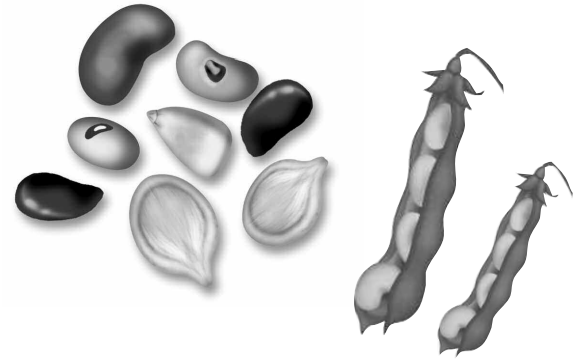


Numbers in Nature: Pre-/Post-Visit Activities



TEACHER GUIDE

Thank you for registering for the GreenSchool Workshop *Numbers in Nature*. During this workshop, your students will investigate how plants and their parts can be used to teach simple arithmetic, geometry, and number series. The following selection of suggested pre- and post-visit activity ideas and recommended resources is designed to support 3rd–5th grade classroom integration of the concepts addressed in *Numbers in Nature*.

PRE-VISIT ACTIVITY IDEAS

Shapes in Nature

In a natural outdoor setting, students strengthen both observation skills and understanding of geometrical shapes by searching for shapes.

Materials:

- paper
- rulers
- pencils
- magazines
- glue
- tape

Review the basic shapes (circle, square, rectangle, triangle, etc.) with your class. Direct students to draw a grid that includes a column with each shape, and rows to record where each shape is found.

In an outdoor setting, ask your students to record each instance that they see each shape on the grid. For example, pointy leaves could be recorded as triangles; a tree stump would count as a circle, and so on.

Discuss the results back in the classroom.

- Which shape was observed the most often? Where?*
- Why do you think this is?*
- Was there anything that didn't have a recognizable shape?*
- Discuss the difference between organic and inorganic shapes.*

Alternatively, your students can do the above exercise using a natural scene found in a magazine. Have each student cut out a picture and glue or tape it down on the page with the grid, before recording the shapes that they see.

How Many Seeds in a Fruit

Students gain understanding about seed dispersal through analysis and comparison of the numbers of seeds in different sized fruits.

Materials:

- selection of fruits (apple, peach, tomato, grapes, peapods)
- knife
- trays or plates
- graph paper
- pencils

Divide your class into small groups, and distribute a selection of fruits to each group. Direct the students to sort these fruits by size, and guess how many seeds each fruit might have.

- Which do you think will have the most seeds? The least?*
- Do you think the size of the fruit affects how many seeds it holds?*

Cut open all of the fruits and have the students count the number of seeds in each. Each group should draw a bar graph with the fruits in order from smallest to largest along the bottom, with the number of seeds each contains shaded in. Alternately, they can clean and glue the actual seeds to the graph. Explain the three main methods of seed dispersal (air, water, animal),

and challenge your class to think about how the number of seeds might affect which way they are dispersed, or spread out.

POST-VISIT ACTIVITY IDEAS

Twig Age

Students extend their understanding of mathematical patterns in nature by using observable markings on twigs to determine age.

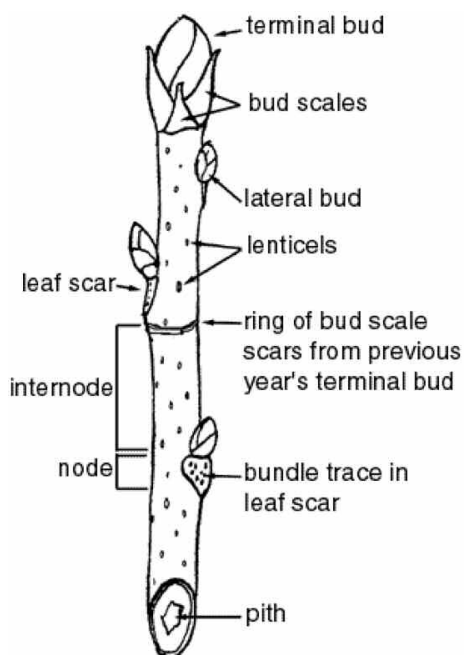
Materials:

- twigs
- hand lenses
- rulers

Encourage students to share what they remember about the process of determining tree age during the *Numbers in Nature GreenSchool* workshop. Explain that twigs and branches can also provide an idea about how old a tree may be.

Give each pair of students a branch or long twig to examine. Guide them through the process of looking backward from the new bud to the most recent terminal bud, and counting as many annual growth rings as they can see. Explain that as the original twig became a branch, the branch became increasingly thicker, obscuring a lot of the evidence of past years' growth, and that at best the amount of growth indicated on the branch tells the minimum age of the tree from which it came. Have students measure and compare the length of growth between annual rings.

- Were there some years that the tree grew dramatically more/less in one year?*
- Why do you think this would happen?*



Estimating Tree Height

Students practice and apply skills in measuring and calculating when mathematically determining the height of a tree.

Materials:

- measuring tape
- yardstick
- calculator (optional)

Guide your class to a tall tree that is casting a shadow along flat ground. Explain that you are going to work together to measure how tall the tree is. Encourage students to brainstorm some possible ways that this could be done—without climbing to the top of the tree!

Have one or two students help measure the shadow of the tree with a measuring tape. Then have another student dangle a yardstick straight down until it reaches the ground, casting a shadow. Another student can help measure this shadow with a measuring tape. Explain that they will set up a ratio between the tree and its shadow; and the yardstick and its shadow.

Back in the classroom, explain and use the following formula to determine the height of the tree (you might need to use a calculator):

$$\frac{\text{yardstick length} \times \text{tree shadow length}}{\text{yardstick shadow length}} = \text{tree height}$$

*For example, if the tree shadow was 52 inches, and the yardstick shadow was 12 inches, the ratio would be (36 inches x 52 inches/12 inches), with a resulting tree height of 156 inches (13 feet).

Discuss the results with your class.

- What are some other tall things that could be measured using this method?*
- Why would it be useful to know the height of a tree?*

To extend this activity, have your class measure a group of trees in this manner, and enter the results in a graph to determine the most/least often recurring heights.

RECOMMENDED TEACHER RESOURCES

Burns, Marilyn. *About Teaching Mathematics.* Sausalito, Calif.: Math Solutions Publications, 1992

Stewart, Ian. *What Shape is a Snowflake?.* New York: W.H. Freeman, 2001.

RECOMMENDED BOOKS FOR CHILDREN

Lottridge, Celia Barker. *One Watermelon Seed.* Toronto: Stoddart Kids, 1986.

Swinburne, Stephen R. *Lots and Lots of Zebra Stripes.* Honesdale, Pa.: Boyds, Mills Press, 1998.

For more information, call the Manager of School Programs at 718.817.8124.