANDARDS

Math: PreK: 4.1, 3, 4 K.CC.C, K.MD 1.MD.A,C, 1.G.1 2.MD.A.B.D

PUMPKIN MATH FOR BIGGER KIDS

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

GRADES: 3-5

OBJECTIVES

The student will be able to:

• Estimate the number of seeds in a pumpkin based on the estimated seeds per section.

MATERIALS NEEDED

- One medium-sized or large pumpkin, preferably purchased from a farm market so that you can save the seeds to plant in the spring. (Pumpkins shipped in from elsewhere may be hybrids that won't grow well.)

ACTIVITY

Have each student guess how many seeds could be in a pumpkin. Tell them that pumpkins can have between 100 and 700 seeds. Next, divide the students into small groups of at least three. Ask the group to come up with an estimate for the number of seeds. A rough estimate for the number of seeds in a pumpkin is 16 seeds per fruited section. (A section is between two seams of the pumpkin.)

Ask the students to figure out a way to find an estimate, not an exact count, of 16 multiplied by the fruited sections. Bringing the whole class together again, ask the groups to report their estimates. Ask the class to find the median estimate and the mean estimate. Now cut the pumpkin open and have each small group scoop out a handful of seeds until all the seeds are taken. Ask the groups to count the seeds. Next as a whole class, add up the total number of seeds. Ask the class if the estimate of 16 per fruited section worked or not. Ask each student to find the difference between his original guess for the number of seeds and the actual number. Ask each small group to find the difference between their estimate and the actual number. Who had the closest guess? Which group had the closest estimate?

EVALUATION:

The student can estimate the number of seeds in the pumpkin and can find the difference between her original guess and the actual number of seeds.

NEW JERSEY LEARNING STANDARDS

Math: 3.OA, 3.NF, 3.MD 4.OA.AB, 4.NF 5.NF

PUMPKIN MEASUREMENT

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Students observe pumpkins, then predict the weight, circumference, width, height and number of seeds. Students measure and calculate the weight, circumference, width, height and number of seeds in their pumpkin.
Grade Level: 3-5

OBJECTIVES

Student will:

- Conduct a scientific investigation
- Collect and analyze data

MATERIALS NEEDED

- Pumpkins (1 per group)
- Sugar (5 lb bag) or any 5-pound weight
- Measuring tape
- String
- Scale
- Rulers
- Knife
- Garbage bags
- 10 cups per group
- Orange paper (12 by 18)
- Markers/crayons

ACTIVITY

Divide students into groups(3-4) and give each group a pumpkin. Have students record their observations.

Have students lift a 5 lb. bag of sugar and then predict and record the weight of their pumpkin. Define and illustrate circumference. Have students predict and record the circumference of their pumpkin. Have students predict and record the width of and height of their pumpkin. Ask students what is inside a pumpkin. Have students predict and record how many seeds are inside their pumpkin.

Demonstrate how to measure the circumference, width and height of their pumpkin and then allow the students to measure and weigh their pumpkins. This can be set up in stations and groups can rotate through.

Cut pumpkins open for students. Have them take out the seeds and count them. (Do this outside, weather permitting) Students should use the 10 cups to count out ten seeds in one cup. When all cups have 10 seeds, record 100 (10 groups of 10 seeds)seeds and empty cups into a plastic zipper bag. Continue until all seeds have been counted.

EVALUATION:

1. Give groups a large piece of orange paper. Students should draw the outline of their pumpkin, then share all the information they gathered about their pumpkin.
2. Display each group's pumpkin information, and ask students questions based on their information, i.e. Which pumpkin was the heaviest? Shortest? Etc.
3. Ask students questions to see if there was any relationship between the size of the pumpkins and number of seeds or weight.

NEW JERSEY LEARNING STANDARDS

Math: 3.OA, 3.NF, 3.MD 4.OA.AB, 4.NF 5.NF

Pumpkin Measurement

	Prediction	**Actual**
Weight in pounds (lb.)		
Circumference in inches (in.)		
Width in inches (in.)		
Height in inches (in.)		

