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Answer Key

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Activity Lab Manual

"Extensive knowledge and modern science must be acquired. The educational process we see today is in an ongoing and escalating challenge which requires hard work.
We succeeded in entering the third millennium, while we are more confident in ourselves."

H.H. Sheikh Khalifa Bin Zayed Al Nahyan
President of the United Arab Emirates

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SCIENCE, TECHNOLOGY, AND ENGINEERING

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What do you know about animals that live in Madagascar?

Meet two scientists who are curious about the natural world and everything that lives in it. Chris Raxworthy and Paule Razafimahatratra study animals that live in Madagascar. They work at the American Museum of Natural History in New York City and at the University of Antananarivo in Madagascar.

Use the text in your book to help you answer the questions below.

1. How would you look for animals in their natural habitat?

   Possible answer: I would observe the animals in a way that does not disturb them.

2. What kinds of animals would you see in the forest?

   Possible answer: I would see birds in the trees and insects and small rodents on the ground.

3. What does an animal need to live in the forest?

   An animal needs food, water, and a place to hide or rest.

4. How do scientists find answers to these questions?

   Scientists ask questions, form hypotheses, test those hypotheses by gathering data, and draw conclusions.

Explore Name _____ Date _____

Draw Conclusions

5 What do scientists do?

Possible answer: Scientists use the scientific method, a process that helps them to investigate and answer questions about the natural world.

6 How do scientists test a hypothesis?

Possible answer: Scientists test a hypothesis by making predictions and then gathering data to see if their predictions are correct.

Explore More

How do scientists draw conclusions?

Possible answer: Scientists decide whether their data supports their prediction and then write up their conclusions so that other scientists can study their work and repeat their experiments.

Open Inquiry

Think of your own question about why animals live in different places and different forests. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: Besides temperature and rainfall, what might affect why an animal lives in a particular place?

How I can test it: Sample answer: I can do research at the library or on the Internet to determine what other needs animals have.

My results are: Sample answer: Animals have different food needs and also a need to protect themselves from predators.

Name _____ Date _____

Alternative Explore

What do you know about studying animals?

Materials

- reference materials such as an encyclopedia or the Internet

Procedure

1. Explore more about animals by identifying the animals that live in your neighborhood and using reference materials to research facts about them. Then answer these questions.

2. What kinds of animals, besides pets, live in your neighborhood?

   Possible answer: squirrels, rabbits, mice, birds, chipmunks

3. Where do these animals find food, water, and shelter?

   Possible answer: They find food from fruits and nuts and seeds in the trees and on the ground. They also eat insects.

4. Suppose you wanted to learn more about one of these animals. What would you do?

   Possible answer: I would go to the places where the animal was seen before, wait for the animal to appear, and watch the animal, taking notes about what it ate, where it lived, and what it did.

5. Imagine you were going with Chris and Paule to a forest in Madagascar to study animals. What things would you bring?

   Possible answer: a notebook, pen, binoculars, camera, compass, magnifying glass, sketch pad

Explore

Name _____ Date _____

How do living and nonliving things differ?

Material

- four 1-meter pieces of string

Purpose

Find out some characteristics of living and nonliving things.

Procedure

1. **Predict** How are all living things alike? How are nonliving things alike?

   Possible answer: Living things grow and change; they have needs such as water, food or sunlight.

2. Make a table on a separate piece of paper. Label the columns *Living Things* and *Nonliving Things*.

3. Place 4 pieces of string outside on the ground so that they form a square.

4. **Observe** Look for living things in your square area. List them in your table. Tell how you know they are living. Do the same with nonliving things that you see.

Name _____ Date _____ Explore

Draw Conclusions

5 **Interpret Data** What characteristics do the living things share? Which do the nonliving things share?

Living things grow and change, they need water, they may move on their own, they produce waste, they live and die, they reproduce.

Nonliving things don't grow or change on their own, they don't take in food or water or produce waste.

Explore More

Experiment Does the amount of sunlight affect how many living things are in an area? How could you test this?

More sunlight allows more plants to live in an area, which will likely attract other organisms. I could compare a sunny place to a shaded or dark place.

Open Inquiry

Design additional activities to differentiate between living and nonliving things.

My question is: Sample question: The pictures on a TV screen move. Is the screen living or nonliving?

How I can test it: Sample answer: I can observe the TV screen to see if it shows other characteristics of living things, such as growth or eating. I can see if the screen still moves when the TV is turned off.

My results are: Sample answer: The TV screen is not a living thing.

Alternative Explore

Name _____ Date _____

Is a shell alive?

Purpose

In this activity, you will look at shells to find out if they are alive.

Materials

- assorted shells
- hand lens
- crayons

Procedure

1. **Observe** Use the hand lens to look at at least two different shells.

2. **Communicate** In the space below, draw two of the shells you observed.

3. **Communicate** List the characteristics of the shells you observed.

Possible answer: The shells are different colors. They are hard, have different shapes, and do not move.

Draw Conclusions

4. **Infer** Do you think that shells are alive? Why or why not?

Possible answer: No, I do not think that shells are alive. They do not grow, respond, or reproduce.

Name _____ Date _____ Quick Lab

Observe Cells

1. **Observe** Look at a piece of onion. Then observe it using a hand lens. What do you see?

I see an enlarged version of the skin with some detail but I am unable to see cells.

2. **Communicate** On a separate piece of paper, draw how the onion looks when viewed with a hand lens.

3. **Observe** Look at a slide of an onion under a microscope. What do you see? Is there any space between the cells?

I am able to see small cells. The cells are right next to one another.

4. **Communicate** Draw how the onion looks when viewed with a microscope. Then compare your two drawings.

5. **Infer** How small are cells? What tool do you need to observe cells?

Possible answer: Cells are extremely small, too small to see with just my eyes. I need a microscope to see cells.

Explore

Name _____ Date _____

How are plants alike?

Materials

- hand lens
- 3 plants

Purpose

Find out about some characteristics of plants.

Procedure

1. **Observe** Look carefully at each plant. Which plants have leaves? How do their leaves compare? Describe them.

Possible answer: Most plants will have leaves. Leaves have many different shapes. Some are long and thin, and some are broad.

