



Activity 3.3: Preparing for Project BudBurst

Grades 7 – 9

Description: This activity serves as an introduction to phenology and Project BudBurst, and will prepare students to start collecting data. Depending on when you start the curriculum, you may want to introduce this now, or wait to introduce these activities as they appear in the curriculum.

Part 1: Mystery Plant ID: Students make observations of unfamiliar plants, create a field guide, and practice identifying other plants by using their classmates' field guides. This activity will exercise students' observation and scientific communication skills and provide students with practice identifying plants in preparation for the other activities. This is an outdoor activity, but can also be done inside on collected or purchased flowers/plants. (http://budburst.org/education-mysteryplant_sg)

Materials:

Part 1

- Field journal or blank paper
- Cardboard or clipboard (one per student)
- Crayons or markers
- Rulers
- Digital camera (optional)
- Field guides to local wildflowers, grasses, shrubs, and trees
- Copies of the Mystery Field Guide and Official Field Guide

Part 2

- Computers with internet access
- Field journal or blank paper
- Cardboard or clipboard (one per student)
- Rulers
- Digital camera (optional)
- Field guides to local wildflowers, grasses, shrubs, and trees
- Pens/pencils

Part 2: BudBurst Data Collection: The class, groups, or individual students choose what plants they will collect data on, create a BudBurst site, and decide on a data collection protocol and schedule, in preparation for the growing season. Students then collect data on their chosen plant species throughout the growing season and enter it into the BudBurst website over a period of weeks or months. Students can write the data on the BudBurst data collection sheets. Plant ID sheets and phenophase guides are available on the BudBurst website. <http://www.budburst.org>

Total Time: Two to three class periods

National Science Education Standards:

A1.c Use appropriate tools and techniques to gather, analyze, and interpret data.

C3.c Behavior is one kind of response an organism can make to an internal or environmental stimulus.

AAAS Benchmarks:

12C/M3* Make accurate measurements of length, volume, weight, elapsed time, rates, and temperature by using appropriate devices.



Guiding Questions

- What is Project BudBurst?
- How do we identify plant species?
- What are phenophases? What is the value of recording phenophase data?

Assessment(s)

- Mystery Field Guide
- Official Field Guide
- BudBurst data collected

Part I: Mystery Plant Identification

Time: One 45-minute class period

Background Information

Careful observation is a foundation of all science. It seems like such a simple skill, but it is not always easily mastered. When making observations, it is important to look closely in order to notice details, including information about size, shape, color, texture, and spatial relationships. It is also important to use many of the senses: sight, sound, smell, and touch. Finally, it's important to avoid focusing too narrowly on an object so you don't see how it relates to other objects around it and to the general environment. Spending time making quality observations will help students learn the skills involved in this part of scientific inquiry.

Quality observations are detailed, accurate, and often conjure up an image in the mind of the person hearing the observation for the first time. For example, describing something as "short" doesn't provide an accurate description, but saying, "it's taller than a two-liter bottle and shorter than this stool" is descriptive and clear. The details of the observation become extremely important and allow students to form valid observations based on a series of true statements.

Source: Adapted from Coskie, T., Hornof, M., and Trudel, H. 2007. "A Natural Integration." *Science and Children* 44(8): 26-31. This teacher resource was made possible, in part, by support from the National Geographic Education Foundation.

Pre-Activity Preparation:

- Identify an area to observe wildflowers, grasses, shrubs, and trees. Look at the plants ahead of time, and reference the Project BudBurst field guides for ideas and information (available at www.budburst.org).

Procedure:

1. Tell students that soon they are going to begin collecting phenology data that will help scientists understand how plants are responding to climate change, but that first, they need to know how to identify plant species so that they can collect good, accurate data. Today they



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are going to identify some of the plants outside the classroom for which they will be collecting data in the future.