Number of Seeds:

PUMPKIN SCIENCE IDEAS

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

1) Science Journals: The presence of a collection of pumpkins in your classroom provides numerous opportunities to increase observational skills and promote some important scientific concepts. During your visit to the pumpkin patch, have each child select his or her own pumpkin – one that has personality from the child's perspective, but one that he or she can carry around without too much trouble. If a trip isn't possible this year, try to have each child bring a pumpkin to class or solicit donations from a local merchant or farmer. If each child is not able to have his or her own pumpkin, a few pumpkins – three or four – can be used for class observation and activities. Have the children scrutinize their own pumpkins carefully and then write as many descriptive sentences about the pumpkin as they can in their science journals. You might want to model some simple descriptive sentences for very young writers to use as a guide. Once their journals reflect thorough observations of their own specimen, allow for some switching with classmates to note likenesses and differences.

2) The Great Pumpkin Race: After a few sessions of pumpkin journal writing, your students will be captivated by “The Great Pumpkin Race,” an experiment to see which pumpkin will decompose faster: one in a cool, dark spot or one in a warm, bright area. Use extra pumpkins for this experiment and not the students' personal pumpkins. Discuss predictions with the class, then give students a chance to record their observations of the pumpkins and to write their predictions in their journals. They can then use their journals regularly to record their observations of the pumpkins as they check them on a weekly basis for changes. Keep each decomposing pumpkin in an aquarium or other large glass container, tightly sealed with plastic wrap and duct tape. The eliminates the odor, allowing you to keep the pumpkins quite a long time, while permitting the children full view of the changes. Or you can keep your decomposing pumpkin outdoors and visit it once a week.

NEW JERSEY LEARNING STANDARDS

Science: PreK: 5.1.1-5, 5.3.1-4 K.LS1.C 1.LS1.A 2.LS2.A

PUMPKIN STAND STEM DESIGN CHALLENGE

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Students will work in small groups to design a stand to hold a pumpkin, and then will try their stands to see if they work.
GRADES: K-5

OBJECTIVES

The student will be able to:
• Design a stand for a pumpkin based on criteria provided.
• Compare multiple stand designs and with a group design a stand based on criteria provided.
• Build the stand with a group based on the design selected.
• Evaluate the group's stand based on the criteria provided.

MATERIALS NEEDED

- Paper
- Straws
- K-2: Pumpkin Stand Design Challenge, How Did We Do? sheet for each student
- Tape
- Glue
- 3-5 Pumpkin Stand Design Challenge Rubric sheet for each student
- Craft sticks
- One small pumpkin or one for each group

ACTIVITY

Divide the students into groups of four. For K-2 students, write the criteria on the board or on a large paper. For 3-5 students, distribute the design challenge rubric sheets. Explain and review the criteria with the class and answer questions. Explain and review the challenge rules. Explain and review the time schedule. Tell students that you will be observing their progress and reminding them to stick to the challenge criteria, rules, and time requirements.
Display the pumpkin at the front of the room. If available, every group can have its own pumpkin. Students may look at the pumpkin but may not touch it or hold it to test the weight.

CRITERIA:

- Your pumpkin stand must be at least 6 inches tall
- Your pumpkin stand must stand freely
- Your pumpkin stand must hold the weight of one pumpkin

CHALLENGE RULES:

- Listen carefully to ideas from everyone on your team.
- Decide on the best design before you begin to build.
- You may only use the materials provided.
- You do not have to use all the materials provided.
- You must build your pumpkin stand in the time provided.
- You may use additional tools such as scissors and rulers.

TIME SCHEDULE: Teacher will set a timer and notify students when to move on to the next step.

- 5 minutes for each student to sketch his/her own design.
- 5 minutes to brainstorm ideas as a group.
- 10 minutes to plan out the design.
- 20 minutes to create the product (the pumpkin stand).
- 10 minutes to reflect. How can we improve the design? What worked well? What did not work well?