2. **Infer** Which part of each plant grows underground? How is this part the same on each plant? How is it different?

Possible answer: Most roots grow underground. Roots vary in shape and size.

3. **Observe** Look carefully at each plant again. What other parts does each plant have? Record your observations.

Possible answer: I can also identify stems, flowers, fruits, seeds, and cones.

Name _____ Date _____ Explore

Draw Conclusions

4 **Infer** What parts do most plants have?

Possible answer: Most plants have leaves, roots, and stems.

Explore More

Experiment Can different-looking plants survive under the same conditions? How could you find out? Make a plan and try it.

Possible answer: I can plant different seeds and place samples from each type under the same conditions. I can compare how each plant responds.

Open Inquiry

Design additional activities to find out what plants need to grow.

My question is: Sample question: Do plants grow differently with different amounts of light?

How I can test it: Sample answer: I can observe similar plants placed in sunlight and placed away from sunlight.

My results are: Sample answer: Plants grow faster in sunlight than in shade.

Alternative Explore

Name _____ Date _____

How are leaves different?

Materials

- various leaves
- hand lens

Purpose

In this activity you will observe various types of leaves and compare their characteristics.

Procedure

1. **Observe** Use the hand lens to look at several different kinds of leaves.

2. **Communicate** Record your observations in the chart below.

Type of Leaf	Leaf Shape	Leaf Size	Leaf Color

3. **Infer** How do you think the different leaves help plants?

Possible answer: Big leaves absorb more sunlight and make more food. Smaller leaves keep water in the plant.

Draw Conclusions

4. **Communicate** What characteristics do all of the leaves have in common?

Possible answer: All of the leaves are green and smooth. All of them have tiny stems attached.

Name _____ Date _____ Quick Lab

Observe Stems

1. Get a stalk of celery with leaves on it. Carefully cut two inches off of the bottom.

2. Half fill a plastic jar with water. Then add five drops of food coloring to the water. Mix the water with a spoon.

3. **Observe** Place the celery into the jar. Observe the celery stalk a few times throughout the day. What do you notice?

I observed that the colored water rose through the stem and colored the leaves.

4. **Communicate** How has your celery stalk changed? Draw a picture. Write a description.

Possible answer: The celery stalk and its leaves changed color.

5. **Infer** What do stems do?

Possible answer: Stems carry water up into the rest of the plant.

Name _____ Date _____

Structured Inquiry

What do plants need to survive?

Materials

- 4 identical plants
- measuring cup and water
- ruler

Form a Hypothesis

Do plants need light to grow? Do they need water? Write a hypothesis. Start with, "If plants do not get light and water, then . . ."

Possible hypothesis: If plants do not get light and water, then they will not be able to grow.

Test Your Hypothesis

1. Label four identical plants as shown.

2. **Observe** How do the plants look? How tall are they? Measure them and record your observations in a chart. Use words and pictures.

   Possible answer: My plants are all about the same size.

3. Put the plants labeled *No Light* in a dark place, such as a closet. Put the plants labeled *Light* in a sunny place, such as on a windowsill.

4. **Predict** What do you think will happen to each plant? Record your predictions.

   Possible answer: I predict that the plant given light and water will grow the most. The plant given neither light nor water will grow the least and possibly die.

5 **Observe** Look at the plants every other day. Water each plant labeled *Water* with 200 mL of water. Measure how tall the plants grow. Record your observations in your chart using words and pictures.

Draw Conclusions

6 **Interpret Data** Which plant grew the most after two weeks? Which plant looks the healthiest? Use your chart to help you.

The plant given water and light will have grown tallest and will look healthiest.

7 What do plants need to survive?

Plants need water and light to survive (in addition to air and soil).

Be a Scientist

Name _____ Date _____

Guided Inquiry

What else do land plants need to survive?

Form a Hypothesis

Do plants need air? Do they need nutrients? Write a hypothesis about one of these.

Possible hypothesis: If plants do not get air and nutrients, then they will not be able to grow.

Test Your Hypothesis

Design an experiment to test your hypothesis. Decide which of the materials below you will use. Write the steps you will follow on a separate piece of paper.

- two identical plants
- petroleum jelly
- measuring cup
- water
- water with nutrients

Draw Conclusions

Did your results support your hypothesis? Why or why not? Share your results with your classmates. What questions do they have about your investigation?

Possible answer: Yes, plants do need air and nutrients to grow.

Name _____ Date _____

Be a Scientist

Open Inquiry

What other questions do you have about plants and their needs or structures? Talk with your classmates about questions you have. Choose one question to investigate. How might you answer this question? Make sure your experiment tests only one variable at a time.

My question is: Sample question: How do stems help a plant to survive?

How I can test it: Sample answer: I can weaken or break the stem of a plant to see what happens.

My results are: Sample answer: Plants need stems to support their leaves, which make food, and also to transport nutrients and water through the plant.

Explore

Name _____ Date _____

How do an animal's structures help it meet its needs?

Materials

- snail
- cotton swab
- water
- clear plastic container
- paper towel
- lettuce leaf

Purpose

Observe a snail to learn about its structures.

Procedure

1. **Observe** Look at the snail. What parts does it have? Do you see legs or eyes? Handle animals with care.

I observe eyes at the end of the snail's antennae and see that the snails lack legs.

2. Draw the snail. Label all the parts you can.

3. **Predict** Which parts help the snail move? Which parts help it get food or stay safe?

Possible answer: The snail uses its shell for protection. It moves on its "belly" (muscles called the "foot" move it forward) and it has a mouth for eating.

4. **Experiment** Gently touch the snail with a cotton swab. Observe the snail's actions for a few minutes. Record what you see.

Possible answer: I notice the "foot" on the bottom of the body. Its mouth ingests food. It moves away from my touch.

5. **Experiment** Place a wet paper towel in the container. Record the snail's actions. Repeat with a lettuce leaf.

Possible answer: The snail moves toward the lettuce leaf.

Draw Conclusions

6 **Communicate** On your drawing, circle the parts that the snail used to move and eat. Describe how it responded to its environment.

7 **Infer** Think about other animals you have seen, such as hamsters, birds, and fish. Do they have the same parts as the snail? Which parts do they use to meet their needs?

