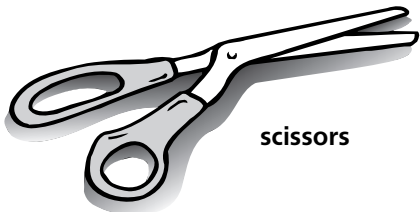
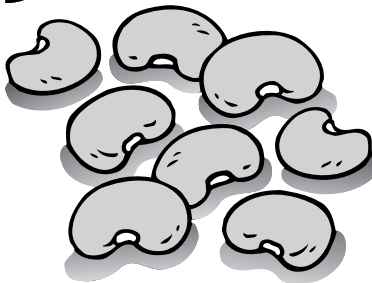


Responses of Plants to Gravity

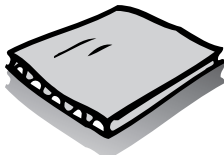
WHAT YOU NEED



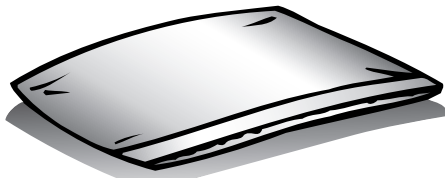
scissors



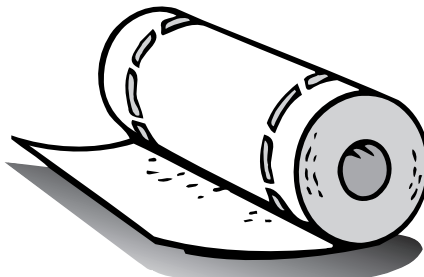
eight lima beans
(soaked in water
overnight)



piece of corrugated
cardboard



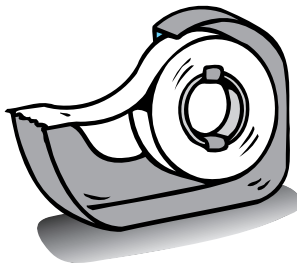
self-sealing
plastic bag



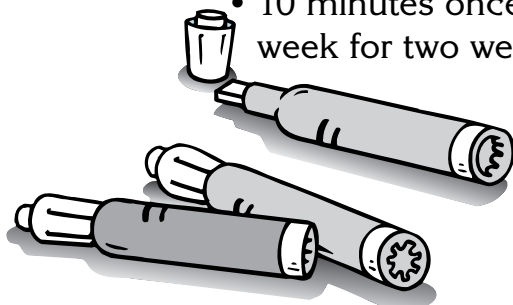
several paper towels



water



tape



markers

Find Out

Do this activity to see how plants respond to gravity.

Process Skills

Observing
Communicating
Predicting
Inferring
Interpreting Data
Designing
Investigations

Time

- 30 minutes the first day
- 10 minutes once a week for two weeks

WHAT TO DO



1. Cut a piece of cardboard so that it will barely slide inside the plastic bag. Use two layers of cardboard if necessary to get a tight fit. Remove the cardboard from the bag and wrap a layer of paper towels around it. Slide the towel-covered cardboard back into the bag. Pour in enough water to soak the cardboard and the towels. Pour off any excess water after the cardboard is thoroughly wet.

2. Slide eight lima beans inside the bag on top of the towel-covered cardboard. Place the lima beans in a circle.
3. Put your name and the date on the bag. Seal the bag. The plastic should hold the lima beans in place. If any of the beans slip, push on the outside of the bag and line them up or add more paper towels.
4. Hang the bag on a wall in your classroom. Do not lay the bag flat.
5. **Observe** the lima beans once a day until the seeds begin to sprout.
6. **Draw** how the roots look when the seeds sprout. Hang the bag in the same place after you make your observations.
7. **Predict** how the roots of each of the seeds will look after one week by drawing how the seeds will look.
8. Once the seeds have sprouted, wait one week. Then, **observe** and **draw** the roots of the seeds.



Plant Responses to Gravity

How the Roots Look When Seeds Sprout

Drawings will vary.

Prediction of How the Roots Will Look One Week After Sprouting

Drawings will vary.

How the Roots Look One Week After Sprouting

Drawings will vary but will likely show all the roots growing downward.

Conclusions

1. **Infer** what force, or environmental influence, caused the roots to grow downward.

Gravity caused the roots to grow downward.

2. How does this response help the plant to survive?

Answers may vary, but may include that by growing downward roots will likely contact soil, where they can find needed water and nutrients.

New Questions

1. What is the name of the plant response that involves a change of position by growing toward or away from a stimulus?

tropism

2. What are some other environmental influences that can cause a plant to change its position?

light, water, touch—phototropism, hydrotropism, and thigmotropism

3. How could you design an experiment to show how one of these environmental influences could change the growth or position of your bean sprouts? Explain what would be learned by collecting data on this influence.

Designs and explanations will vary.



Name _____

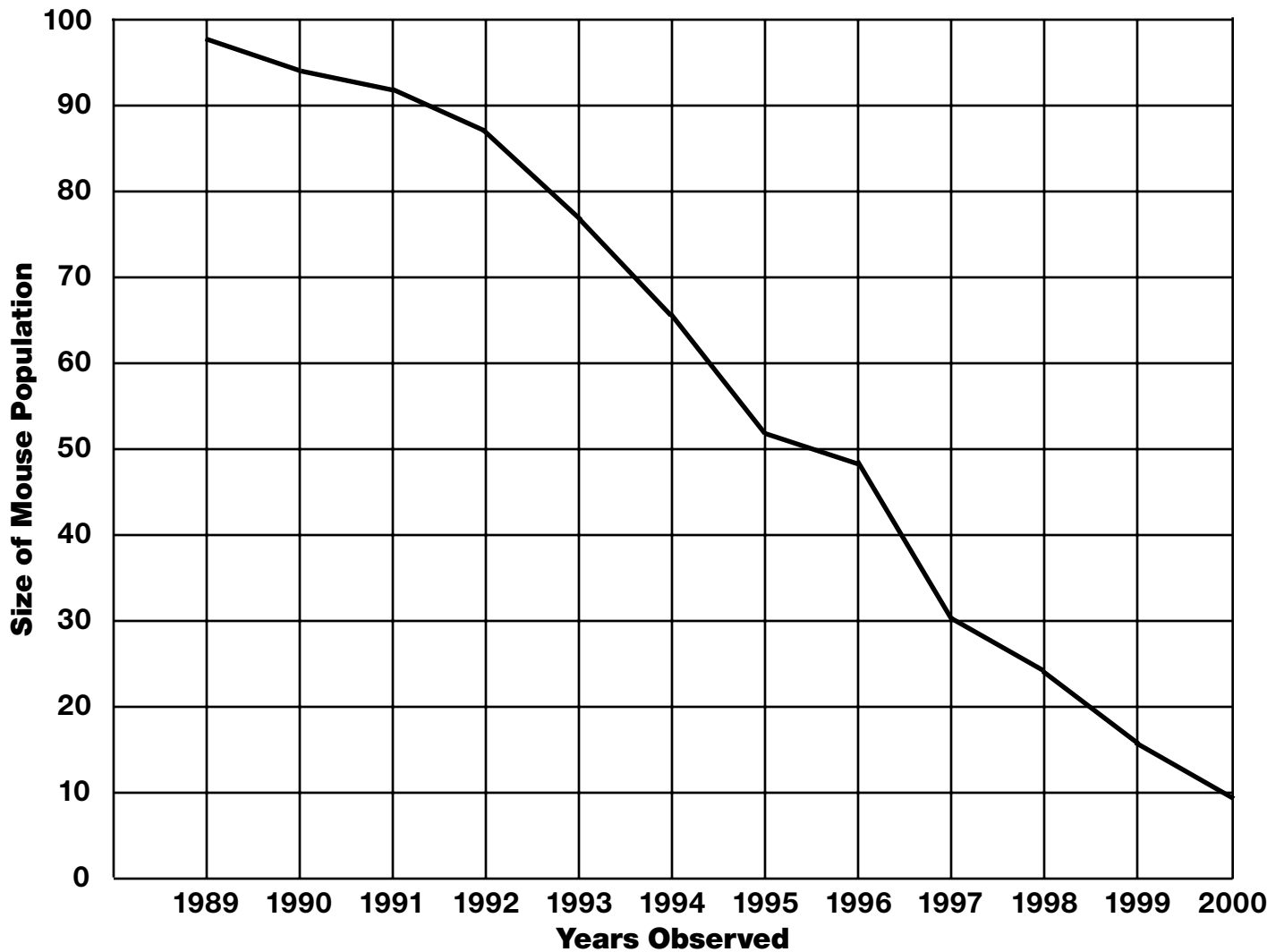


ACTIVITY

Investigating a Population

Predict what you think happened to the mouse population between 1989 and 1999.

Answers will vary.



Name _____

Conclusions

- 1** Was your prediction supported by the data? Why or why not?

Answers will vary based on the predictions made. Students should recognize that the number of mice decreased as the number of houses increased.

- 2** Did the number of mice increase or decrease between 1989 and 1999?

The number of mice decreased.

- 3** Between which two years was there the greatest change in the population?

The greatest change in population was between 1996 and 1997.

- 4** **Infer** what limiting factors affected the population size of the field mice.

Answers will vary but may include that the mice had less food, water, and appropriate living conditions.

Asking New Questions

- 1** List two factors that could cause the mouse population to decrease.

Answers may include emigration, death, disease, or limited resources.

- 2** List two factors that could cause the mouse population to increase.

Answers may include immigration and reproduction.

Name _____



ACTIVITY