NEW JERSEY LEARNING STANDARDS

Science: K-2: ETS1.A,B,C 3-5: ETS1.A,B,C

Lesson created by Elaine Makarevich
Stillwater Township School

NAME_____

PUMPKIN STAND DESIGN CHALLENGE RUBRIC 3-5

Imagine that you want to display a pumpkin for everyone to look at. Today your challenge is to design and build a stand that can hold a pumpkin.

You will have only 40 minutes to do this project. When all groups have completed their pumpkin stands, we will tests the stands to see if they work.

CRITERIA:

- Your pumpkin stand must be at least 6 inches tall.
- Your pumpkin stand must stand freely.
- Your pumpkin stand must hold the weight of one pumpkin.

CHALLENGE RULES:

- Listen carefully to ideas from everyone on your team.
- Decide on the best design before you begin to build.
- You may only use the materials provided.
- You must build your pumpkin stand in the time provided.
- You may use additional tools such as scissors and rulers.

RUBRIC

To evaluate your pumpkin stand, circle how you met each specification below.

CRITERIA	3	2	1
Height is 6 in. or more	Yes!	Almost	no
Stands freely	Yes!	barely	no
Holds the pumpkin	Yes!	unsteady	no
Original and creative	Impressive	unique	Interesting
Used materials on list only	Yes!	some	other

NAME_____

PUMPKIN STAND DESIGN CHALLENGE K-2

How Did We Do?

Our pumpkin stand is at least 6 inches tall.

YES NO

Our pumpkin stand stands freely.

YES NO

Our pumpkin stand holds the weight of one pumpkin.

YES NO

We only used the materials on the table.

YES NO

We worked together and listened to each other.

YES NO

We are proud of our pumpkin stand design.

YES We can do better next time

PUMPKIN VINE THROUGH TIME

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

GRADES: 1-3

OBJECTIVES

The student will be able to:
• follow directions to create a pumpkin across time
• explain the life cycle of a pumpkin

MATERIALS NEEDED

- One 12*18 piece of white construction paper
- Two 12*9 pieces of orange construction paper
- Stamp paint : brown, green for soil and vine
- Pumpkin seed
- Yellow tissue paper
- Stamps for pumpkin, green and orange paint

BACKGROUND:

Pumpkins are a fruit harvested from vines in the fall. They have been cultivated in North and South America for at least 9,000 years. Other members of the pumpkin family include: gourds, squash, cucumbers, and melons.

Pumpkins were a staple in the diet of Native Americans. They are a very nutritious and can be stored for a long period of time. They are not as important to our lives as they used to be, but we still use pumpkins for breads, muffins, pie and stews.

Pumpkins can grow in most of North America and anywhere else there is a growing season of at least 90 days without frost. It takes a pumpkin about 120 days to reach full size. For some pumpkins that can mean up to 800 pounds or only two inches high.

ACTIVITY

Make a copy of these directions….
Make your Own….Pumpkin Vine Through Time

1. Fold white paper in half.
2. Bring one half to meet the fold.
3. Turn the paper over. Fold the other half the same way.
4. Glue orange paper covers to the front and back of your book.
5. Cut corners to make pumpkin shaped book.
6. Glue on brown stem/
7. Decorate pages following these directions:

. Page One:

- Stamp soil with brown paint.
- Glue pumpkin seed in soil.
- Begin vine growing out of the seed and across all four pages.
- Add leaves to the vine

a. Page Two:

- Glue three yellow tissue paper blossoms onto this page
- Add vine leaves.

b. Page three:

- Stamp a baby green pumpkin on this page
- Add more leaves to the vine,

c. Page four:

- Stamp a large orange pumpkin to his page.
- Add more leaves to the vine.

d. Back cover

- Stamp or draw eyes, nose, mouth on your pumpkin.

e. Front cover

- Add a title and your name. You can write a story about what happens in your book.
-

OPTIONAL:

Here are sentences that can be used to caption pictures…
A pumpkin seed is planted in the ground.
A vine begins to grow.
Next yellow blossoms form.
Lake small green pumpkins appear.
Finally, there is a large orange pumpkin.

