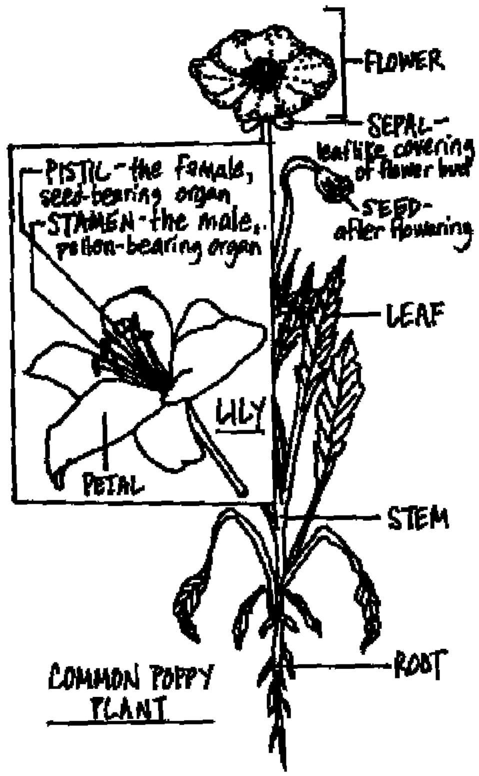
1 Parts of a Plant

Science Background Information for Teachers

The basic parts of plants include: root, stem, leaves, flower, pistil, stamen, sepal, and seeds.



Materials

- newspaper
- small plants in flower, one per student or per pair of students (buy cell packs at a garden centre)
- soft paintbrushes
- chart paper, felt pens

Activity

As an introduction to plants, have students brainstorm a list of all the plants they know. Record their ideas on chart paper, and discuss what all of these plants have in common.

Have students work individually or in pairs. Give each student or pair of students some newspaper, a paintbrush, and a flowering plant. Ask the students to cover their desks with the newspaper, then gently remove the plant from its pot and lay the plant on top of the newspaper.

Have the students use the paintbrush to carefully brush away as much soil as they can. Then have them identify any parts of the plant they know. Ask:

- What do these plants all have in common?

As the students identify the parts – including roots, stem, leaves, flowers, and seeds – write the name of each part of the plant on chart paper. Have the students predict and discuss the function of each part.

Once all of the parts of the plant have been identified, have students sketch their plant on their activity sheet and label the diagram.

Activity Sheet

Directions to students:

Draw a diagram of your plant. Label these parts: root, stem, leaf, flower, seeds (1.1.1).

Note: Additional plant parts can also be labelled if observed on the plant (e.g., pistil, stamen, sepal).

Extension

Plan and implement a language arts novel study, using *The Secret Garden* by Frances Hodgson Burnett.

Assessment Suggestion

Through individual conferences, or by reviewing the students' activity sheets, determine if students can identify and describe the basic functions of the different parts of the plant. Use the rubric on page 19 to identify criteria and record results.

Date: __________________ **Name:** ____________________________

Basic Parts of a Plant

Label the following on your diagram: root, stem, leaf, flower, seeds

3 Special Features of Plants

Science Background Information for Teachers

Roots: Roots anchor a plant in place, and seek out and store moisture and nutrients for the plants. The two types of root systems are tap roots and fibrous roots. A tap root is a long, thick root that grows down deep and straight (e.g., dandelion root, carrot, turnip). A fibrous root has many root tips that spread out in all directions (e.g., grass, most potted plants).

Stem: The xylem cells of the plant stem transport water and other nutrients from the roots to the leaves. The stem also carries the food made in the leaves to all parts of the plant.

Leaves: Leaves make food for the plant to live and grow. Leaves are filled with chlorophyll (this gives the leaves their green colour). Chlorophyll helps turn sunlight, water, minerals, and air into food for the plant.

Materials

- paper lunch bags
- clipboards
- pencils
- trowels
- newspaper
- samples of fibrous and tap roots
- potted plants (optional – see Note: Activity A)
- glasses of water (two per group)
- food colouring
- fresh pieces of celery with tops (one per group)
- white carnations (one per group)
- knife (for adult use only)
- cactus
- variety of leaves collected by students
- *Straight from the Bear's Mouth: The Story of Photosynthesis*, a book by Bill Ross
- water

As a class, review the parts of the plant. Now explain to the students that they are going to conduct a number of experiments to investigate the special features of plants. Through these experiments, they are going to learn how each part of the plant has a special role in the survival of that plant.

