Lesson Title: **Measure of presence of sweetness**

Grade: **5th**

Objectives: **Understand physical and chemical change**

Standards: Science

5.1.2 Nature of Science

Materials/preparation: refractometer, apples, & Brix scale

Sequence of activities/procedures:

1. Explain, that an apple that is good has sugar in it. Why don't you eat unripe apples?
2. Experiment with different varieties of apples and different degrees of ripeness.

Assessment/Closure: Students will be able to measure in a quantitative manner of sweetness in different types of apples. The apple that is the sweetest will have a higher brix level than a tart apple.

Considerations: An indicator of whether it is an acid or base.

Lesson Title:

Grade: 4th

Objectives:

Students will identify natural insect predators to the apple trees.

Standards:

4.3.4 Describe a way that a given plant or animal might adapt to a change arising from a human or non-human impact on its environment.

Materials/preparation:

-Fly strips

-Sticky Balls

-Duct tape

-Rubber cement

-Peanut Butter

-Honey

-Styrofoam Balls (6)

Sequence of activities/procedures:

Lesson 1: Inquiry unit

Investigate insects on the tree. Investigate the stickiness of various substances that can be used to collect insects from the tree.

What differences in bugs do we see with the various sticky surfaces?

Lesson 2: Creation of design

Students will construct and prepare materials used in the investigation.

Lesson 3: Design a Calendar

Students will develop a schedule of when observations will be made.

Lesson 4: Collect data and analyze results.

Students will collect the insect collections and report the findings on a chart. Students will then compare to see if there are any differences in numbers of bugs collected and compare the types of bugs collected on the different sticky surfaces.

Assessment/Closure:

Students will present the conclusions based on their group's data.

Considerations:

Lesson Title: Plant Features & Their Functions

Grade: 3

Objectives:

Standard 3: Life Science

Core Standard: Observe, describe and ask questions about plant growth and development.

3.3.1 Identify the common structures of a plant including its roots, stems, leaves, flowers, fruits and seeds. Describe their functions.

Materials/preparation:

Paper, markers, colored pencils, textbook, MSB Video, pre-labeled numbers, Mini-lesson visual

Sequence of activities/procedures:

1. Front-load with plant foldable to teach parts of the plant.
2. Use science book to explain functions.
3. Magic School Bus video about plants.
4. Teachers pre-label trees outside with numbers.
5. Take students outside to identify tree parts via the pre-labeled numbers. Give mini-lesson outside.

Assessment/Closure:

1. Take students outside to identify tree parts & their functions.

Considerations:

Lesson Title: Survival of the Fittest

Grade: 3

Objectives:

Standard 2: Earth Science
Core Standard: Observe and describe how natural materials meet the needs of plants and animals (including humans).

3.2.5 Describe natural materials and give examples of how they sustain the lives of plants and animals. Organic-anything that has ever lived or is living

Inorganic-everything left after burning

Materials/preparation:

Soil samples, scale, ceramic bowl over a fire, periodic table

Sequence of activities/procedures:

What does a plant need in order to survive? Soil

What is in soil?

Is soil living or nonliving? Living, because organic matter is living. Let's prove it!

Take a soil sample.

Weigh it

Burn it

Weigh it (pot ash) Now you can see what is left, the inorganic material. The organic burned up. Vitamins and Minerals.

Assessment/Closure:

Journal

Lesson Title: Let's Start Growing

Grade: 4th

Objectives:

-Students will understand the growing requirements of a tree.

-Students will begin to grow a tree from a seed.

Standards:

4.2.5 Describe methods that humans currently use to extend the use of natural resources.

4.3.3 Design investigations to explore how organisms meet some of their needs by responding to stimuli from their environments.

MA.4.M.2 Know relative sizes of measurement units within one system of units. (cm)

Materials/preparation:

Tree Seeds	Science Journals	Pencils	Rulers
2 liter bottles	Masking Tape	Markers	Paper Cup
Potting Soil	Large butter dish		

Sequence of activities/procedures:

Learning activity:

Pass out materials to create the growing box. Students will plant their seeds.