NEW JERSEY LEARNING STANDARDS:

Science K-3 LS1.A,B

WHY DO CRANBERRIES FLOAT?

A lesson from the New Jersey Agricultural Society Learning Through Gardening program

OVERVIEW & PURPOSE

Your students probably don't ever wonder whether the fruits or vegetables they eat can float or not, but for one fruit – cranberries – this characteristic is important to how they are harvested. In this fun floating lesson, students practice making hypotheses and learn how to theorize why their hypotheses were correct or not. And students learn how one of New Jersey's biggest crops – cranberries – are harvested when they float.

GRADES: PreK-2

OBJECTIVES

The student will be able to:
• Make a hypothesis on whether a fruit or vegetable will float
• Develop theories for why their hypotheses were correct or incorrect.
• Explain why cranberries float.
• Explain how most cranberries are harvested.

MATERIALS NEEDED

- Variety of fruits and vegetables of varying sizes and weights, for example: a potato, a carrot, a pumpkin, an apple, an orange, grapes, peas, and especially cranberries.
- A water table or large container filled with water

PREPARATION

Create a chart listing all the fruits and vegetables and two columns: Floats and Sinks.

ACTIVITY

Students will conduct a floating and sinking experiment. Before a child places a fruit or vegetable in the water, ask the students whether it will float or sink and take a vote. Record the votes on the chart. For example: Carrot: sinks = 5 votes, floats = 16 votes. A child tests the item and the vote that is correct is circled.

After all the items have been tested, look at the predictions. How many times did the students predict correctly? Discuss what factors children considered in making their prediction. List them. Why were the predictions wrong on certain items? What factors fooled them? Ask the class why they think the cranberries floated when the _____ did not.

Cut open a cranberry and show the students the air pockets inside. Compare the cranberry to other floating things students know that are filled with air (tubes, rafts, etc.) Explain that many cranberries are grown in New Jersey. In fact, New Jersey is number three in the country for cranberry production. Tell students that cranberries grow in wet, spongy areas called bogs. When cranberries are harvested, the bogs are flooded, a machine is driven through the bogs to shake the berries off the plants, and the cranberries all float to the top. The cranberries are then gathered and sucked into a truck. Show the YouTube video How Does It Grow: Cranberries: (59) CRANBERRY | How Does It Grow? - YouTube

Discuss the video with the class. What did they learn about cranberries? How are cranberries harvested? What in the video surprised them?

EVALUATION:

Students can explain verbally why he/she made a particular hypothesis. Students can develop a theory as to why that hypothesis was correct or incorrect. Students can explain that cranberries float because of the air pockets inside them. Students can explain that cranberries bogs are flooded at harvest time so that the cranberries will float to the surface.

EXTENSION:

- Take your floating and sinking experiment further. Make hypotheses with the class about which items sink or float and devise ways of proving or refuting the hypothesis. Examples: Large items sink. Test all large items. Is the hypothesis true? Red items float. Test all red items Is the hypothesis true? Small items float. Test. Items that sink will float if you cut them into small pieces. Test Is weight the factor? Weigh the items and record the weights. Test the heavy-items-sink hypothesis. A bag of cranberries weighs more than one cranberry. Does a bag of cranberries float? How about six oranges in a bag? Figure ways items that sink can be made to float. How can you sink the floaters? Objects like egg and milk cartons, rocks, blocks, string, and tape can be introduced to make this possible.

- Read the book Cranberries, Fruit of the Bogs, by Diane Burns
- Locate on the map other places where cranberries are grown. (Massachusetts, Wisconsin, Oregon, Washington, and British Columbia.) Use cranberries as counters for math problems.
- Estimate the number of cranberries needed to fill various containers.

NEW JERSEY LEARNING STANDARDS

Science: PreK:5.1.1-4 K:LS1.C, ESS3.A, ETS1.A 1: LS1.A, ETS1.A 2:LS2.A, ETS1.A