Divide the class into small groups (approximately four students per group). Keep students in these groups as they work through each activity.

Activity: Part One: Root Systems

Note: For this activity, have the students collect their own root samples from weeds and other plants in the neighbourhood. If this is not possible, you can use a variety of potted plants to investigate root systems.

Ask the students to predict and explain the job of the roots of a plant. Have students fill in the prediction box at the top of activity sheet A (1.3.1).

If the season permits, take the students for a walk in the schoolyard or in a local park. Have students work in their small groups. Give each group a paper lunch bag, clipboards, pencils, and activity sheet A. Ask the students to find a weed in the ground. Before they dig up the weed, have the students draw what they think the root system looks like. Once they have drawn their prediction, ask the students to dig up their weed carefully and place it in their paper lunch bag. Once you are back in the classroom, have the students soak their weed in water to remove any soil around the weed. Ask students to compare their prediction of what they thought the roots would look like with the actual root system. Have them draw the actual root system next to their prediction.

Display the weeds on a table covered with newspaper. Once the students have had an opportunity to view the root systems of different weeds, ask:

- Are all root systems the same?
- How are they different?
- Was it easy to dig up your root from the ground?
- What special role do you think roots play in the survival of a plant?

Introduce the terms *tap root* and *fibrous root*. Have the students sort their weeds according to the type of root system.

Note: If students did not collect examples of both fibrous and tap roots, use samples that you have provided to observe, compare, contrast, and discuss.

Activity Sheet A

Directions to students:

1. Fill in your prediction at the top of the page.
2. Draw your prediction of the root system of the weed you have found.
3. Draw the actual root system of the weed you have found.
4. In your own words, describe the special function of roots.

Extension

Grow plants from vegetables (e.g., a potato and a carrot) and from cuttings. Observe the different root systems. Compare the growth of these plants.

Activity: Part Two: Stem

Ask students to predict and explain the job of stems in a plant. Have students fill in the prediction box at the top of activity sheet B (1.3.2) before starting the activity.

Provide the following instructions to each group:

1. Fill two glasses with water.
2. Put a few drops of food colouring in each glass.
3. Put the celery stalk in one glass and the carnation in the other.
4. Draw the plants on your activity sheet (initial observation).
5. Set the glasses in the sunlight. Leave them overnight.
6. Record your observations on your activity sheet.

Ask the students:

- Can you explain the role of the stem in the survival of a plant?
- Why is this an important role?

Using a sharp knife (adult only), cut off a section of the stems of the celery stalk and carnations so that students can examine the inside of the stem. Ask:

- What does the inside of the stem look like?
- Can you locate the tubes that carry the water up the stem in the celery and in the carnation?
- How did you locate these tubes?
- What else do you think stems may carry? (They carry nutrients to different parts of the plant.)

Display the cactus and have students identify it and locate the stem. Explain to the students that cacti have special stems called fleshy stems. Ask:

- Do you think the role of the stem in a cactus is different from any other plants?
- What is the habitat of a cactus like?
- Why is the stem so important for a cactus?

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Activity Sheet B

Directions to students:

1. Fill in the prediction box at the top of the page.
2. Draw a diagram of the celery and the carnation in the coloured water at the beginning of the experiment.
3. Draw your observations of the celery and carnation stems at the end of the experiment.
4. In your own words, explain the special function of the stem.

Extension

Vary this experiment by using more than one colour of food colouring and by splitting the stems of a variety of flowers (e.g., white carnations, Shasta daisies, and white roses). Try splitting stems into halves, thirds, or quarters and putting each stem section into a different colour of water for several hours or overnight.

Activity: Part Three: Leaves

Note: The concept of photosynthesis can be quite abstract for students at this age: it is impossible for students to observe directly the production of food by the plant. The activities that follow should assist students in gaining a basic understanding of the importance of leaves.

Provide each group with several leaves (from both coniferous and deciduous trees) to observe, examine, and discuss. Encourage them to identify similarities and differences. Ask students to fill in their prediction box at the top of activity sheet C (1.3.3). You can also have them draw diagrams of five different types of leaves on the back of their activity sheets.

Read the story *Straight from the Bear's Mouth: The Story of Photosynthesis* by Bill Ross.

Note: You may wish to read only those parts from the book that are appropriate for this investigation.

Following the story, ask the students:

- Why are leaves green?
- Why does the plant need the green part (chlorophyll)?
- What else does a green leaf need in order to make food for the plant?