Learning activity 2-10 (Weekly):

Set up observation and process sheet. Students will record water given, and observations of plant growth. Students will begin measuring to the nearest centimeter.

Assessment/Closure:

Drawing conclusions on the growth charts created by students.

Considerations:

A longer process involving observations and constant collection of measurements.

Lesson Title: Measuring branch angles

Grade: 4th

Objectives:

-Students will identify the angle of various tree branches and the effect of apple production.

Standards:

MA.4.DA.1 Formulate questions that can be addressed with data. Use observations, surveys, and experiments to collect, represent, and interpret data.

MA.4.M.6 Measure angles in whole number degrees using appropriate tools.

Materials/preparation:

Tool to measure angles of branches. (Larger)

Observation sheet

Sequence of activities/procedures:

Lesson 1:

Measuring angles of branches to determine the baseline measurements for tree growth.

Lesson 2: Develop an understanding of the observations.

-Students will relate information between angle of the tree branch and production of apples. Students continue this process over multiple observation lesson. (April 2016-May 2016)

Assessment/Closure:

Drawing conclusions on the growth charts created by students.

Students will determine if there is a correlation between the angle of the branch from the trunk and the number of apples produced on the limb.

Considerations:

A short amount of time is available to notice the difference in growth and angles of the branch.

Lesson Title: Buoyancy Bobbing

Grade: 3

Objectives:

Standard 3: Measure the Volume, Weight, & Density of an Apple
Core Standard:
Observe, describe and ask questions about plant growth and development.

3.3.2 Investigate plant growth over time, take measurements in SI units, record the data and display the data in graphs. Examine factors that might influence plant growth.

Materials/preparation:

Apples, plastic containers, water, balance in oz or grams, measuring container in tsp. or ml. (Wea Creek Orchard has some calibrated pitchers we may use), journal

Sequence of activities/procedures:

1. Fill containers with water up to 1/2 and apples.
2. Predict if apples will sink or float.
3. Bobbing activity
4. What made it difficult to grasp the apple? Why do apples float?
5. How can we measure the air in the apple? Density
6. Place an apple on the balance and record the weight. (oz or grams)
7. Fill calibrated container with water to a certain level. Record water level. (tsp or ml)
8. Gently place the same apple in the same container and record the displaced measurement.
9. Take the weight and divide that number by the volume, to get the density of the apple. If it's 1 or greater, and it will sink, then it's more dense. If it's less than 1, it will float, then it's less dense.
10. Do the same with a rock.

Assessment/Closure:

Journal

Lesson Title: **Measure of presence of sweetness**

Grade: **5th**

Objectives: **Understand physical and chemical change**

Standards: Science

5.1.2 Nature of Science

Materials/preparation: refractometer, apples, & Brix scale

Sequence of activities/procedures:

1. Explain, that an apple that is good has sugar in it. Why don't you eat unripe apples?
2. Experiment with different varieties of apples and different degrees of ripeness.

Assessment/Closure: Students will be able to measure in a quantitative manner of sweetness in different types of apples. The apple that is the sweetest will have a higher brix level than a tart apple.

Considerations: An indicator of whether it is an acid or base.

Lesson Title: Measure the trunk

Grade: 5th

Objectives: Understand the relationship between radius and diameter (circumference too)

Standards: Math

5.G.1: Identify, describe, and draw triangles (right, acute, obtuse) and circles using appropriate tools (e.g., ruler or straightedge, compass and technology). Understand the relationship between radius and diameter.

Materials/preparation: calipers, paper, pencil, clipboards

Sequence of activities/procedures: Students will use the calipers in the metric system to determine growth. Using the data, students may speculate how much growth will occur within a year.