Possible answer: Other animals also have mouths and feet to help them meet their needs.

Explore More

Experiment Does the snail respond to light and dark? Make a plan and find out.

Possible answer: I can create a shadowed area for the snail and see if it tries to move out of the light.

Open Inquiry

Design an activity to determine how a snail responds to another type of stimulus.

My question is: Sample question: How would a snail respond if it came close to sand?

How I can test it: Sample answer: Place a snail on a piece of paper with a little sand sprinkled on the paper. Observe the snail.

My results are: Sample answer: A snail may avoid sandy areas.

Name _____ Date _____

How will a sow bug respond to its environment?

Materials

- sow bug
- hand lens
- cotton swab

Make a Prediction

Look at a sow bug and predict how it will respond to a change in its environment.

Possible prediction: I predict that the sow bug will curl up when threatened.

Procedure

1. **Observe** Use the hand lens to look at the sow bug. What does it look like? Which parts does it have?

   Possible answer: It is black/gray. Its body has many parts. It has many legs. It is round.

2. **Predict** What do you think will happen if you touch the sow bug with the tip of a cotton swab?

   Possible answer: It will curl up into a ball.

3. **Experiment** Gently touch the sow bug with the tip of a cotton swab.

4. **Communicate** Describe what happened to the sow bug when you touched it with the cotton swab. Was your prediction correct?

   Possible answer: The sow bug rolled up into a ball when I touched it with a cotton swab. My prediction was correct.

Name _____ Date _____ Quick Lab

Observe Animal Structures

1. Find photos of dolphins in a magazine or an encyclopedia.

2. **Infer** Look at the dolphins' structures. How does a dolphin use its tail? How does it use its blowhole? What structures help it get food?

A dolphin uses its tail to swim, its blowhole to breath, and its teeth to help it eat.

3. **Communicate** Make a data table to show how each structure helps a dolphin meet its needs.

Body Part	Purpose
Sharp Teeth	
Strong Tail	
Fins	
Blowhole	

Name _____ Date _____

Inquiry Skill: Classify

Earth is a big place. Millions of living things find homes in many different environments. With so many living things and so many environments, what can scientists do to understand life in our world? One thing they do is classify living things.

Learn It

When you classify, you put things into groups that are alike. Classifying is a useful tool for organizing and analyzing things. It is easier to study a few groups of things that are alike than millions of individual things.

Name _____ Date _____

Try It

Scientists classify Earth's environments. They classify animals, too. Can you?

1. To start, observe the animals shown on page 63 of your student textbook. Look for things they have in common.

2. Then come up with a rule. What characteristic can you use to group the animals? Let's try wings. Which animals have wings? Which animals do not? Make a table to show your groups.

Wings	No Wings
eagle	fish
butterfly	dog
dragonfly	frog
	chameleon
	bear
	wild sheep
	snake
	squirrel
	tiger

Name _____ Date _____

Explore

How can you classify animals?

Materials

- 4 plastic containers
- hand lens
- worm
- beetle
- snail
- ant

Purpose

Classify animals to form groups with similar characteristics.

Procedure

1. **Observe** Look at each animal. What structures does each animal have? Does each animal have legs? If so, how many? Does each animal have a distinct head and body?

Ants and beetles have 6 legs. Worms and snails have none.

Worms have no distinct head.

2. **Communicate** Make a chart like the one shown. Use words and pictures to describe characteristics of each animal.

3. **Classify** Put the animals into groups that are alike. Use the information in your chart to help you. Is there more than one way to group the animals?

Possible answer: There are many methods to group animals.

Step 2

Animal Structure	beetle	snail	worm	ant
legs	6			
antennae	2			
head				
mouth				
eyes				
shell				

Name _____ Date _____

Draw Conclusions

4 **Interpret Data** Which two animals are most similar to each other?

Possible answer: The beetle and ant are the most similar.

5 **Communicate** What rule did you use to classify the animals? Why did you classify the animals the way you did?

Possible answer: I classified the animals according to which had legs and which had soft bodies.

Explore More

Classify What other animals fit into your groups? Add animals to each of your groups. Research any animals you are not sure of.

Answers will vary.

Open Inquiry

Look at photos of several different animals. Can they be classified?

My question is: Sample question: How would I place these animals into different groups?

How I can test it: Sample answer: I can examine a group of animals. I can list the traits they have in common and those that are different.

My results are: Sample answer: I grouped animals together according to traits like number of legs, soft or hard bodies, or how they moved.

Name _____ Date _____

Alternative Explore

How can you classify animals?

Material

- pictures of animals

Purpose

In this activity you will classify animals into groups with similar characteristics.

Procedure

1. **Observe** Look at all the pictures of the different animals. Arrange the animals into groups with the same characteristics.

2. **Communicate** What groups of animals do you have?

Possible answer: I put the animals into groups of birds, fish, and mammals.

3. **Communicate** Fill in the chart below according to how you classified the animals.

Birds	Fish	Mammals

Draw Conclusions

4. **Communicate** Why did you classify the animals the way you did?

Possible answer: I can classify animals by their characteristics or by the environments they are adapted to.

Quick Lab

Name _____ Date _____

Model a Backbone

1. **Observe** Look at the photo of the raccoon on page 68 of your student textbook. What does its backbone look like?

Its backbone is a line of bones that can curve slightly.

2. **Make a Model** Use clay and pipe cleaners to make a model of a backbone. Design your model so that it can bend from side to side and forward and backward.

3. **Experiment** How can your model move? Can you move one bone without moving all the others?

Possible answer: My model can move slightly from side to side and forward and back. Yes, you can move some bones and not others.

4. **Infer** If your backbone were one solid bone, could it move as much?

No, because bones do not bend.

Name _____ Date _____

Explore

What does a seed need to grow?

Materials

- 6 seeds
- 2 paper towels
- spoon
- hand lens
- water
- 2 plastic bags

Form a Hypothesis

Do seeds need water to grow? Form a hypothesis. Start with "If seeds do not get water, then . . ."

Possible hypothesis: If seeds do not get water, then they will not grow into plants.

Test Your Hypothesis

1. **Observe** Look at the seeds with a hand lens. Draw what you see on a separate sheet of paper.