Activity Sheet C

Directions to students:

1. Fill in the prediction box at the top of the page.
2. Draw all of the things a green leaf needs in order to make food for the plant (recipe for plant food).
3. In your own words, explain the special function of leaves.

Extensions

- Provide three potted, newly sprouted plants of the same size. Label the plants (1, 2, and 3). Pinch all the leaves off Plant 1. Pinch half the leaves off Plant 2. Do not pinch any leaves off Plant 3. Care for the plants in the same way, making sure they receive the same amount of sunlight and water. Have students observe the plants and measure the differences in growth. Discuss the importance of leaves in the growth of the plant.
- **Leaf Rubbings:** Place a leaf under drawing paper and lightly colour the paper with a crayon. The stem and leaf pattern will be clearly displayed.
- Leaves can be saved for further study or for classroom display by placing them between sheets of wax paper, covering the wax paper with a cloth, and pressing with

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a warm iron. Leaf patterns will be apparent and the leaves will be permanently maintained.

- **Leaf Skeletons:** Collect various leaves and place them between sheets of newspaper. Place books on top of the newspaper to add weight. After a few days, when the leaves have become dry and brittle, place one leaf between two sheets of paper and use a hammer to gently pound the entire leaf surface. Remove the top sheet of paper and observe the leaf skeleton. This is an excellent way to closely examine veins, stems, and the framework of leaves.
- **Breathing Leaves:** Using one plant with several leaves, rub half the leaves on both sides with Vaseline. Tie a string or a twist tie loosely around the stem of each coated leaf so that you will remember which leaves have been treated. Leave the plant for several days, observing the changes in the leaves; the leaves covered with Vaseline will begin to die because they cannot take in air.
- **Patterned Leaves:** Using plants that have several large leaves, paper clip small cutout circles or rectangles of black construction paper over sections of some of the leaves. Place the plants in a sunny area for several days, then remove the construction paper and observe the leaves. The areas covered with paper will be much paler, because these areas did not receive the sunlight required to produce chlorophyll, which gives the plants their green colour. (Sunlight is necessary for photosynthesis, a process in which the plant creates its own sugar for food.)
- **Moisture in Leaves:** Using a plant with several leaves, place a small plastic bag over a few of the leaves, then tie the bag securely with string. After a few days you will notice water droplets in the bag because plants that use water also disperse water into the air.
- Use leaves for printmaking by dipping them in paint and pressing them onto art paper.
- Gather a group of leaves and have students sort them according to size, veins, edges, texture, colour, and shape.

Assessment Suggestion

Through individual conferences with students, have the students identify the parts and explain the functions of a displayed sample plant. Use the individual student observations sheet on page 16 to record results.

Date: ________________ Name: ___________________________

Roots

Prediction Box

I think the function of the root is ________________________

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Predicted Root System **Actual Root System**

Function of Roots

The function of roots is ____________________________________

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Date: ________________ **Name:** __________________________

The Stem

Prediction Box

I think the function of the stem is_________________

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First Observations:

Final Observations:

Function of the Stem

The function of the stem is ______________________

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Date: ________________ **Name:** __________________________

The Leaves

Prediction Box

I think the function of leaves is ____________________

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Recipe for Plant Food

Function of Leaves

The function of the leaves is ______________________

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2 Magnets in Everyday Life

Science Background Information for Teachers

Magnets are used all around the house. You might find magnetic knife holders, and magnets to keep the fridge door and many cupboard doors closed. Magnets are used in all kinds of machines. They are in stereo speakers, television sets, computers, and telephones.

Magnets can be helpful if used properly. If used incorrectly, they can cause serious problems. Powerful magnets can actually erase the picture on a television screen by rearranging the atoms. They can also cause damage to cassette tapes and computer disks.

Recording tapes and computer disks are coated with an iron oxide. When we record music or sound on a cassette, the atoms on the tape are realigned so that when we play the tape back, the sounds will be reproduced. Similarly, the magnetic tape disk that turns around inside a floppy disk rearranges the atoms so that we can retrieve information at a later time. When a magnet is brought in contact with a cassette tape or computer disk, it mixes up the atoms so the sound or information cannot be retrieved.

