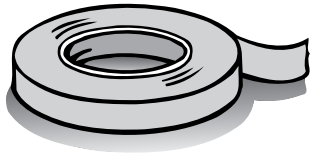
Chapter Science Investigation Name _____

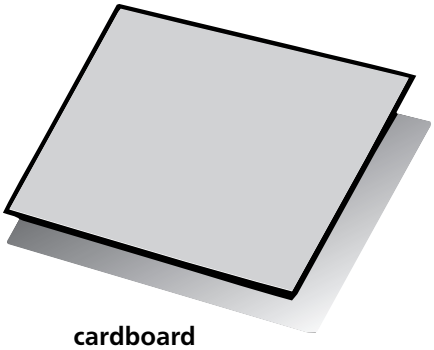
Growing Toward Light

What You Need

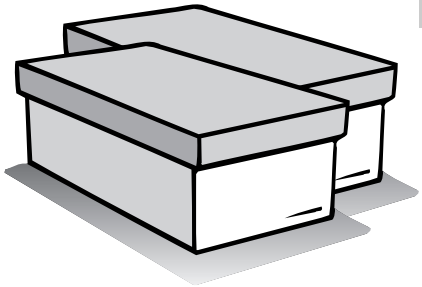
scissors



masking tape



cardboard



two shoe boxes with lids

three germinated bean seeds

Find Out

Do this activity to observe how a plant species has adapted.

Process Skills

Controlling Variables
Hypothesizing
Observing
Communicating
Experimenting

Time

- 20 minutes one or two weeks before starting the investigation
- 10 minutes once a week for three weeks

Germinate bean seeds about 1–2 weeks before placing them in boxes.

What to Do

1. Plant the bean seeds in potting soil in separate pots two weeks before starting this investigation. Put the pots in a sunny place, and water them each day.

2. Use the cardboard and tape to make a maze inside one shoe box, as shown. Cut a hole somewhere in the box, making sure there is enough room for some light to reach the plant when you first put it in the box. Do not put the first barrier right on top of the plant.

3. Put one plant in the maze shoe box. Place the box lid on the box. Put the second plant in the shoe box with no light holes. Place the box lid on the box. Leave the third plant on a plate. Put all three plants near a sunny window, but not in direct sunlight.

4. **Write a hypothesis** about how light will affect the plants.

5. **Observe** the plants after three days, and **record** your observations.

6. **Observe** and **record** the changes in the plants each week.

Make sure the students continue to water all three plants. Use the same amount of water for each plant.

Hypothesis: _____

_____

_____

Growth of Bean Plants			
Time	**Plant with No Light**	**Plant in Maze Box**	**Plant in Sunlight**
After Three Days			
End of Week 1			
End of Week 2			
End of Week 3			

Conclusions

1. How did the plants grow as time went on?
They all grew toward the light, twisting and bending as made necessary by the cardboard barriers.

2. Why did the plants grow as they did?
Plants grow toward the light because they need the light to produce food. When a barrier is in between the plant and the light, the plant will bend to get to the light.

3. How does the way the bean plants grew help them to survive?
Answers will vary. One possibility is that the ability of the bean plant to grow toward the light gives it an advantage when competing for resources, such as sunlight.

New Questions

1. Can living organisms adapt to all changes?
No, but if they are to survive, living things must adapt to change. If a plant is blocked from the light, to survive it must grow in the direction of the light. If an animal's food source is taken away, it will travel to find a new source. But, sometimes the organism cannot adapt, so it will not survive.

2. Write a new question you have about living things.
Accept any reasonable questions.

Name _____

ACTIVITY

Moving Water Through Plants

What did you **observe** as you watched the water rising in the paper towel? What did you **observe** as you watched the water rising in the glass tube? How long did it take for each? **Record** your observations in the chart below.

Answers will vary.

	Observations	**Time**
Glass Tube		
Paper Towel		

Name _____

Conclusions

1. How long did it take for the water to rise in the glass tube?
fast, all-at-once

2. How long did it take for the water to rise in the paper towel?
First, it started quickly. Then, it crept slowly, bit by bit.

3. Which plant is like the paper towel and which one is like the glass tube?
Moss is like the towel; lettuce is like the glass tube.

Asking New Questions

1. Why do you think mosses are small and grow close to the ground?
Answers will vary. One possibility is so the water can seep up faster.

2. Do you think trees absorb water like the paper towel or like the glass tube? Why?
Glass tube. Tall plants are all vascular plants.

Name _____

ACTIVITY

Investigating Vertebrates

Record your observations from the animal photos in the table below.

Animal	Length	Color	Body Parts	Outer Covering

How do you think each animal moves?
Accept reasonable answers.

What type of environment do you think each animal needs?
Accept reasonable answers.

Name _____

Conclusions

1. Based upon your observations, how could you **classify** the different animals?

Answers will vary. Possible answers include: vertebrates, bilateral symmetry; the giraffe and the Amazon parrot are warm-blooded; the iguana, angelfish, and salamander are cold-blooded.

2. What body parts help each of the animals move?

The iguana, giraffe, and salamander all use four legs to move. The amazon parrot can use its two legs and its wings to move. The angelfish has fins that it uses to move.

3. What is the smallest animal? The largest?

The smallest animal is the salamander. The largest animal is the giraffe.

Asking New Questions

1. What are the major differences you observed among fish, amphibians, and reptiles?

Answers will vary. Possible answers include: fish, amphibians, and reptiles each have different kinds of outer coverings; they live in different environments. Fish do not have legs, but reptiles and amphibians do have legs.

2. What are the major differences you observed between birds and mammals?

Answers will vary. Possible answers include: birds and mammals have different outer coverings. They move in different ways.

Name _____

ACTIVITY

Animal Behavior

Where did the earthworms move? **Record** your observations in the chart. Answers will vary. Have students compare notes and discuss why multiple trials are needed to reach conclusions.

Earthworms	Where They Moved on the Paper	Where They Moved Under the Box

Name _____

Conclusions

1. Where did the earthworms move after one or two hours?
The earthworms should end up under the black construction paper and stay there. The earthworms under the box should not end up under the construction paper.

2. Did all of the earthworms move to the same location?
Answers will vary, but it is likely that when they end up under the black paper they will stop moving. When the box is placed over the paper, the earthworms may not move very much at all.

3. Compare the positions of the earthworms under the box and on the paper after one hour.
Answers will vary. The earthworms in the dark are less likely to move around.

Asking New Questions

1. Why do you think the earthworms reacted the way they did?
Answers will vary, students may suggest that the earthworms move around because they are reacting to the light.

2. Can you **explain** how this behavior might be an example of instinct?
Answers will vary. Possibilities might include that all of the earthworms have similar reactions, and they did not learn this behavior from prior experience.