2. **Use Variables** Fold each paper towel into quarters. Then put two spoonfuls of water onto one towel. Put the wet towel into a plastic bag. Label the bag *Water.* Put the dry towel into a bag. Label this bag *No Water.*

3. Place three seeds into each bag. Seal the bags and place them in a warm spot.

4. **Observe** Look at the seeds every day for a week. Record what you see with pictures and words. If the paper towel in the *Water* bag feels dry, add two tablespoons of water.

Name _____ Date _____

Draw Conclusions

5 **Interpret Data** Which seeds changed? How did they change?

Possible answer: The seeds in the bag with the damp paper towel sprouted.

6 **Infer** Why do you think the seeds changed?

Seeds need water in order to grow.

Explore More

Experiment What would happen if you wet the paper towel with something other than water? Experiment to find out.

Possible answer: Liquids that contain water could help seeds sprout. Other liquids are toxic to plants.

Open Inquiry

What other things do you think seeds need to sprout? Think of a question about what seeds need. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: In addition to water, do seeds need light, the right nutrients, or the right temperature to sprout?

How I can test it: Sample answer: I can set up an experiment in which some seeds receive light and some do not, or in which some seeds are kept warmer or colder than others.

My results are: Sample answer: Some seeds need lots of light and a warm temperature in order to sprout. Others do not.

Name _____ Date _____

Alternative Explore

What else do seeds need in order to grow?

Materials

- encyclopedia
- computer

Make a Prediction

Besides water, predict what a seed will need in order to start growing.

Possible answer: nutrients, soil, light, the right temperature

Test Your Prediction

1. **Research** Use your research materials to find instructions for growing three different types of plants. According to your research, what does a seed need in order to grow?

   Possible answer: nutrients, the right temperature

Draw Conclusions

2. How good was your prediction?

   Possible answer: My prediction was fairly good. I correctly predicted nutrients and temperature.

3. **Think Critically** Which conditions were required for some seeds but not for others? Why do you think this is so?

   Possible answer: The temperature requirement was different for some seeds. Some seeds do not need soil. Plants have different characteristics that lead to differences in seeds.

 Name _____ Date _____

Fruits and Seeds

Materials

- fruit from 3 different plants

1. **Observe** Look at the fruits from three different plants. Compare their shapes and sizes.

2. Carefully cut open the fruits. How do their parts compare? Do they all have a peel or skin? Do they all have seeds?

Possible answer: All of the fruits have fleshy parts for food. Most have some covering or peel. All of them contain seeds.

3. **Observe** Look at the seeds from each fruit. Compare the location of the seeds in each fruit.

4. **Infer** What do all fruits have in common? How might fruits help seeds survive and grow?

Possible answer: All fruits carry seeds. They have food and a covering to protect seeds. Their fleshy parts attract animals that eat the fruit and spread the seeds.

Name _____ Date _____

Focus on Skills

Form a Hypothesis

You just learned how seeds grow into plants. Can seeds grow in the cold? To answer questions like this, scientists start with what they know about plants. Then they use this information to turn their question into a testable statement. That is, they **form a hypothesis.**

Learn It

When you **form a hypothesis,** you make a statement that you can test by collecting data. Suppose you want to find out if plants need sunlight. Based on what you know, you could form a hypothesis like this: If plants do not get sunlight, then they will not grow.

A good hypothesis needs to be testable. You could test this statement by placing one plant in the dark and one in sunlight. Then you could observe and record what happens. A hypothesis also needs to identify the variables. In the example above, sunlight and plant growth are variables.

Name _____ Date _____

Try It

Form a hypothesis about what seeds need to grow. Then test that hypothesis with an experiment.

Materials

- water
- 2 paper towels
- 6 pea seeds
- 2 sealable plastic bags
- 2 foam cups
- ice

1. Think about what you know about seeds. Now form a hypothesis about this question. Will pea seeds germinate more quickly in a cold spot or in a warm spot? Begin with "If I plant a pea seed in the cold, then. . . ."

   Possible answer: If I plant a pea seed in the cold, then it probably will not germinate as quickly as a seed placed in a warmer area.

2. Fold two wet paper towels in half, and place three seeds onto each. Place each paper towel into a plastic bag, and seal the bags.

3. Place one bag into a foam cup filled with ice. Place the other into an empty cup.

4 Record your observations in your science journal. Transfer your notes to a table like the one below. Use it to record your observations each day. Do your results support your hypothesis?

Yes. I found that the seeds germinated more quickly in warm areas.

Step 4	Cold	Warm
Day 1		
Day 2		
Day 3		
Day 4		

Apply It

Now that you have learned to think like a scientist, you can answer other questions. Do seeds germinate more quickly in the light or dark? **Form a hypothesis** about this question. Then plan an experiment to test your hypothesis.

If a plant is exposed to light, then it will only germinate a little bit faster than if it were in the dark. I should try to germinate similar seeds in sunlight and in dark areas. Seeds exposed to sunlight may germinate more quickly if their environment is made warmer by the Sun.

Explore

Name _____ Date _____

How does a caterpillar grow and change?

Materials

- caterpillar
- ruler
- hand lens
- caterpillar kit

Make a Prediction

How does a caterpillar change as it grows? Write a prediction.

Possible answer: A caterpillar changes as it grows by getting bigger and changing its shape.

Test Your Prediction

1. **Observe** Look at the caterpillar. On a separate piece of paper, draw a picture of it and label all the parts you can see. △ **Be Careful!** Handle animals with care.

2. **Measure** Find the length of your caterpillar. Record the caterpillar's length on your drawing.

3. Put your caterpillar into the kit.

4. **Observe** Once a day, observe your caterpillar and draw a picture of it. Label any changes you observe. If you can measure the caterpillar's length without disturbing it, record the length each day.

Name _____ Date _____ Explore

Draw Conclusions

5 **Interpret Data** What small changes did the caterpillar go through? What big changes did you observe?

Possible answer: The caterpillar grew larger, then formed a cocoon and turned into a butterfly.

6 **Infer** What are the stages in a butterfly's life cycle?

egg, caterpillar (larva), cocoon (pupa), adult butterfly

Explore More

Experiment How do tadpoles change as they grow? Make a plan to test your ideas.