Investigating What a Predator Eats

Predict what an owl might eat.

Answers will vary.

Record the types and numbers of skulls you found in the pellet.

Answers will vary.

Name _____

Conclusions

1 Compare your prediction with your observations.
Answers will vary based on predictions made. Students should recognize that an owl eats small animals.

2 What kinds of materials did you identify in the owl pellet?
Answers will vary but students will likely find bones, including skull bones.

3 **Infer** what the interactions and relationships were between the owl and the animals it ate.
The owl is a predator and the animals were the owl's prey.

Asking New Questions

1 How are the owl and other predators important to Earth's ecosystem?
Answers will vary but may include that predators can prevent overpopulation of a species, are part of the carbon and nitrogen cycles, and are important to their food webs.

2 **Infer** what the owl's niche might be in its community.
Answers will vary but may include that the owl's niche is to eat small animals, such as rodents.

Name _____



ACTIVITY

Investigating Earthworm Behavior

How do the earthworms react when you hold the container under a bright light?

They burrow into the soil.

What does the earthworm do when you hold it in the palm of your hand?

It wriggles.

How does the earthworm react to the vinegar?

It moves away from the vinegar.

Name _____

Conclusions

- ① What were the different stimuli to which the worm responded?
The worm responded to light, touch, and vinegar.

- ② What earthworm behavior did you observe?
It moved to light, away from vinegar, and wiggled when touched.

- ③ If the earthworm had never before been exposed to the stimuli used in this activity, was the earthworm's behavior learned or innate? Why?
The earthworm's behavior was innate, because learned behavior is taught or results from experience.

Asking New Questions

- ① How might the earthworm's responses to light, touch, and vinegar help it to survive?
Answers will vary and may include that it moves away from things that might endanger it and moves toward light for warmth.

- ② How else might you test an earthworm's responses to its ecosystem?
Answers will vary and may include exposing it to different but harmless stimuli—such as sugar water, a cooler temperature, or different surfaces—and watching how it reacts.