

BIOLOGY OF PLANTS

HOW PLANTS GROW Activities

LOOKING INSIDE A SEED

Students will take apart a seed, examine, and identify its parts.

Materials:

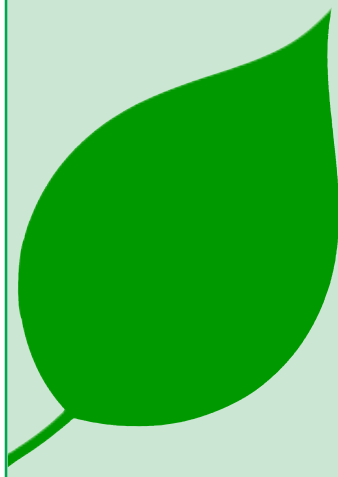
1. Lima beans
2. Shallow container for soaking seeds
3. Hand lenses

Preparation:

1. Soak the seeds overnight in about one inch of water.
2. Drain off the water.
3. If you forget to soak the seeds, microwave them in water on medium for 10-15 minutes. Remove seeds when coats begin to split. Cool seeds thoroughly before using them.

Procedure:

1. Tell students that every seed contains a new plant and a food source to keep that plant alive until it is big enough to make its own food. Explain that we will see both the new plant and the food today. Pass out seeds to each student.
2. Have students pull off the loosened seed coat. Ask what the coat does for the seed. (It protects the new plant from cold or wet or from drying out before it is ready to grow.)
3. Carefully split the seed in two from the side AWAY from the indentation. It will split open like a book. Opening the two halves of the seed exposes the embryo. Have students find the plant's leaves and roots.
4. Ask what all the rest of the material in the seed is. (Food for the new plant—and the food store is larger than the small plant.)
5. Have students draw the seed parts they have seen.



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CONDITIONS FOR GERMINATION (ZIPLOC BAG METHOD)

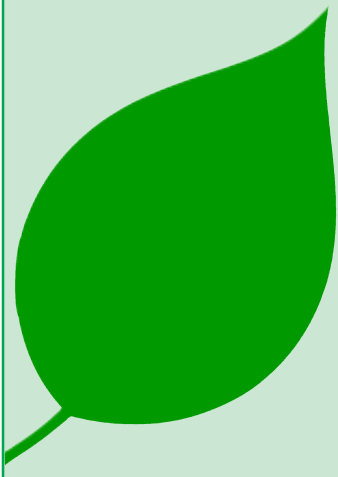
Students will experiment to see which conditions favor germination of seeds.

Materials:

1. 4 ziploc bags for each group of students
2. 4 paper towels for each group of students
3. 12 seeds all the same kind for each group (mung bean, lima bean, alfalfa, or radish)
4. 4 label for each group
5. Markers
6. Water

Procedure:

1. List ideas about what people need to grow healthy and strong. Ask what plants need to grow. What do seeds need to grow? (It is likely that their answer for seeds will be the same as for plants—water, sunlight, air, soil). Explain that the class will do an experiment together to find out what seeds need to grow.
2. Give each group of experimenters bags, labels, and markers. Have them write their group's name on all the labels. Number the labels 1 through 4. Place one label on each bag.
3. Give each group paper towels. Have them fold the paper towels in fourths.
4. Wet three of the towels. Place them in bags 1 through 3. Place the dry towel in bag 4.
5. Add three seeds to each bag.
6. Discuss where seeds can be put to receive sunlight and no sunlight. Also select a cold, dark spot where some seeds can be placed.
7. Place bag 1 in the sun. Place bag 2 in the dark. Place bag 3 in the cold, dark place. Place bag 4 in the sun.
8. Check on the seeds in 4–5 days. Make a chart to record your results.



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CONDITIONS FOR GERMINATION (PLASTIC POT METHOD)

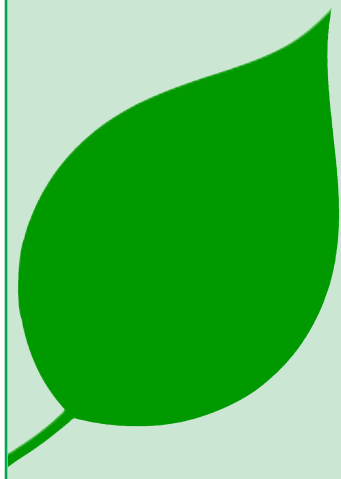
Students will experiment to see which conditions favor germination of seeds.

Materials:

1. 4 two-inch plastic pots for each group
2. Potting soil
3. 12 seeds all the same kind for each group (mung bean, lima bean, alfalfa, or radish)
4. 4 label for each group
5. Markers
6. Water

Procedure:

1. List ideas about what people need to grow healthy and strong. Ask what plants need to grow. What do seeds need to grow? (It is likely that their answer for seeds will be the same as for plants—water, sunlight, air, soil). Explain that the class will do an experiment together to find out what seeds need to grow.
2. Give each group labels, pots, and markers. Write group's name on all labels. Number the labels 1 through 4. Place one on each pot.
3. Place potting soil in each pot to within one inch of top.
4. Water pots 1, 2, and 3. Leave pot 4 dry.
5. Place 3 seeds on top of soil in each pot. Make sure that each of the pots which is watered remains damp throughout the experiment. When seeds dry up after being moistened, the new plant dies.
6. Discuss where seeds can be put to receive sunlight and no sunlight. Also select a cold, dark spot where some seeds can be placed.
7. Place pot 1 in the sun. Place pot 2 in the dark. Place pot 3 in the cold, dark place. Place pot 4 in the sun.
8. Check on the seeds in 4–5 days. Make a chart to record your results.



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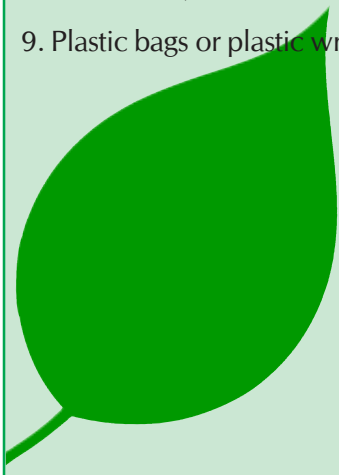
HOW PLANTS GROW Activities

CHARACTERISTICS OF LIVING THINGS

Students will list the characteristics of living things. Students will test plants' ability to respond to their environment.

Materials:

1. Collection of objects from the room including a plant and an insect.
2. *Mimosa pudica* plant (also called sensitive plant)– (available through Carolina Biological Supply Company: 800-334-5551 or www.carolina.com)
3. Lima beans for each child, soaked overnight
4. Pins
5. Corrugated cardboard, cut in small squares (1 per student)
6. Paper towel for each child
7. Water
8. Clothesline and clothespins (paper clips can be substituted)
9. Plastic bags or plastic wrap



Procedure:

1. Present the collection of living and non-living objects to your students. Ask how we would know that each of these objects is a living thing, or a non-living thing. List the characteristics that all agree fit living things, and non-living things.

(One characteristic which may not show up on their list is that all living things react to their environment. Be sure that this is included at least tentatively, and discuss whether plants fit this criterion.) Accept all opinions and explain that we can test whether plants respond to touch and gravity.
2. Touch: Bring out a mimosa plant. Ask a student to touch its leaves. What happens? (The leaves will fold together.) Explain that plants can move although they cannot uproot themselves and move to another place.
3. Gravity: Have each child place a dampened paper towel on corrugated cardboard. Label the four sides of the cardboard square 1 through 4.
4. Pin a lima bean to the cardboard (pin through the fat center of the seed). Place the cardboard in a plastic bag or wrap in plastic wrap. Hang the cardboard on clothesline with side 1 up.
5. When most of the lima beans have germinated, check to see which way the roots and top of the plant are growing.
6. Turn the plant so #2 is up. Check two days later. What has happened? Repeat, turning to side 3 and side 4.
7. Talk about the ways the seedling and the mimosa plant reacted. Reinforce that all living things, including plants, react to their environment, although some of the reactions are very slow.