Possible answer: Tadpoles change as they grow by getting legs and losing their tails.

Open Inquiry

Explore another animal's growth. Think of a question about animal growth. Make a plan and carry out an experiment to answer the question.

My question is: Sample question: How can I study the growth of a goldfish?

How I can test it: Sample answer: Each day as I feed a goldfish, I can observe and record any changes in the fish's size and appearance.

My results are: Sample answer: The goldfish is growing larger in size.

Name _____ Date _____

How do pets change as they grow?

Materials

- pictures of family pets

Make a Prediction

Humans take care of many animals as pets. These animals live with us as they grow. How do the animals we choose as pets change as they grow older from birth to being adults?

Possible prediction: Pets get larger, they may get stronger, or hair color may change.

Draw Conclusions

1. Examine pictures of one or more animals that your classmates have as pets. Put the pictures of one animal in order, from youngest to oldest. Describe some of the changes you see.

   Possible answer: Most pets get larger. Their limbs get longer.

2. Was your prediction correct? What did you notice in the pictures that surprised you?

   Possible answer: My prediction was correct. Heads and faces change shape and appearance. Very young pets change in dramatic ways during the first few years of growth.

Name _____ Date _____ Quick Lab

A Bird's Life Cycle

1. **Communicate** Describe a chicken's life cycle. How does a chicken change as it grows?

Possible answer: A chicken hatches from an egg and then grows from a chick into a chicken. It gets bigger and grows more feathers.

2. **Compare** How is the chicken's life cycle similar to the turtle's? How does it differ?

Possible answer: A chicken's life cycle is like a turtle's life cycle because they both start with eggs. They are different because a turtle moves from land to water and a chicken stays on land.

 Name _____ Date _____

Which traits are passed on from parents to their young?

Make a Prediction

Which of your traits are inherited, or passed on, from your parents? Is your hair color or hair length inherited? Write a prediction.

Possible prediction: I predict that my hair color is a trait that is inherited from my parents.

Test Your Prediction

1. **Communicate** Make a data table like the one shown. Use your table to describe your traits.

Step 1

Trait Name	Trait Description
Hair Color	
Hair Length	long/short (circle one)
Dimples	yes/no (circle one)
Ear Lobes	attached/unattached (circle one)
Favorite Food	

2. **Classify** Some traits have changed since you were little. Others have not changed. Circle the traits that have not changed.

3. **Communicate** Compare tables with a classmate. Which of your classmate's traits have stayed the same over time?

Possible answer: His hair color and eye color are two traits that stay the same.

Draw Conclusions

4. Which traits did most students classify as traits that stay the same?

Possible answer: Inherited traits were chosen most.

5 **Infer** How do you think you got the traits that do not change?

Possible answer: These traits are inherited traits from my parents.

6 **Infer** Some of your traits are inherited from your parents. Underline the traits that you think you inherited. Explain why you chose those traits.

I chose hair color, eye color, and ear lobes. My parents have the same traits.

Explore More

Make a trait table that has a column for each member of your family. Which traits do you share with your family members?

Possible answer: I share hair color, eye color, and the shape of my nose and ears with my family members.

Open Inquiry

Think of a question about inherited and learned traits. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: Do I share learned traits with my parents?

How I can test it: Sample answer: I can ask my parents to make a list of their favorite foods and sports.

My results are: Sample answer: I share interests that are not inherited traits with my parents.

Alternative Explore

Name _____ Date _____

What traits do people have?

Materials

- notebook

Make a Prediction

Take a moment to think about the characteristics, or traits, that make you similar to or different from your classmates. Then predict how your traits will differ from others' traits in your class. First, list some of your characteristics that you think will be different from your classmates.

Possible answer: height, weight, hair color, eye color

Test Your Prediction

1. Take a few moments to look around and examine your classmates' traits. Which traits do you notice that you did not list above?

Possible answer: I notice the shapes of their faces, noses, and ears.

Draw Conclusions

2. How are the traits that you noticed different among your classmates? How are their traits different from your traits? What traits do you think might be different that you cannot easily observe?

Possible answer: Some of my classmates have a round face, and some have a longer face. Their hair color is different than mine, and so is their eye color. Some traits are not visible, such as strength, speed, agility, and artistic ability.

Name _____ Date _____ Quick Lab

Inherited Traits

1. **Observe** Look at the photo on page 123 of your textbook. How are these people all alike? How do they differ?

Possible answer: They all have straight hair, similar skin tone, white teeth, and similar smiles.

2. **Communicate** Compare the children to their father. Discuss which of their traits are similar to their father's traits.

Possible answer: Their eye color is similar to their father's.

3. **Infer** Why do organisms look similar to, but not exactly like, their parents?

Organisms usually have a mixture of traits from both their parents.

Explore

Name _____ Date _____

What kind of food do owls need?

Materials

- plastic gloves
- paper plate
- owl pellet
- tweezers
- hand lens

Purpose

Find out what an owl eats by studying an owl pellet.

Procedure

1. Work with a partner. Put on plastic gloves. Place your owl pellet onto a paper plate.

2. **Predict** What do you expect to see inside the owl pellet? Write your prediction.

Possible prediction: I expect to see the owl's food inside the owl pellet.

3. Using the tweezers, separate the objects in the owl pellet.

4. **Observe** What is in the owl pellet? Use the hand lens. Record your observations. ⚠ **Be Careful!** Wash your hands when you are done.

In the pellet are all of the parts of the owl's food that it could not digest, such as bones, feathers, and fur.

Draw Conclusions

5 **Interpret Data** What do the materials inside the owl pellet tell you about what an owl eats?

They tell me that the owl eats other animals.

6 **Infer** What organisms might an owl eat? What might those organisms eat?

Possible answer: An owl might eat mice or other rodents. Those animals eat insects and plants.

Explore More

Interpret Data Keep track of the things you eat in one day. Do most of your foods come from plants or animals?

Possible answer: Most of my foods come from plants.

Open Inquiry

How do the diets of animals vary depending on the type of animal and where the animal lives? Think of your own question about the diet of animals. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: How is the diet of a cow different from the diet of an owl?

How I can test it: Sample answer: I can do research in books or on the Internet to find out what cows and owls eat.

My results are: Sample answer: The cow eats mostly grass and grains and is a vegetarian. The owl eats small animals and is a carnivore.

Name _____ Date _____

Where do the foods in your cafeteria come from?

Materials

- school cafeteria menu

Make a Prediction

Humans are omnivores, which means that they eat foods that come from both plants and animals. Predict where the foods you eat in the cafeteria come from.

Possible prediction: The foods in the cafeteria come from plants and animals.

Draw Conclusions

1. **Research** Take a look at your school's cafeteria menu. List the foods. Next to each item, write where you think that food came from.

   Possible answer: salads (from plants), green beans (from plants), chicken patty (from animals), beefburger (from an animal, a cow)

2. **Draw Conclusions** Where did most of the cafeteria foods come from?

   Possible answer: Most cafeteria foods come from plants. Some foods come from animals.

3. **Think Critically** Plants get their energy from the Sun. Where do the animals you eat get energy?

   Possible answer: The animals get their energy from eating plants and other animals.

Name _____ Date _____ Quick Lab

Observe Decomposers

1. Put some apple pieces into a plastic bag. Seal the bag.

   ⚠ **Be Careful!** Do not open the sealed bag.

2. **Observe** Leave the bag in a warm, dark place for a week. Observe the pieces every day. Record the changes you see.

3. **Communicate** What happened to the pieces of apple? How did they change over time?

   Possible answer: The pieces of apple changed color and became moldy. They got more moldy and the apple broke down over time.

4. **Infer** What does this activity tell you about decomposers?

   Microscopic decomposers are everywhere, and they become visible when conditions are right for them to grow.

Name _____ Date _____

Communicate

You know that organisms get energy from food. Scientists study ecosystems to learn how different organisms get energy. Then they communicate, or share, their observations. Communicating helps people learn about the world.

Learn It

When you communicate, you share information with others. Some ways you share information in science are by talking, writing, drawing, or making graphs and charts.

Grassland Organisms	
Organism	**Where Organism Gets Energy**
grass	Sun
snake	field mouse
hawk	snake
field mouse	grass

Try It

In this activity you will organize and **communicate** data about a grassland ecosystem. Look at the data table on the previous page. It shows how some organisms in a grassland get energy. It also tells how the organisms interact. A table is one way to communicate data. You will try some other ways.

1. One way you can communicate data is by making a food-chain diagram. The photographs on page 153 of your textbook show the start of a food-chain diagram. Part of the diagram is shown below. Complete it by adding the last three organisms in the correct order.

2. Next, communicate by making a food pyramid. Fill in the blank spaces on the pyramid above.

3. Now, communicate by writing a paragraph. In your paragraph, classify each organism as a producer or consumer. Tell where each grassland organism gets its energy.

4. Did all three ways of communicating help you understand the data? Which way did you think worked best? Why?

Possible answer: Yes, they helped me. I think that the food-chain diagram worked best because it was easy to read and understand.

Name _____ Date _____

Apply It

Think of a food chain from another ecosystem. **Communicate** information about this food chain to a partner. Draw a food-chain diagram to show where organisms in the ecosystem get energy. Now describe the food chain in words. Discuss what you learned.

Possible answer: I drew an ocean environment where plants on the surface get energy from the Sun. Then smaller organisms like shrimp and krill eat those plants. Then small fish eat the shrimp and krill. Bigger fish then eat the smaller fish.

Name _____ Date _____

Explore

Can ocean animals live and grow in fresh water?

Materials

- 2 jars
- measuring cup and water
- sea salt
- spoon
- brine shrimp eggs
- hand lens

Make a Prediction

Can brine shrimp grow in both fresh water and salt water? Write a prediction.

Possible prediction: If I put brine shrimp in fresh water, they will not survive.

Test Your Prediction

1. Fill each jar with 480 mL of water. Put two spoonfuls of sea salt in one jar. Label it *Salt Water.* Label the other jar *Fresh Water.*

2. Add one spoonful of brine shrimp eggs to each jar.

3. **Observe** Watch what develops in each jar over the next few days. Use a hand lens.

The brine shrimp eggs in the salt-water jar hatched. The brine shrimp eggs in the fresh-water jar did not hatch.

Name _____ Date _____

Draw Conclusions

4 **Interpret Data** In which jar did the brine shrimp eggs hatch? How could you tell?

Possible answer: The brine shrimp hatched only in salt water.

5 **Infer** Can all ocean animals live and grow in fresh water? How do you know?

No. Ocean animals need salt water to survive and grow. This is why the brine shrimp only hatched in salt water.

Explore More

Experiment Does temperature affect the hatching of brine shrimp eggs? Design an experiment to find out.

Possible answer: I could place the brine shrimp in jars with cold water and warm water and observe whether they hatch.

Open Inquiry

How would the type of water used for watering a plant affect the plant's growth? Think of your own question about plants and how they grow. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: How would watering a plant with salt water affect its growth?

How I can test it: Sample answer: I can water a potted plant with salt water and observe how it grows.

My results are: Sample answer: My plant did not grow well in salt water.

Name _____ Date _____

Alternative Explore

How are desert and forest plants different?

Materials

- cactus plant
- fern plant

Make a Prediction

Plants and animals have different characteristics that allow them to live in different types of environments. Predict which characteristics allow cactus plants and fern plants to live in different ecosystems.

Possible prediction: The plants will use different types of leaves or roots or stems to make food or store the water they need.

Draw Conclusions

1. **Observe** Look at the cactus plant and the fern plant side by side. How are their stems and leaves different?

   Possible answer: The stem of a fern plant is slender, while the cactus's stem is thick. The leaves of a fern plant are large and wide, while a cactus plant has spines rather than leaves.

2. How do you think these features are helpful in a desert or forest environment?

   Possible answer: The stem of a fern plant is thin because it is used only to hold up the leaves. The stem of a cactus plant is thick because it is used for water storage. The leaves of a fern plant are broad because they need to capture as much sunlight as possible. The leaves of a cactus are thin and spiny because they receive plenty of sunlight and instead must help protect the plant from animals.