2. Share some field guides of local plants with your students. Working in small groups, have the students go through their guide and create a list of the different types of information included in the field guide. Have each group share a field guide trait or two until you have a fairly comprehensive list on the board. The class list might include: photos/drawings, information on leaves, flowers, bark, and fruit. Discuss the observation skills they needed to use when studying their “mystery” plant (looking at details, noticing size/shape/color/, leaf structure, etc.).
3. Take students outside and ask each student to select a plant they are unfamiliar with to observe. This can be a wildflower, grass, shrub, or tree. They don’t need to identify the plants yet, so don’t provide field guides for this part of the activity.
4. Instruct students to spend at least ten minutes carefully observing their selected plants.
5. Next, ask students to record information about their plants in a journal or on a blank sheet of paper. This should include observable properties such as size, color, texture, odor, and markings.
6. In addition to writing about the plants, ask students to draw the plants. As best they can, they should draw what they really see and add labels to identify the important parts of the plant and measurements.
7. Once students have completed their observations, instruct them to fill out a *Mystery Field Guide* page for their plants. These field guides can include photos if you have a digital camera and printer they can use. This *Mystery Field Guide* includes a description and illustration of the plant. Students should also create a name for their plant.
8. Working in pairs, have students exchange their field guides with each other, and try to identify the plant described by their partner.
9. Once students have identified their partner’s plants using the *Mystery Field Guide*, ask them to find the true identity of their plants using field guides you have provided for your local area.
10. Instruct students to fill out the *Official Field Guide* page for this plant, and compare the information between this and the *Mystery Field Guide* page they created.

Discussion Questions:

- What similarities were there between the plant descriptions on your *Mystery Field Guide* page and your *Official Field Guide* page?
- What differences were there between the plant descriptions on your *Mystery Field Guide* page and your *Official Field Guide* page?



Extension Activities

1. Classroom Exchange Identification Challenge

- Have at least two classes participate in the activity, both drawing and describing their plants. Collect student work at the end of each class.
- Set up stations around the classroom, each with a different flower or plant.
- Break students into their working groups and hand each an identification guide created by a group in a different class.
- Have students walk around to each flower station and apply the guide to try and identify the plant it refers to. See how many of the students are able to identify their plant using the guide.
- Have students sit down in their groups and make sure that each group has identified their plant. Discuss how they used the guide to identify the plant, and what challenges they faced. Did the description give them enough information to identify their plant? What other information might be included to help with identification?
- Have them work in their groups to make suggestions and provide constructive feedback to the guide authors.
- The second class would do the same for the first class.
- Once both classes have completed the activity, have groups revise their original identification guide. As a culminating project, you can have them research their plant on the web, find pictures, and design an identification guide that can be included in their portfolio.
- For a math extension, you may graph percentages of correctness in each class.

2. Have students use a dichotomous key to identify their plants

- Go over how to use a dichotomous key with students. Inexpensive, easy-to-use dichotomous keys for a variety of plant types and regions can be purchased at <http://www.naturestudy.com/finders.html>.
- Set up stations around the classroom, each with a different flower or plant.
- Break students into their working groups and hand each a dichotomous key.
- Have students walk around to each flower station and use the guide to try and identify the plant at each station. See how many of the students are able to identify their plant using the guide.
- Go over student responses and work through the correct identification with students.



Part II: Project BudBurst

Description: Students review what they learned about phenology, research plant species, and choose a plant to observe, and begin making observations they will contribute to Project BudBurst.

(<http://www.Budburst.org/home>)

Time: One to two class periods (data collection to be repeated)

Materials:

Part 2

- Data collection sheets printed from the BudBurst website
- Cardboard or clipboard (one per student)
- Rulers
- Digital cameras (one per group, optional)
- Field guides to local wildflowers, grasses, shrubs, and trees (guides for BudBurst species are available in printable form on the website)
- Pens and pencils

Pre-Activity:

- Reserve the computer lab
- Create a BudBurst site for your class. You will want to generate passwords for your students so that they are able to log into their class site. Complete directions for creating a classroom BudBurst site can be found in the *Creating a BudBurst Classroom Site* document.
- Familiarize yourself with the Project BudBurst website.
- Locate a site near the school that can serve as the data collection site.
- Decide whether you will identify specific plants for students to observe ahead of time, or whether you want to have students identify the plants themselves.
 - If the former, you will need to set up a classroom BudBurst site and add the plants students will observe before beginning the activity.
 - If students will be choosing and identifying their own plants, make sure you budget at least one class period for students to spend outside locating and identifying the plant they are going to observe.
- You may want to label the plants that the students will be observing so that they are easy to locate when making subsequent observations.
- Once students have identified their plants, collect that information and enter it into the classroom BudBurst site (you will have to add the plants to the site because student accounts do not have administrative privileges). Once the plants have been added, students will be able to enter their data.