Materials

- tape cassette with recorded music (Do not use a favourite tape as the music will be distorted. Prepare a tape just for this activity.)
- computer disk with a file of information on it (Do not use an important disk as the files will be erased. Prepare a disk just for this activity.)
- computer
- bar magnet
- tape player
- several objects containing magnets, such as fridge magnets, an electric can opener, and a wallet or purse
- chart paper, markers

Activity

Display the objects containing magnets, and have the students examine them. Then discuss the usefulness of magnets in everyday life. As a class, brainstorm uses for magnets and record these ideas on chart paper.

Demonstrate the harmful effects of magnets. First copy a file from the disk onto the computer. This will show students that there is a file on the disk. Now remove the disk from the computer and ask the students:

- What do you think will happen if I touch the bar magnet to the disk?

Take the bar magnet and pass it slowly over the computer floppy disk (about three to four seconds on the top of the disk, not over the metal wheel). Repeat this three or four times.

Now put the disk back in the computer, and try again to copy the file. You will likely receive a message telling you that you have an error or a statement saying that the computer cannot find the file. Ask the students:

- What do you think happened?
- What does this tell you about proper storage of computer disks and magnets?

Repeat this activity using the cassette tape. Play the music selection for the students. Ask:

- What do you think will happen if the magnet comes in contact with the tape?

Pass the magnet over the tape slowly at least five times.

Note: When you play back the tape in the tape player, parts of the tape will not be affected. Other sections will be completely blank, muffled, muddy sounding, or distorted.

Discuss the effects of the magnet on the tape, and the importance of proper storage of these materials.

Activity Sheet

Note: This activity sheet is to be completed at home under the supervision of parents/guardians. Remind students not to take household items apart, unless they receive permission and are supervised.

Directions to students:

Find as many objects as you can in your home that use magnets. Explain how the magnet is used in each item (2.2.1).

Activity Centre

Have students make their own fridge magnets. Provide several button-type magnets or magnetic strips and art supplies such as modelling clay, dried flowers, tree bark, shells, and beads.

Date: ________________ Name: __________________________

Magnets in My Home

List the objects in your home that use magnets.

Object	How the Magnet Is Used

3 Making a Magnet

Science Background Information for Teachers

The first magnets were actually pieces of rock. These rocks, called lodestones, contain magnetite. Magnetite is naturally attracted to iron. Magnetic induction occurs when a piece of metal like iron touches a magnet. It becomes a magnet itself. When a metal object containing iron or steel is rubbed by a magnet, the object will become magnetized. Iron will act like a magnet for a short period of time when treated like this. Steel (made from iron) will hold its magnetism for a long period of time.

Materials

- objects that are attracted to magnets (see Magnetic Attraction, page 85)
- bar magnets
- nails
- screws
- metal sewing needles
- paper clips (or staples)

Activity

Note: Have the students complete the activity sheet during the exercise.

Divide the class into working groups and provide all materials. Have the students examine a nail, and the paper clips or staples. Ask:

- Do you think the nail could pick the paper clips up?

Now have the students rub the nail fifteen times (in the same direction, not back and forth) with a bar magnet. Ask:

- Do you think the nail will pick up the paper clips now?

Have them test their predictions by testing the nail as a magnet. Have them record their predictions on the activity sheet. Ask:

- How many paper clips were attracted?

Have them record results on the activity sheet.

Now magnetize the metal sewing needle, then the screw, and repeat the exercise. Ask:

- How many paper clips were attracted to each of these?
- Which object worked best as a magnet?

Have the students record their predictions and results on the activity sheet.

Ask:

- Would it make a difference if the object was rubbed twice as much (thirty times)?

Have the students rub the objects thirty times on the magnet, then record their predictions and results on the activity sheet.

Activity Sheet

Directions to students:

Record the number of paper clips that the objects picked up after being rubbed with the magnet, then answer the questions (2.3.1).

Activity Centre

At the centre, provide paper clips (or staples), bar magnets, and objects such as nails, pens, pencils, and scissors to test. Have the students make a temporary magnet by touching the bar magnet to the head of the nail. Instruct them to use the nail's point to try to pick up the paper clips. Ask:

- How many paper clips can you pick up?

Now move the nail gradually away from the magnet. Ask:

- What happens to the paper clips?

Experiment with other objects such as pens, scissors, screws, and pencils.

Date: ________________ **Name:** ___________________________

Making a Magnet

Record the number of paper clips the object picked up after being rubbed with a magnet.

Object	Number of Rubs	Number of Paper Clips Attracted	
		Prediction	Result

How can you tell when an object is charged or magnetized?____________________________________

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When you rub an object with a magnet, does the number of rubs make a difference to the charge?

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