Sailin' Seeds

Objectives:
At the end of this exercise, students will be able to:

- Identify different types of fruit and seed dispersal.
- Design fruits/seeds so that they will disperse effectively in the wind.
- Measure the distance the fruit/seed travels and estimate the time aloft.
- Summarize their data in graphical format and analyze their results.
- Determine if there is a correlation between the distance a fruit or seed travels and the amount of time aloft.

Background:
Dispersal of seeds is important for the continued survival of a plant species. If plants grow too closely together, they compete for light, water, and soil nutrients; therefore, seed dispersal is a way to distribute offspring. In flowering plants like apple trees, one or more seeds are housed within a fruit which is the portion of the apple that we eat. Sweet fruit like apples are eaten by animals that disperse the undigested seeds. In contrast, some plants have fruit that remain on the plant and disperse only the seeds. In either case, plants have evolved different dispersal mechanisms. Some fruits can be carried by water, like the coconut. Burdock fruits have hooks that attach to and are dispersed by animals. Dandelion fruits are suspended from feathery "parachutes" that are carried on the wind. The fruit of maple and ash trees have wings that let them float on air. This activity is a fun way for the students to learn how fruit or seed size and shape influence their ability to disperse by wind. Students design their own fruit or seed and measure two important qualities that enhance the ability of it to disperse in the wind: distance travelled and time aloft.

Materials:

- fruit and/or seed examples from sunflowers, dandelions, maple trees, coconuts, apples, peas, nuts, etc. (you may choose many different types or the same for each student).
- supplies to construct artificial "fruit" or "seeds" (paper, tape, scissors, glue, pipe cleaners, sunflower, watermelon or squash seeds, etc...)
- window or large fan
- meter stick or tape measure
- stop watch
- marker

Procedure:
Set up lab stations with different types of fruits and seeds at each station (or a group of fruits/seeds with similar methods of dispersal). Have students record the fruit or seed type, and guess how the seed is dispersed.

After the students have viewed each fruit or seed, review what they have observed. Ask questions that have students consider the relationship between the fruit or seed structure and its mode of dispersal.

Distribute one sunflower fruit (commonly called "sunflower seeds") and supplies to construct a wind dispersal mechanism for the fruit. Explain to the students that they will be placing their completed "fruit" in front of the fan and measuring the distance it disperses. This is a competition to determine which travels the furthest. In addition, they will be measuring the maximum time the "fruit" remains in the air–the maximum time aloft.

After they have created their "fruit", the class will evaluate their dispersal characteristics. Set the fan up on a desk blowing horizontally across the room. Establish a standard drop site above the fan and set a tape measure along the floor beneath the fan. Each "fruit" should be dropped by the student three times and the average used in their results. Alternate students in charge of measuring the distance from the fan as well as measuring the time the "fruit" is in the air.

For the second part of the experiment, have the students drop their "fruit" from a standard height (2 meters) while measuring time spent aloft with a stopwatch. Repeat so that each student does three trials of this experiment. Calculate the average of the three trials and record in the chart.

After all the data has been collected, the students should graph the distance traveled and the time aloft. Have students graph all of the class's data.

The students should determine if a correlation exists between the maximum time aloft and the distance traveled from their graphs.

Elementary Grade Activities

Assessment Questions:

- Discuss with students why the winner's "fruit" traveled the furthest and lasted the longest in the air.

Sailin' Seeds (cont.)

- What design did the winning "fruit" have?
- Why was this a particularly effective disperser? That is, what may have contributed to the win? Was it built better, stronger, lighter?
- How much paper or tape did the student use? Do these affect the weight of the "fruit"?
- Does it matter how the student dropped the "fruit" in front of the fan?
- What other factors in nature contribute to wind dispersal?
- Does it matter if the plant is higher from the ground? In an open area?
- What are the advantages of wind dispersal? Are there any disadvantages?
- Is wind dispersal more likely in dry or fleshy fruits?

Extend the Lesson

Many trees that are also invasive and damaging to our urban forest and natural areas have airborne seed dispersal… and they produce hundreds and hundreds of seeds on each tree. Why would having wind-dispersed seeds be beneficial if you are a tree? Would you rather make an edible fruit?

Elementary Grade Activities

Mapping Your Schoolyard Trees created by Tree Pittsburgh

Goals: To become familiar with the trees that students pass and interact with each day.

Materials:

Paper
tree identification guides (see resources pages),
markers or pencils
clipboards (not necessary though)

Begin indoors.
Often the students will need help starting their maps. On the board, explain to them the parts of a map—a compass, a key, landmarks, etc.

Draw a box for the school on the board. Explain the cardinal directions. Have students show you where other school grounds landmarks are on the map you are making, i.e.: the playground, the recess yard, the outdoor classroom, the parking lot, road names, etc. Once you have the basics drawn out, and each student has them as well, everyone will be on the same page when it is time to go outside.

Going Outside

Explain the rules for going outside, (see Tips for Taking students outside, p. 1) and set a time limit. You may want to go from tree to tree with the students together, or allow them to do this themselves. You know how independent your class is.

Show the students how to use whichever tree identification guide you choose to use. If you use a dichotomous key, practice keying out the species with samples in the classroom. You can do this by having the students id a couple leaves. This could also be an entirely separate lesson on how to id trees.

Once you go outside, determine which tree to visit first, if you are working together, or have the students go off in pairs or small groups. If working together, stand under a tree and ask the students who have figured out what it is to raise their hands. Call on one and if they are right, ask how they can identify this tree in the future/what is unique about this tree? Make sure everyone marks it on their map, and move on.

At the end of the lesson collect the maps.

Extending the Lesson

- Have the students who made the maps break into groups and research the trees they mapped. Have each student group be an expert on one tree.
- Have the students that made the maps lead tours of the trees for Arbor Day, or with younger students, or with adults who visit the school.
- Have the students create labels for the trees. These can be plaster molds of tree leaves and their names, place in the ground near the trees, tags that hang loosely from branches, etc. Remember not to harm the trees when applying labels to them! Be creative.