Assessment/Closure: Students will create a bar graph to show the results of the radius and diameter.

Lesson Title: Measure of presence of starch

Grade: 5th

Objectives: Understand physical and chemical change

Standards: Science

5.1.2 Nature of Science

Materials/preparation: iodine, apples, droppers. Arrange apples and ask students how we determine sweetness. Students will have a taste test and then actually test the apples with iodine.

Sequence of activities/procedures:

1. Explain, that an apple that is good has sugar in it. Why don't you eat unripe apples?
2. Experiment with different varieties of apples and different degrees of ripeness.

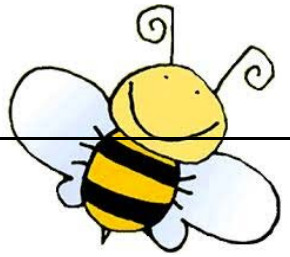
Assessment/Closure: Students will be able to measure in a quantitative manner of the amount of starch in different types of apples. The apple that has the darkest blue has the most starch.

Considerations: An indicator of whether it is an acid or base.

Pollination

Name_____

Experiment



My bag of Cheetos represents…

My hand represents…

When I touched a flower…

Pollen

Pollen

Pollen

Bee

Bee

Bee

Pollination

Pollination

Pollination

Lesson Title: Busy Bees

Grade: K/1

Objectives: Students will learn and identify the each step of pollination. The students will appreciate the importance of bees in agriculture.

Standards: 1.3.3 Observe and explain that plants and animals have basic needs for growth and survival.

Materials/preparation:

Cheetos

Brown paper bags

Bumblebee finger puppet

Black/white diagram of flower to glue on bag

Crayons, scissors

Vocabulary

Nectar- a sweet liquid reward for pollinators that is produced by flower glands called nectaries

Pistil- the female part of the flower including the stigma, style, and ovary.

Pollen - the fine, powder-like material produced by the anthers of flowering plants.

Pollen basket-a smooth,slightly concave surface of the outer hind leg of a bee that is fringed with long, curved hairs that hold the pollen

Sequence of activities/procedures:

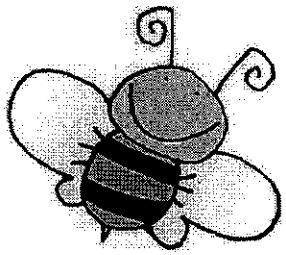
1. Read the beginning pages of The Bumblebee Queen by April Pulley Sayre(Cole Library)
2. Hand out the finger puppet for students to color.
3. Glue the flower to the paper bag
4. Fill each bag with Cheetos—(pollen)
5. Have the kids eat their Cheetos being sure not to lick their fingers of wash their hands.
6. Have kids fly from flower to flower and see that they are leaving pollen on the flowers.

Assessment/Closure:

1. Show You-tube video---Pollination Process in plants for kids
2. Have kids share with each other what just happened.
3. Do worksheet to check for understanding.

Considerations:

Pollination Experiment



Name_____

My bag of Cheetos represents…

My hand represents…

When I touched a flower…

Pollen

Pollen

Pollen

Bee

Bee

Bee

Pollination

Pollination

Pollination

Lesson Title: Apples from the Tree

Grade: K-1

Objectives: To harvest apples to observe and taste

Standards:

- K.1.1. Use all senses as appropriate to observe, sort and describe objects according to their composition and physical properties, such as size, color and shape. Explain these choices to others and generate questions about the objects.
- K.1.2 Identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas.
- K.3.1 Observe and draw physical features of common plants and animals.
- K.2.3 Describe in words and pictures the changes in weather from month to month and season to season.
- K.3.3 Describe and compare living plants in terms of growth, parts, shape, size, color and texture.
- K.M.1: Make direct comparisons of the length, capacity, weight, and temperature of objects, and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler, or holds more.

- 1.3.1 Classify living organisms according to variations in specific physical features (e.g., body coverings, appendages) and describe how those features may provide an advantage for survival in different environments.
- 1.3.2 Observe organisms closely over a period of time in different habitats such as terrariums, aquariums, lawns and trees. Draw and write about observations.
- 1.3.3 Observe and explain that plants and animals have basic needs for growth and survival: plants need to take in water and need light, and animals need to take in water and food and have a way to dispose of waste.
- 1.3.4 Describe how animals' habitats, including plants, meet their needs for food, water, shelter and an environment in which they can live.
- 1.3.5 Observe and describe ways in which animals and plants depend on one another for survival.
- 1.M.1: Use direct comparison or a nonstandard unit to compare and order objects according to length, area, capacity, weight, and temperature

Materials/preparation:

- Knife, paper towels
- Magnifying lens
- Packet for notes, clipboards, pencils
- String for branch length and piece of string that was cut to branch length in the spring
- scissors
- camera, ruler

Sequence of activities/procedures:

- During visit at OEC:
    - Measure length of a selected branch (measured and marked in spring lesson)
        - Together with students, cut a piece of string the length of the selected branch.
        - Compare length of string with the one from earlier seasons and determine how much the branch grew since last visit.
        - Display strings on apple tree bulletin board in classroom.
    - Observe and harvest apples
        - Take picture of an apple with ruler to display with earlier pictures
        - Cut apple in half!
        - In packet, students will draw the inside of the apple and label the parts.
        - If there are enough apples to harvest, cut for a taste sample.
    - Take picture of tree to display with earlier pictures

Closure:

Discuss all additional pictures posted on apple tree bulletin board in classroom.

Lesson Title: The Life Cycle of an Apple Tree

Grade: 2nd Grade

Objectives: The students will understand the life cycle of an apple tree through various hands on experiments.

Standards:

- **2.3.1** Observe closely over a period of time and then record in pictures and words the changes in plants and animals throughout their live cycles- including details of their body plan, structure and timing of growth, reproduction and death.
- **2.3.2** Compare and contrast details of body plans and structures within the life cycles of plants and animals.

Materials/preparation:

Life cycle of an Apple Tree Video from Discovery Education (1:52 long)

Life cycle of Trees Lesson Plan

How Do Apples Grow? By Betsy Maestro

The Seasons of Arnold's Apple Tree by Gail Gibbons

Sequence of activities/procedures:

Introduce the Life Cycle of an Apple Tree with the Video

Red and white construction paper

Stapler, pencils, and glue

Yellow and green tissue paper cut in one-inch squares

Apple shapes pattern

Handout: Life Cycle of an Apple Tree

Assessment/Closure:

- Students will demonstrate understanding of the importance of trees to the environment by participating in class discussion
- Monitor student understanding of the life cycle of a tree as they write or sequence the pages of their books.

Considerations:

Lesson Title: Measuring Growth

Grade: 2nd Grade

Objectives:

- Students will measure (or see parts being measured for wood growth, girth, and height).
- Students will count number of blossoms on marked section of branch for blossoms, leaves, and blossoms to apples.

Standards:

2.M.1 Describe the relationships among inch, foot, and yard. Describe the relationship between centimeter and meter.

2.M.2 and measure the length of an object by selecting and using appropriate tools, such as rulers, yardsticks, meter sticks, and measuring tapes to the nearest inch, foot, yard, centimeter and meter.

2.M.3 Understand that the length of an object does not change regardless of the units used. Measure the length of an object twice using length units of different lengths for the two measurements. Describe how the two measurements relate to the size of the unit chosen.

Materials/preparation:

- Measuring
- String
- Permanent markers
- Clipboards

Sequence of activities/procedures:

Measuring growth

Height of tree

Measure around circumference with string

Watch and count blossoms on certain limbs

Watch and count blossoms on certain links

Blossoms that turn to apples

Assessment/Closure:

Considerations:

April to the end of May is opt. work time.

