

**Topic:** What do Pumpkins need to grow?

**Grade Level:** 2

**Time:** 7 weeks (The class lesson time is 45 minutes weekly but the research, observations, collect and record data, water and tend the pumpkin patch will be a daily routine from beginning of school in September to late October)

**Standards:**

### **Next Generation Science Standards**

#### **2-LS2 Ecosystems: Interactions, Energy, and Dynamics**

**2-LS2-1.** Plan and conduct an investigation to determine if plants need sunlight and water to grow.

**2-LS2-2.** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

### **Science and Engineering Practices**

#### **Developing and Using Models**

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)
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#### **Planning and Carrying Out Investigations**

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
- Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)

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#### **Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence**

- Scientists look for patterns and order when making observations about the world. (2-LS4-1)

## Disciplinary Core Ideas

### LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow. (2-LS2-1)
- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

### ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)

## Crosscutting Concepts

### Cause and Effect

- Events have causes that generate observable patterns. (2-LS2-1)

### Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

### Common Core State Standards Connections:

#### *ELA/Literacy* –

- W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1), (2-LS4-1)
- W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(2-LS4-1)
- SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-LS2-2)

#### *Mathematics* –

- MP.2 Reason abstractly and quantitatively. (2-LS2-1),(2-LS4-1)
- MP.4 Model with mathematics. (2-LS2-1),(2-LS2-2),(2-LS4-1)
- MP.5 Use appropriate tools strategically. (2-LS2-1)
- 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. (2-LS2-2),(2-LS4-1)

**Background:**

Every October, here in New Jersey, we take the elementary students on a “pumpkin picking” field trip to a local farm. For the following month or two the students in different grade level engage in different pumpkin investigation projects. For example: Life cycle of a pumpkin, Parts of a pumpkin, Dissection of a pumpkin, Cooking and Tasting the pumpkin, and/or Decomposition of a pumpkin. Since we are a Montessori School most of the pumpkin lessons and projects were taught with Montessori materials (“three-part cards” consisting of pictures and labels), by the head teachers in the classroom.

Since I began teaching STEM (an enrichment class) I took the opportunity to engage the students in the actual process of the “Life cycle of a Pumpkin” by planting the pumpkin seeds that was collected and dried from one of the pumpkins from the farm. Since most of the students have been familiarized with the pumpkin, they went through a brief review of the life cycle of a pumpkin and parts of a pumpkin to pre-assess what they know or remember. Then we began the “life cycle” process in the spring, (late April/early May) by germinating the pumpkin seeds, planting the seeds in the ground, watering and tending the pumpkin patch. Throughout the summer I watered and tended the pumpkin patch with the students who came for summer camp. I am continuing the project when school starts in September until the pumpkins are ready for harvest, probably towards the end of October, to carve their own Jack-O-Lantern for Halloween. After the harvest, the life cycle of the pumpkin will continue as we repeat the process.

**Engaging Contexts:**

Do you remember going to a farm and picking a pumpkin? Do you know how a pumpkin grows? Do you know the life cycle of a pumpkin? Do you know the Parts of a pumpkin? What part of a pumpkin can we use to grow our own pumpkins? What do pumpkins need to grow?

**Justification:**

This Unit lesson is the final piece of the entire project that began in the spring, learning about the life cycle of a pumpkin beginning from a seed and identifying what it needs to grow until harvest, which will then be continued into another life cycle the following spring. Through this lesson, students will use the tools of STEM to study and understand how to care for living things by identifying and providing a necessary element, which in this case is water. This project will allow the students to utilize and hone their research skills through the use of electronic technology in searching for rainfall data from different websites. Students will use their scientific knowledge to gather data and evidence through observations. Students will develop their engineering skills through the building of a rain gauge to use as a tool to collect their data. Students will also practice their mathematical skills as they analyze the data to create a document

using charts and graphs which calculates the need to water the plants according to the amount of rainfall recorded. Overall, the students will have an opportunity to interact and cooperate with each other as they lead and learn through this STEM integration.

**Objectives:**

Student will be able to:

- Recall the trip to the pumpkin farm and the study of a pumpkin.
- Complete the “Life Cycle of a Pumpkin” worksheet.
- Label the “Parts of a Pumpkin” correctly.
- Identify that the pumpkin needs water and sunlight to grow
- Identify the available water sources for the pumpkins.
- Check the weather forecast for rain and record the rainy days on the weather chart.
- Gather the rainfall data from the **CoCoRaHS** (Community Collaborative Rain, Hail & Snow Network) website
- Record the data on the rainfall data chart.
- Build a rain gauge and place it in the pumpkin patch.
- Collect and record data using a rain gauge in the pumpkin patch.
- Create a watering schedule and rotation schedule.
- Water the pumpkin patch as needed and record the date and time on the “watering record” chart.
- Write a journal of the pumpkin growth.
- Pick the ripe pumpkin from the pumpkin patch.
- Collect the seeds from the pumpkin and save them till spring and begin the life cycle again.

**Materials:**

- A picture, (of the students picking pumpkins at the farm or any picture of a pumpkin farm.)
- Life Cycle of a Pumpkin three-part cards and worksheet
- Parts of a pumpkin three-part cards and worksheet
- Weather Forecast data chart
- Rainfall data chart
- Rain gauge building directions
- Materials for rain gauge: clear plastic container 8-10 inches high, small pebbles or marbles, laminated measuring gauge, 12-inch plastic ruler, “My Weather Report” chart to record findings.
- Watering Record chart
- i-pads

- Access to the faucet and the hose near the pumpkin patch
- Student STEM journal, pencils, erasers, coloring pencils, scotch tape/glue stick
- Plastic tray and a bowl to collect the pumpkin seeds
- Paper towels

**Possible misconceptions:**

Students may have never seen the actual process of how pumpkins or any fruit and vegetables grow. They may have an idea of purchasing them from a supermarket. Unless they have a vegetable garden at home where they experience firsthand in growing vegetables, the students would not have any information on how the vegetables grow. This project will give the students firsthand experience of the life cycle of a pumpkin and what they need to do to help the pumpkin grow.

**Prior knowledge needed:**

Previously we covered a unit on insects and learned about the helpful insects such as honey bees which pollinates flowers so that the fruit and vegetables will grow. Reviewing the information, students will understand that the bees help us as well to grow our food. Students have prior knowledge on how to use an i-pad to search for information.

**E-learning connections:**

i-pads for research, gathering data, taking pictures.

Check the weather forecast

<http://forecast.weather.gov/MapClick.php?CityName=Plainsboro&state=NJ&site=PHI&textField1=40.3343&textField2=-74.5817&e=1#.WU6vIWjytME>

Check the rainfall data

<https://www.cocorahs.org/ViewData/StateMultiDayPrecipReports.aspx?state=NJ>

Build a rain gauge

[https://teachables.scholastic.com/teachables/books/make-a-rain-gauge-9780439731973\\_003.html](https://teachables.scholastic.com/teachables/books/make-a-rain-gauge-9780439731973_003.html)

**Engaging phenomena:**

Life Cycle of a Pumpkin video: <https://www.youtube.com/watch?v=iXLnCd4JMH4>

**Lesson Procedure:****Engage**

The teacher will show the students a picture that was taken at the field trip to the local farm the previous year, and ask: How many of you remember going on a trip to pick pumpkins?

The teacher will select a few students who raise their hands to share their experience and write on the board some of the key points from the students' responses.

The teacher will ask: Do you remember what we did with one of the pumpkin after we brought it from the farm? Answer: We opened the pumpkin, studied the parts, saved the seeds and planted them in the ground.

Teacher will ask: Do you remember the "Parts of a Pumpkin" and "Life Cycle of a Pumpkin" lessons?

Review the "Parts of a Pumpkin" with three-part cards and hand out the Parts of a Pumpkin worksheet to complete.

<http://thehelpfulgarden.blogspot.com/2014/10/parts-of-skeleton-and-parts-of-pumpkin.html>

<https://drive.google.com/file/d/0B-Jp2xvcHjp4S2RCOXprSnRyWU0/view>

<http://homeschoolclipart.com/science/botany-clipart/pumpkin-clipart/>

<http://homeschoolclipart.com/wp-content/uploads/2015/09/PumpkinLabeling.pdf>

Review the "Life Cycle of a Pumpkin" with three-part cards and hand out the Life Cycle of a Pumpkin worksheet to complete.

[http://www.montessoriforeveryone.com/Cultural-Materials\\_ep\\_61-1.html](http://www.montessoriforeveryone.com/Cultural-Materials_ep_61-1.html)

[http://www.montessoriforeveryone.com/assets/PDF/Life\\_Cycle\\_of\\_a\\_Pumpkin.pdf](http://www.montessoriforeveryone.com/assets/PDF/Life_Cycle_of_a_Pumpkin.pdf)

<https://www.pinterest.com/pin/187180928236311789>

Watch the Life Cycle of a Pumpkin video: <https://www.youtube.com/watch?v=iXLnCd4JMH4>

The teacher will ask: What does the pumpkin need to grow? Answer: Sunlight and Water

Question: How and where will the pumpkins get water?

Students will open their STEM journals and write the question and write their ideas about how and where the pumpkins will get water. Take volunteers to write their ideas on the board.

Confirm the answer to the question, from rain and from people giving water from the faucet.

### **Explore**

Question: How do we know when we need to water the plants?

Answer: When it doesn't rain and when there's not enough rain.

Divide the student into three groups and have them find information to the next three questions by assigning one of the questions for each group.

#### **Group 1**

Question: How will we know whether or not it will rain?

Answer: Check the weather forecast. <http://forecast.weather.gov/MapClick.php?CityName=Plainsboro&state=NJ&site=PHI&textField1=40.3343&textField2=-74.5817&e=1#.WU6vIWjytME>

Task: Record the weather forecast for the week on the weather forecast chart.

### Group 2

Question: How will we know whether or not it rained enough?

Answer: Check the rainfall data.

<https://www.cocorahs.org/ViewData/StateMultiDayPrecipReports.aspx?state=NJ>

Task: Record the rainfall data for the past week on the rainfall data chart.

### Group 3

Question: What can we do to check how much it rained?

Answer: Build a rain gauge.

[https://teachables.scholastic.com/teachables/books/make-a-rain-gauge-9780439731973\\_003.html](https://teachables.scholastic.com/teachables/books/make-a-rain-gauge-9780439731973_003.html)

Provide the materials.

Task: Build the rain gauge and place it in the pumpkin patch to collect data.

### **Explain**

Group 1 will present their search result about the weekly weather forecast chart and create a schedule of when we will need to water the plants.

Group 2 will present their rainfall data chart and show whether or not we have been getting enough rain for the past week and collaborate with group 1 to make adjustments to the watering schedule to compensate for the days the rain is not enough.

Group 3 will present the data they collected using the rain gauge they built. The data they collected will show the actual amount of rain the pumpkins received and will give information to group 1 and group 2 to make more adjustments to the watering schedule.

Three groups will take turns watering and tending the pumpkin patch according to the schedule they made and keeping the record of the date and time they watered, on the watering record chart.

### **Elaborate/Extend**

Students will continue to keep records of data they collected, insert the charts in their STEM journal, and will write their observations of the growth of the pumpkin throughout the unit. Students will determine when it's time to pick the pumpkins that is ripened fully. The students will take the pumpkin they help grow, cut it open, review parts of a pumpkin, save the seeds and prepare for the new life cycle of a pumpkin.

### **Evaluate**

Pre-assessment will be given during the engage stage of the lesson through the use of the Life Cycle of a Pumpkin worksheet and Parts of a Pumpkin worksheet.

Formative assessment will be given throughout the engage and explore stages through the review, repeat and continuing steps of checking the weather forecast, rainfall data and following and recording the watering schedule.

Summative assessment will be given after the pumpkin is harvested and the students will show their STEM journal filled with the data and information they collected, followed the schedule of watering the pumpkins, and written observations of the growth of the pumpkin as well as photos taken for evidence.

### Works Cited

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2-LS2 Ecosystems: Interactions, Energy, and Dynamics

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