Procedure:

1. Review with students what they learned about plant phenology in Activity 3.2: Seasons of a Plant, and ask students:
 - Can anyone tell me what phenology is?
 - What would happen if phenological events didn't happen at the right time?
 - What are the things that influence phenology?
 - What does phenology have to do with climate?
 - Does it matter when a plant blooms? Why or why not? (You might want to establish that if a plant blooms when it is too cold, it might freeze, and if it blooms when the weather is too hot, it might become dehydrated and die.)
 - What does climate have to do with when a plant blooms?



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- Do you think there is a connection between climate change and when plants bloom? What might it be?
 - Why are scientists collecting data on plant phenology?
 - How might changes in bloom time affect other living things in an ecosystem?
2. Explain to students that they are going to be helping scientists answer some of the questions about how climate affects phenology by participating in Project BudBurst. Describe BudBurst as a citizen-science project, which means that students, volunteers, and “regular people” act as scientists by collecting data about plant phenology. Ask students:
 - Why would scientists collect this data?
 - Why might it be important?
 - How might looking at phenology help us understand climate change?
 3. People all over the country collect data about plant phenology. Scientists want to use this information to determine how plant phenology might be changing because of climate change.
 4. Tell students that they are now going to begin collecting data to contribute to scientists’ understanding of how climate affects plant phenology. (If students are going to choose their own plants, hand out field guides, take students outside, and have students work in groups to choose and identify the plant they will observe. If you have already chosen plants for the students, they can begin collecting data immediately.)
 5. Students should determine the phenophase (the phenological stage) of their assigned plants. Students can write the data on the BudBurst Data Collection Single Report Form or in their journal. As noted in the Pre-Activity steps, it is useful to pre-identify the plants students will be observing, and note when they are expected to be in each phenophase. Plant ID sheets and phenophase guides for many species are available on the BudBurst website.

NOTE: BudBurst data collection sheets are available here: <http://budburst.org/reportforms>
There are different data collection sheets for different types of plants (deciduous trees, wildflowers, grasses, conifers, and evergreens) because different types of plants have different phenophases. These specialized data collections sheets are helpful for students because they focus students only on the phenophases they should be looking for for their specific plant.

6. Depending on the time of year and plant species, students will look for the following phenophases:
 - first leaf
 - all leaves unfolded
 - first flower
 - full flower
 - end of flowering
 - first ripe fruit
 - 50 percent color
 - 50 percent leaf fall
7. When one of these stages is found, students should take a picture and record the phenophase and the date.



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8. After the class is done collecting data, the students and/or teacher should enter the data on the project BudBurst website (under Report an Observation). Photos can also be uploaded to the website. BudBurst data collection can be carried out during the entire growing season. In the fall, students should look for ripe fruit, color, and leaf fall. Ideally, students will begin observing as the growing season begins and continue to observe as long as plants are still blooming.

Extension:

- Students can be given an assignment to monitor a plant near their house or on their way to school for a month. This way, they may see several different phenophases on one plant over time. Students should upload their data to the BudBurst website.
- Have some groups monitor the same species in slightly different locations so they can determine whether all plants of the same species go through the same phenophase at the exact same time, or whether there are other factors which further influence life-cycle stages, such as microclimate difference in plant locations.



Mystery Field Guide

Plant Name: _____

Plant description:

Plant illustration:



Official Field Guide

Common Name: _____

Scientific Name: _____

Plant description:

Plant illustration:

Did you know?

Close-up illustration: