

## Details



**Completion Time:** More than a week

**Permission:** Download, Share, and Remix

## Project Budburst – Citizen Science

### Overview

Students will use guidance from the Project Budburst website (<http://neoninc.org/budburst/index.php>) to make observations and keep records on trees found on the school grounds. While this lesson applies to more temperate locations, similar work is undertaken in the Arctic to monitor changes in the timing of plant phenology. Major phenological events (first leaf, first flower, leaf fall, etc) will be recorded in a journal that will be passed down to the following year's class (each tree studied will have its own bound notebook (composition book) in which to record data and observations from year to year).

### Objectives

- The student will be able to use a dichotomous key.
- The student will practice observation and notation skills
- The student will understand the importance of careful and detailed observations
- The student will observe the effect of yearly variation in weather on plants, and from this infer some possible effects of climate change

### Lesson Preparation

This is a standalone lesson that can be integrated into any Life Science class.

### Procedure

The lesson should begin early in the school year so that the students will be able observe their tree for as long as possible. Please note that the 'days' listed below are not consecutive, days 1-3 would probably be spread out over a five to ten day period.

Day 1: An area on the school grounds will be used that contains a sufficient number of trees or shrubs so that there is one tree or shrub for every one to two students.

## Materials

- Bound composition books
- Tree identification guides
- Tape measures
- Meter stick
- astrolobe
- Internet access



Initially the students will be allowed class time to note observations of their assigned (chosen) tree on loose paper. The first year that a tree is observed all initial observations may be made directly into the tree's notebook, in following years the notebooks should not be given to the students until they have made their initial observation and have had the opportunity to determine the type of tree without outside influence. Initial instructions should not be vague; although you stress that you want the observations to be detailed and complete. The student should then be given ten minutes to write down/ draw whatever observations that they believe are important. These observations can also include measurements, and should include observations concerning the area that the tree is found (surrounding substrate; distance from other trees, plants, roads; traffic flow, volume – basically whatever information which can describe the tree or its surroundings). The student should then collect a leaf from their tree – for larger trees leaves may be collected from the ground or, if not readily available, an extension lopper may be used.

Using a tree key the student should attempt to identify their leaf – they should soon realize that they have insufficient information to use the key. At this point they receive a handout that explains alternate vs. opposite leaf arrangement, compound, vs. simple leaves etc. Students should discuss the observation that they have already made, and observations that they will make in the future.

Day 2: The students will go outside, note further observations which will help in their identification of their tree. The students should attempt to use the new terminology associated with leaf and branch arrangement and use their key to make a determination of their tree type, they must explain their rationale.

Day 3: The observations and the tree IDs will be returned to the student along with the notebook that had previously been assigned to their tree (I've numbered all the trees that I use for the activity). The student can now check the verification of the tree's identification, and read previous observations. All future observations will be made directly into the notebook. The loose paper should be securely stapled or taped into the notebook, this marks the start on the student's journal. The students should spend some time on the Project BudBurst website, this may be done during class or as homework.

Day 4 and on: The class will observe their trees to determine the dates of the phenological events that are used in Project BudBurst: 50% Color, 50% Leaf Fall, First Leaf, All Leaves Unfolded, First Flower, Full Flower, First Ripe Fruit, and Full Fruiting. Until all trees have reached 50% Leaf Fall it will probably be necessary for the trees to be checked at least once a week. This may be done as a class, or the students can check their tree. Observations may or may not continue through the winter (after complete fall) and winter tree identification may be practiced.

The trees will have to be watched so that First Leaf is not missed on your 'early' trees. The teacher should check every few days with increased vigilance as the weather warms. Pay



special attention if there is an unseasonable warm spell, this may trigger leafing in some trees but not in others. Extra credit can be offered to the first student to note leafing in any of the trees on the school grounds, I usually include some sort of disincentive to discourage false alerts (point penalty or only one 'claim' per student. The observations of the trees should continue until the end of the year or until the last event has occurred. These journals can now be used for following years.

### Extension

- Follow the Project BudBurst protocols for plants other than trees (grasses, wildflowers, evergreens)
- Participate in Journey North – Tulip Test Garden. Students plant Tulip bulbs in the Fall and log in the blooming of their tulips onto this website <http://www.learner.org/jnorth/tulip/index.html>
- Press leaves - <http://www.wikihow.com/Press-Flowers-and-Leaves>. There are many web sources available for this information
- Have students make astrolabes and use in determining the height of their tree

### Resources

Project BudBurst <http://neoninc.org/budburst/>

Journey North – Tulip Test Garden - <http://www.learner.org/jnorth/tulip/index.html>

Tree identification resources:

<http://www.arborday.org/trees/whattree/?TrackingID=908>

Tree Finder, Mary Theilgaard Watts & Tom Watts – I use this

Winter Tree Finder, Mary Theilgaard Watts & Tom Watts

iPhone Tree ID apps and many, many more

### Assessment

Describe how student understanding, learning, and achievement are evaluated for this lesson. List any related documents (e.g. surveys, rubrics) when submitting the lesson and send them separately.

The tree notebooks are checked randomly at the teacher's discretion, although an initial grading may be made at the end of Day 3. I primarily add comments (mostly positive) and suggestions. Generally most students receive full points if they are completing all the sections.

### Credits

Nancy Bigelow

Adapted: Project BudBurst <http://neoninc.org/budburst/>



**National Science Education Standards (NSES):**

**Content Standards, Grades 5-8**

Content Standard A: Science As Inquiry

- a. Abilities necessary to do scientific inquiry
- b. Understandings about scientific inquiry

Content Standard C: Life Science

- a. Structure and function in living systems

**Content Standards, Grades 9-12**

Content Standard A: Science As Inquiry

- a. Abilities necessary to do scientific inquiry
- b. Understandings about scientific inquiry

Content Standard C: Life Science

- d. Interdependence of organisms