Apple Orchard helpers may do some experiments/planting activities

Lesson Title: Parts of an Apple Tree

Grade: K-1

Objectives:

- To learn the parts of an apple tree (roots, trunk, bark, branches, leaves, fruit, etc.)

Standards:

- K.1.1. Use all senses as appropriate to observe, sort and describe objects according to their composition and physical properties, such as size, color and shape. Explain these choices to others and generate questions about the objects.
- K.1.2 Identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas.
- K.3.1 Observe and draw physical features of common plants and animals.
- K.2.3 Describe in words and pictures the changes in weather from month to month and season to season.
- K.3.3 Describe and compare living plants in terms of growth, parts, shape, size, color and texture.
- K.M.1: Make direct comparisons of the length, capacity, weight, and temperature of objects, and recognize which object is shorter, longer, taller, lighter, heavier, warmer, cooler, or holds more.

- 1.3.1 Classify living organisms according to variations in specific physical features (e.g., body coverings, appendages) and describe how those features may provide an advantage for survival in different environments.
- 1.3.2 Observe organisms closely over a period of time in different habitats such as terrariums, aquariums, lawns and trees. Draw and write about observations.
- 1.3.3 Observe and explain that plants and animals have basic needs for growth and survival: plants need to take in water and need light, and animals need to take in water and food and have a way to dispose of waste.
- 1.3.4 Describe how animals' habitats, including plants, meet their needs for food, water, shelter and an environment in which they can live.
- 1.3.5 Observe and describe ways in which animals and plants depend on one another for survival.
- 1.M.1: Use direct comparison or a nonstandard unit to compare and order objects according to length, area, capacity, weight, and temperature

Materials/preparation:

- Magnifying lens
- Packet for notes, clipboards, pencils
- String for branch length and piece of string that was cut to branch length in the spring
- scissors
- camera, ruler

Sequence of activities/procedures:

- During morning classroom lessons – Intro plant parts that we will observe.
- During visit at OEC:
    - Measure length of a selected branch (measured and marked in spring lesson)
        - Together with students, cut a piece of string the length of the selected branch.
        - Compare length of string with the one from the spring and determine how much the branch grew during the summer.
        - Display strings on apple tree bulletin board in classroom.
    - Observe and record by drawing and labeling parts of the apple tree
        - Students will have a page in their packet for drawing the tree
        - Together label the parts
            - Roots
            - Trunk and bark
            - Knuckle and crown
            - Branches, leaves
            - apples
    - Observe and measure apples
        - In packet, students will color an outline of an apple to match the apples we observe on the tree.
        - Take picture of apple with ruler to display with earlier pictures
    - Take picture of tree to display with earlier pictures

Assessment/Closure:

Considerations:

Lesson Title: Compare Flavors and Colors of Various Apples Using the Five Senses

Grade: 2nd Grade

Objectives:

- Discuss different uses for apples (cooked, raw, juices, and baked)
- Taste Testing: Sweet, Tart, Crunchy, and Soft

Standards:

2.4.1 Identify parts of the human body that can be used as tools-like hands for grasping and teeth for cutting and chewing.

2.4.2 Identify technologies developed by humans to meet human needs. Investigate the limitations of technologies and how they have improved quality of life.

Materials/preparation:

Experiments done by Wea Orchard Staff (ripeness and crispness)

Decibel meter

Speakers

Microphone

Videos made by Wea Orchard Staff, if they are unable to attend.

Sequence of activities/procedures:

Taste Testing

Sweet: (Cole's Trees)

Tart: King David

Crunchy: (Cole's Trees)

Soft: Macintosh

Smell the blossoms in the spring

Touch: Waxy or Dusty (experiment)

Sound: Crunchy Test with Decibel

Sight: Size and color of the apples

Assessment/Closure:

Vote for our individual favorite apple.

Discuss how favorites could lead to buying apples from a store (economics).

Considerations: