Area and Perimeter of Leaves

Get Outside!
Taking Learning Outdoors

Cross-curricular Connections

Understanding area and perimeter are key mathematical understandings. However, students often mistakenly think that there is a direct relationship between area and perimeter without considering the shape of what is being measured. This activity helps students deepen their understanding of such measurements by calculating the area and perimeter of different leaves. The activity supports *Science and Technology* and *Mathematics* and may be adapted to a variety of grades.

This activity is adapted from: *Math in the Garden*, White et. al. 2006.

Preparation / Resources

- Check out the schoolyard and look for an area where a variety of leaves (different sizes and shapes) are available.

Each student needs:

- Clipboard and pencil
- 1 cm square graph paper (1 sheet);
- Length of string (about 30 cms).
- Clipboard.

Each pair of students needs:

- Centimeter ruler;
- Scissors;
- Tape.

Description of Activity

Time Outside*:* 30 minutes

- Before going outside, review perimeter and area; ask the class to suggest why perimeter and area are useful measurements.
- Ask the students if they think there is a relationship between perimeter and area (collect their responses) then explain that they are going to investigate this possible relationship by examining leaves in the schoolyard.
- Take the class outside; review guidelines for collecting leaves (i.e. preferably on the ground or carefully, if from a plant). Set a time limit; ask each student to bring back at least one leaf.
- Have students work with a partner to trace the outline of each leaf on the graph paper.
- Each student calculates the area of a leaf by counting the number of squares (and partial squares) inside the outline; record the results on the graph paper (area = ____ cm^2)
- To calculate perimeter, partners help each other use the string to "trace" the drawn outline of the leaf; when finished, students cut the string, measure it, record the length on the graph paper (perimeter = _____ cm), then tape the string to the bottom of the graph paper.

Follow-up *(plus Adaptations and Extensions)*

- Organize the leaf tracings (with attached strings) from smallest to largest in **area** and observe the results; guiding questions: *Are you surprised by the placement of any of the leaves? Why? Look at the leaves with the largest area. How are they similar? Look at the ones with the smallest area. How are they similar? Are there any leaves whose shape is different but areas are similar?*
- Using **perimeter** measurements, reorder the leaf tracings from shortest to longest and observe the results; guiding questions: *How has the order changed? Does the leaf with the largest area have the greatest perimeter? Does the leaf with the smallest perimeter have the smallest area? Is there a relationship between area and perimeter? Why or Why not?*
- When doing the activity, have some leaves in reserve in case students have difficulty with the ones they chose (i.e. an irregular shaped leaf like a Maple is challenging; a beech leaf is less challenging).
- To help students consider the relationship between shape, area and perimeter, have them cut a 20 cm piece of string and challenge them to make a leaf shape with the smallest possible area, then the largest. Ask students what characteristics the shapes with the smallest or largest area share.
- Have students use the area measurement of their leaf to create different shapes that have the same area but different perimeters.
- Investigate relationships between leaf shape and adaptations for survival.