 Name _____ Date _____

Water Temperatures

1. Fill two jars each with 200 mL of salt water. Label one jar *Sunlight* and put it in a sunny place. Label the other jar *No Sunlight* and put it in a very dark place.

2. **Observe** Measure the water temperature in each jar with a thermometer later in the day. Which jar is warmer?

   Possible answer: The sunlit jar is warmer.

3. **Infer** The two jars model two parts of the ocean. What are those parts? How are they different?

   Possible answer: The Sunlight jar models the surface of the ocean. The No Sunlight jar models the deep ocean. The Sunlight jar is warmer than the No Sunlight jar. This tells me that the surface of the ocean is warmer than the deep ocean.

Name _____ Date _____

Explore

Does fat help animals survive in cold environments?

Materials

- vegetable fat
- paper towel
- ice water
- stopwatch

Form a Hypothesis

Can fat help keep your finger warm in cold water? Write a hypothesis. Write your answer in the form "If my finger has a layer of fat, then . . ."

Possible hypothesis: If my finger has a layer of fat, then it will be affected less by cold temperatures.

Test Your Hypothesis

1. Use a paper towel to spread vegetable fat over one index finger. Try to coat it completely. Leave your other index finger uncovered.

2. **Predict** What will happen when you put both index fingers in a bowl of ice water?

   Possible prediction: The fat-covered finger will not feel as cold.

3. **Experiment** Put one index finger into the ice water. Ask a partner to time how long you can keep your finger in the water. Repeat with your other index finger. Record the data in a chart on a separate piece of paper.

4. Trade roles with your partner and repeat steps 1 through 3.

Draw Conclusions

5. **Interpret Data** Which finger could you keep in the ice water longer? Why? Did your results support your hypothesis?

   Possible answer: the finger coated with fat; yes

Name _____ Date _____

6 **Infer** Walruses have a layer of fat under their skin. How does this help them survive?

Possible answer: Fat keeps heat in the walrus's body from escaping.

Explore More

Experiment How could you measure how well fat keeps things warm? Could you use thermometers? Make a plan and test it.

Possible answer: I can fill two ziplock bags with warm water, cover one bag with vegetable fat, place them in a cold place, and monitor their temperatures over time with a thermometer.

Open Inquiry

What adaptations do animals have that allow them to survive comfortably in hot weather? Think of your own question about animal adaptations. Make a plan and carry out an experiment to answer your question.

My question is: Sample question: Does having the ability to store water help animals survive in hot environments?

How I can test it: Sample answer: I can do research at the library or on the Internet to learn about animals that live in the desert.

My results are: Sample answer: Some desert animals, like the camel, can store extra water in their bodies to survive in the desert.

Name _____ Date _____

Alternative Explore

What adaptations can you observe?

Materials

- photos of various animals

Make a Prediction

All animals have adaptations that help them live in certain environments. Predict one feature of an animal that helps it adapt to its environment. How does the adaptation help the animal live in a particular environment?

Possible prediction: Wings help animals find food and avoid predators.

Draw Conclusions

1. **Observe** Look at the pictures of animals that your teacher has provided. List some of the adaptations you see in the photographs.

Possible answer: I see adaptations such as legs, hooves, hair, eyes, noses, teeth, and claws that help animals live in specific environments.

2. **Interpret Data** Describe how each adaptation helps an animal live in a certain environment.

Possible answer: Hooves help some animals run on flat land, hair helps keep animals warm, good eyesight and claws help animals hunt, and wings help animals flee danger.

Quick Lab

Name _____ Date _____

Storing Water

1. **Make a Model** Wet two paper towels. Then wrap one in wax paper. This models a plant that has waxy skin. Use the uncovered towel to model a plant that does not have waxy skin.

2. Place your models in a sunny window.

3. **Observe** How do the paper towels feel later in the day?

Possible answer: The wax paper kept one paper towel moist.

4. **Infer** How does waxy skin help desert plants survive?

Possible answer: The waxy skin keeps water from escaping.

Name _____ Date _____

Be a Scientist

Structured Inquiry

How does camouflage help some animals stay safe?

Materials

- yellow paper
- brown paper
- scissors
- stopwatch

Form a Hypothesis

Which is easier to find, an animal that blends into its environment or an animal that does not blend in? Form a hypothesis. Start with "If an animal blends into its environment, then . . ."

Possible hypothesis: If an animal blends into its environment, then it will be harder to find.

Test Your Hypothesis

1. Cut out 20 yellow circles and 20 brown circles.

2. **Experiment** Spread out the circles on yellow paper to model animals with and without camouflage. Then ask a classmate to pick up as many circles as he or she can in 10 seconds.

Name _____ Date _____

3 **Communicate** How many of each color circle did your classmate pick up? In the space below, create a chart to record the results.

4 Repeat steps 1 and 2 with two other classmates.

Draw Conclusions

5 **Interpret Data** Did your classmates pick up more yellow or brown circles? Which circles were harder to find?

Possible answer: They picked up more brown circles than yellow circles. The yellow circles were harder to find.

6 **Infer** How does camouflage help animals stay safe?

Possible answer: Camouflage makes it hard for predators to find animals in their environments.

Name _____ Date _____

Be a Scientist

Guided Inquiry

How do pale colors help some animals survive?

Materials

- black beans
- white beans
- 2 thermometers

Form a Hypothesis

How do pale body coverings affect a desert animal's temperature? Write a hypothesis.

Possible hypothesis: If desert animals have pale body coverings, then they will stay cooler than if they had dark body coverings.

Test Your Hypothesis

Design a plan to test your hypothesis. Use the materials shown. Write the steps you plan to follow.

Possible answer: 1. Fill one clear cup with black beans. 2. Fill another cup with an equal amount of white beans. 3. Put thermometers in the cups. 4. Put both cups in a warm, sunny spot. 5. Check the temperatures of the beans every hour.

Draw Conclusions

Did your results support your hypothesis? Why or why not? Share your results with your classmates.

Yes, the temperature of the white beans was lower than the temperature of the black beans. The lighter-colored beans absorbed less heat.

Name _____ Date _____

Open Inquiry

What other questions do you have about plant and animal adaptations? Discuss with classmates the questions you have. How might you find the answers to your questions?

My question is: Sample question: Why are some plants and animals brightly colored?

