



BIG GREEN LESSONS

Plant Lifecycle: 6th – 8th Grade

Key Understandings

Students will understand that plants have a lifecycle that can be observed in the Learning Garden.

- A plant has a lifecycle that can be observed in the Learning Garden.
- A scientific explanation uses observations and measurements to explain something we see in the natural world.
- A scientific explanation should be logical and defensible.

Standards Alignment

Common Core – English Language Arts

- SL.6.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- SL.6.4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- SL.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume and clear pronunciation.
- SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- SL.8.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Next Generation Science Standards

- MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Materials and Preparation

- Lifecycle of a Plant worksheet – one per student
- Learning Garden Scientific Explanations worksheet (two sided) - one per student
- Clipboard or hard surface for writing – one per student

- Pen or pencil – one per student
- Ruler – one per student
- Video Presentations:
 - <https://vimeo.com/69225705>
 - <https://youtu.be/Z-iPp6yn0hw>
 - https://youtu.be/A_tNMJTvy7I
- Review lesson, materials, and preparation
- Review teacher background:
 - Plant Lifecycle
 - Plant Reproduction
- Familiarize yourself with your Learning Garden and what's currently growing
- *Optional: supplies for additional Learning Garden activities*

Reminder: Big Green's Garden Educators are always available for additional support via email or by phone call

Instructional Pacing

This garden lesson is broken up into two 25-minute sections. The first section is designed to be taught in the classroom and introduces the lesson topic. The second section is designed to be taught in the Learning Garden and provides an opportunity for students to put their knowledge to use experientially. The sections may be taught as one longer lesson, approximately 60 minutes, or the sections may be divided up over two class periods.

Teacher Background

Plant Lifecycle

The plant lifecycle begins with a seed being planted in the soil. Seeds have three main parts – a seed coat for protection, the embryo which grows into the immature plant, and the cotyledon which provides nutrients and energy to the germinating seed. A seed germinates with water and warmth, and the process involves two main steps – root development and emergence of a stem and first leaves. The germinated seed will grow to adulthood and form a mature plant. The mature plant will flower and reproduce by forming new seeds, which will begin the next lifecycle.

Stage One: Planting – The seed is planted, watered and warmed by the sun.

Stage Two: Germination – The roots emerge from the seed underground.

Stage Three: Germination – The stem emerges from the seed and pushes above ground with its first leaves.

Stage Four: Plant Growth – The plant continues to grow above and below ground.

Stage Five: Reproduction – The mature plant flowers.

Stage Six: Reproduction – The mature plant grows fruits and/or seeds.

Plant Reproduction

Flowers are specialized plant structures that help plants reproduce as efficiently as possible. There is a female part of the flower, and a male part of the flower. The female part of the flower is in the center of the flower, and is made up of the ovary, the style

and the stigma. The stigma is sticky and captures the pollen from other flowers (sometimes carried on the legs and abdomen of pollinators such as bees, butterflies, hummingbirds, etc.) The female flower produces pollen, which germinates on the stigma and travels down the inside of the style, toward the ovary. Once the pollen reaches the ovary, it combines with the female gamete to make a seed or ovule.

The male part of the flower is the anther, stamen and filament. The anther carries the pollen, which fertilizes the female parts of the flower. The stamen and the filament hold up the anther. The petals are the colorful structures that help the flower attract pollinators. Sepals are like petals, usually attaching below the petals on the receptacle. The receptacle is the part of the flower that is left once the flower has been fertilized and the petals fall off. This part of the flower swells as the seeds develop.

Introduction (5 minutes)

Welcome students to their garden lesson and spend time discussing the following introductory questions:

- What is a lifecycle?
- Do all plants share the same lifecycle?
- Can you think of something else that has a lifecycle?

Make the connection between the nutrition and garden lesson. Remind your students that to be healthy, they need to know how to read and decipher a nutrition label. For our Learning Garden to stay healthy we need to know how to “read” our plants through scientific observations during the entire lifecycle. These observations will help us know if our plants are receiving the proper light, air, water, nutrients, and space to grow in the Learning Garden.

Classroom Lesson (25 minutes)

During the classroom portion of today’s lesson students will be learning about the lifecycle of a plant from seed to adult plant and back to a seed.

1. Pass out the Lifecycle of a Plant worksheet and ask for a student volunteer to read the introductory paragraph aloud.
2. Have your students view the following videos and ask them to take notes about the different lifecycle stages they observe.
<https://vimeo.com/69225705>
<https://youtu.be/Z-iPp6yn0hw>
https://youtu.be/A_tNMJTvy7I
3. Ask students to share the stages they observed. Create a list on the white board or on a large piece of paper: seed, germinated seed, sprout, seedling, mature plant, mature plant with flowers and/or fruit.
4. As a group, use the introductory paragraph on the student worksheet and what students observed in the videos to sketch out the steps of the plant lifecycle.
5. Review the directions and have students work individually to complete the Lifecycle of a Plant worksheet.

6. When students are finished with the worksheet, review the correct order. Ask students to think about how plants reproduce. We all know that the plant lifecycle is continual, but *why* is it continual?
7. Have students discuss and hypothesize in small groups what part of the plant is the specialized part that aids in plant reproduction.
8. Review with students that the *flower* is the specialized plant structure that supports reproduction.

Break here if the lesson will be taught in two sections.

Garden Activity (25 minutes)

Assemble and welcome your students into the Learning Garden. Address the entire group and establish the expectation that this is a time for learning. If appropriate, review the agenda for the Garden Activity with your students. Ask students if they know what they will be doing in the Learning Garden for the day's lesson. Let them know they will be learning about how to make scientific observations!

1. Ask students to review the plant lifecycle and let students know that they will be observing plants at various stages in their lifecycle.
2. Distribute the Learning Garden Scientific Explanation worksheet and review the directions on the front and back of the worksheet.
3. Give students the rest of the time to complete their observations, measurements, and scientific explanations. Students can work in pairs if needed.
4. Once all students have finished, review four scientific questions with the class, soliciting students to share their answers.

NOTE: As the teacher, be aware of poisonous plants and other hazards in and around your Learning Garden, and review those concerns with your students. Review any additional Learning Garden rules with the students. Inquire about known bee/wasp sting allergies before going into the Learning Garden.

Conclusion (5 minutes)

Have students share key parts of the day's activity and review the Key Understandings for this lesson. Review the following questions with your students:

- Are there any stages of the plant lifecycle not currently visible in the Learning Garden? Why not? When do you think you might be able to see the plants in the Learning Garden movie through those stages of their lifecycle?
- Do we eat plants in all the different stages of their lifecycle? What are some examples of those foods?
- Did any of the scientific observations students made in the Learning Garden today tell you anything about the health of the plants? What are some other scientific observations that could be made to help you assess the health of the plants?

Students should clean-up the Learning Garden as needed.

Additional Learning Garden Activities

There are other Big Green activities to extend your time in the Learning Garden during this garden lesson! Activities include planting, watering, growing and harvesting.

You can find resources for the additional Learning Garden activities online at www.biggreen.org > Teaching in your Garden > Garden Skills.



Name:

Date:

Lifecycle of a Plant

A plant starts out as a seed planted in the soil. As it rains (or as you water your seed) and the sun warms the soil, the protective seed coat breaks open and the seed begins to grow roots underground. Once the seed has grown roots in the soil, a stem with leaves will push its way above the ground. Below the ground, roots continue to grow, while above the ground, leaves and stems continue to grow. Eventually, as the plant gets bigger and stronger, your plant will start to grow flowers. Those flowers will produce a fruit that will hold new seeds. The process starts again when a new seed is planted, and the lifecycle continues.

Directions: Sketch each step of the plant lifecycle. When you are finished, add arrows between each of the lifecycle stages. Your lifecycle will now be complete and will represent a continual cycle of birth, growth, and reproduction.

1

2

6

3

5

4

Name:

Date:

Learning Garden Scientific Explanations

For each question below, use data you collect on the opposite side of this sheet to answer each question. Your answers need to be supported with data you observe and/or measure.

Question: Is your Learning Garden fully planted?

Answer: My scientific explanation is...

Question: Are your Learning Garden plants healthy?

Answer: My scientific explanation is...

Question: Is your Learning Garden growing adult plants or young plants?

Answer: My scientific explanation is...

Question: Is your Learning Garden receiving enough water?

Answer: My scientific explanation is...

Learning Garden Scientific Explanations, continued.

Make a plant observation (information or knowledge gained through using your senses) and take measurements (using the appropriate tools) in and around your Learning Garden to support your scientific explanation for each of the questions on the back of this page.

Plant Name	Lifecycle Stage (see choices below)	Observation	Measurement #1 Height of Plant (cm)	Measurement #2 Width of Stem at Base of Plant (cm)	Measurement #3 Number of Leaves or Flowers	Measurement #4 How many of this type of plant are in the Learning Garden?

Lifecycle Stages (Choose one stage for each plant recorded above.)					
Seed	Germinated seed	Sprout	Seedling	Mature plant	Mature plant with fruits or flowers