How I can test it: Sample answer: I can observe flowers in a garden or woodland to see which ones attract more insects.

My results are: Sample answer: Brightly colored flowers attract more insects.

Name _____ Date _____

Seasons

Materials

- small branch or tree

The change of seasons can be seen in many trees. In the winter, many trees have no leaves and are dormant. They are resting and do not grow during this time. In the spring, the trees produce leaves, flowers, and fruits. In the summer, the trees make and store food. In the fall, the trees start preparing for the winter and lose their fruits and leaves. Inside the branches and trunk of a tree, during the spring and summer, the tree produces more woody tissue and grows. From year to year, this growth is shown by a new ring of wood.

Purpose

Your task is to tell the age of a tree from its branch.

Make a Prediction

Look at the rings in a tree branch. Can you predict the age of a tree by adding up the number of rings?

Possible prediction: The number of rings in a branch will tell me the age of a tree.

Test Your Prediction

1. Find a tree branch and count the number of rings.

2. Compare this branch with a thicker or thinner branch from another kind of tree. Does the new branch have more or fewer rings?

Answers will vary.

3. Compare the thicknesses of the rings in one tree branch. Do they vary in thickness? What might this tell you about tree growth?

Possible answer: Thicker rings mean greater growth. Trees grow at different rates each year.

Draw Conclusions

4. What did you observe? How old do you think the first tree you looked at is?

Possible answer: I counted 10 rings. The tree is ten years old.

5. Is the second tree you looked at older or younger than the first tree? Why?

Possible answer: The second tree had fewer rings and is younger than the first tree.

Name _____ Date _____

Critical Thinking

6 Do all places on Earth have seasons?

Possible answer: No, some places on Earth, like tropical rain forests, are warm all year round and don't have seasons.

7 What can annual rings in a tree tell you about the environment?

Possible answer: From the thickness of the rings, I can infer that in some years the climate was better for plant growth.

 Name _____ Date _____

Structured Inquiry

How does color help living things survive?

Materials

- wrapping paper
- 2 black and white pages from a newspaper
- scissors

Ask Questions

Flowers need to be noticed. They need animals to find them and help them reproduce and spread seeds. Does the color of a flower help the flower advertise itself?

Make a Prediction

What colors help a flower get noticed? Do certain colors work better than others at attracting animals in different places?

Possible prediction: Bright colors help flowers get noticed. Different colors work better in different places.

Test Your Prediction

1. Decide on a typical shape for a flower blossom. The overall size should be about 2 cm or less in diameter. Draw 10 flowers on a wrapping paper page and another 10 flowers on a black and white page. Cut them out.

2. While your back is turned, have a friend spread out the 20 cut-out flowers on a black and white page.

3. **Experiment** When your friend says "go," turn around and pick up as many flowers as possible in just 3 seconds. Pick up one flower and place it on the table before you pick up another flower. Do the test 3 times.

Communicate Your Results

Have a class discussion and share your results and graphs. What did you find out? Use your data to answer these questions:

8. Which flowers were easiest to spot? Did the color of the sheet of paper make a difference?

Possible answer: Yes. Colored flowers on black and white paper or black and white flowers on colored paper were easiest to spot.

9. Which flowers were hardest to spot? Did the color of the sheet of paper make a difference?

Possible answer: Yes. Black and white flowers on black and white paper or colored flowers on colored paper were hardest to spot.

10. If flowers grew in a place where everything was brightly colored, what color flowers would be most easily noticed?

Possible answer: Very dark or very pale (not brightly colored) flowers would be most easily noticed.

11. How do colors help flowers get noticed? What evidence supports your idea?

Bright colors help flowers stand out from their environment. My experimental results support this conclusion.

Name _____ Date _____

Guided Inquiry

Hiding in Plain Sight

Materials

- crayons, markers, or colored pencils
- scissors
- clear tape

Ask Questions

Hiding helps some animals avoid being eaten. Some animals need to hide so that the animals they want to eat do not see them waiting for a meal. How are some animals able to hide but still be right in front of us?

Make a Prediction

If hiding from other animals helps living things survive, make a prediction about how animals can use color to survive.

Possible prediction: Colors that help animals blend into their environment and make them harder to see help them survive.

Test Your Prediction

1. Draw a simple picture of a lizard or a frog as if you were looking straight down on it from above. Color your drawing carefully so that it can hide in the classroom in plain sight. The drawing should be 10 to 15 cm long.

2. When everyone's drawings are colored and cut out, you and half of your classmates should tape drawings on the surfaces you have chosen. Do not hide them under or behind anything. The other half of your classmates should go out of the room while you are hiding the drawings so they cannot see where you are putting them.

3. After all of the drawings are hidden, your classmates will try to find and list as many of the drawings as possible in 1 minute.

Communicate Your Results

Work in groups of 4 to 8 and discuss what you found out about hiding in plain sight.

4. How many pictures were hidden? How many pictures did each student find?

Possible answer: My classmates found most of the pictures, but some took a long time to find.

5. Were some pictures easier to find than others? Describe the color of the drawing and the color of the background of 1 picture that was easy to find. Describe the color and background of a picture that was hard to find.

Possible answer: Where the color of the drawing did not match the background, it was easy to find. Where the color of the drawing matched the background, it was hard to find.

6. How do colors help animals hide? What evidence supports your idea?

Colors help some animals blend in with their environment. Our class experiment supports this idea.

Name _____ Date _____

Open Inquiry

Now You See It, Now You Don't

Invent and test other ways to explore showing off or hiding. Design and perform an experiment. Ask a question, make a prediction, test your prediction, record your data, and communicate your findings. Make a poster to show what you did and what you found out. Here are some ideas to get you started:

- Take a showing-off and hiding survey of living things in your schoolyard. What living things in your schoolyard are most easily seen? What organisms are not easily seen? What makes them good advertisers or hiders?
- In addition to color, what structures help organisms advertise or hide? Does shape make a difference?

My question is: Sample question: Does the shape of an insect help it to avoid predators?

How I can test it: Sample answer: I can research insects with unusual shapes, like a walking-stick insect. I can observe whether they are hard to see in photographs.

My results are: Sample answer: Yes, shape does help some animals to hide from predators.