Sixth Grade Science Overview

	First Semester	Second Semester
Science	Scientific method Experimentation Cell structure Cell division Plant structure and reproduction Photosynthesis Soil and nutrients Classification of living things Plant and animal kingdoms	Animal life cycles Food chains and food webs Ecology Ecosystems Global climate change Human nutrition Human body structures and systems

Grade 6

Basic Life Science

Teacher Manual

Oak Meadow

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Introduction

This teacher manual is intended to help you support your student's learning. In addition to factual answers to assignment questions, you will find suggestions for ways to guide your student's learning, and tips on how to assess their responses. Along with the learning assessments found at the end of each lesson (which highlight learning goals for each lesson), this teacher manual will help you evaluate, track, and document your student's progress.

You are encouraged to use a weekly planner and the assignment checklists to help your child learn to use these organizational tools as well. Time management is an essential skill for students to learn, and one that will be useful for their entire lives.

In this teacher manual, you will find the full text for all assignments. Some activities are listed without the full text. Teacher manual answers are seen in **orange**. If more information is needed about any assignment, you can refer to the full text and reading material in the student's coursebook.

If a writing assignment asks for one or more pages of writing, you can assume that one page equals two or three paragraphs of three to eight sentences each. Students are advised to use their best judgment—two three-sentence paragraphs are not going to equal one page.

When working on assignments, students are encouraged to find out more if their curiosity is not sufficiently satisfied. The project choices found in most lessons encourage original thinking, exploration, and analysis, which are essential elements of the learning experience.

Note about workload: Please note that there are a wide variety of assignments included in this course to give students many options for engaging with the material. Students are not expected to complete every single assignment. You can help your student determine which assignments to focus on each week, based on the student's interests, strengths, and areas needing development. You might also give your student the option to complete some of the written assignments orally. Keep an eye on the workload as your student progresses, and make adjustments so that the student has time for meaningful learning experiences rather than rushing to try to get everything done. If your student is enrolled in Oak Meadow School, please consult with your teacher when making adjustments to the workload.

For obvious reasons, it is best not to share this teacher manual with your student. Each student should be encouraged to come up with their own answers, and sometimes a student might go beyond what is required for the assignment. This is to be encouraged! When a student gets a factual answer wrong,

you can share the correct answer. The focus should always be on the learning process rather than on a sense of judgment. Several incorrect answers related to a particular topic point to an area the student will benefit from revisiting.

If you notice a student's answers matching those of the teacher manual word for word, the student should be advised about plagiarism and the importance of doing original work. Students in sixth grade are starting to understand this concept and its ramifications, and any discussion about it should be approached as a learning opportunity. The issue of plagiarism and properly attributing sources is addressed in the English course.

We encourage you and your student to explore the topics introduced this year in active, experiential ways. We believe a real understanding and appreciation of the wonders of the world and the joy of learning only comes about when you and your student are fully participating in it.

Lesson

1

Science and the Scientific Method

Key Concepts

- Scientific method
  - question
  - hypothesis
  - procedure
  - observations (results)
  - conclusions
- Controlled experiments and variables
- Sample Experiment: The Effects of Caffeine on Sleep Patterns

ASSIGNMENT SUMMARY

- ☐ Analyze the caffeine experiment.
- ☐ Test your power of observation.
- ☐ Choice assignment
- ☐ Complete lesson 1 test.

Your Thoughts

What is the variable in this caffeine experiment? Remember, the variable is the part of the experiment that changes while everything else stays the same, or is controlled. Discuss your ideas with a parent or friend.

Assignments

1. Analyze the caffeine experiment. Use the four questions below to assess the caffeine experiment described in the last section. Think carefully about aspects of the experiment that could be more controlled or where errors might arise. Write a few sentences in response to each question.

   a. Did the experiment really do what it was intended to do?

All experiments in this course should be written up using the scientific method format. Please refer to this lesson for guidance when completing assignments in future lessons.

b. Could the method be improved so that it would have better results? How?

c. Does the experiment suggest other experiments that might be undertaken? What are they?

d. How can the information or process apply to personal life or experiences? This would answer the questions: "What does it all mean?" or "So what?"

This beginning lesson is challenging because it requires developing a scientific way of thinking. Encourage students as they grapple with what may be a new skill.

2. Test your power of observation. Go outside and collect 13 to 20 rocks, sticks, leaves, or other items that can be easily collected. Don't look at them too carefully. Place them in a box or basket and cover the opening. When you have paper and a pencil at your side and are ready to make your observations, take off the covering and reveal the objects. Give yourself one minute to carefully observe as much as you can about the objects and their placement using only your sight, but don't write down anything yet. When the minute is up, cover the items again and give yourself three minutes to write as much as you can remember about what you observed. How many objects did you remember? Could you remember very many details about them? Did some objects remain in your memory more vividly than others?

   Now try this again with the same or a different set of items. Give yourself only a minute again, but this time touch the items in addition to looking at them. At the end of the minute, write or draw (or both) what you remember. How did your observation change? How did your sense of touch increase or decrease what you could remember? For an extra challenge, have someone else collect items for you so that until they are revealed, you don't know what the objects are. Challenge someone else with the objects you gathered and see how their observations differ from yours. Some people are great at remembering lots of detail about a few things, while other people are quick to learn just one thing about many objects.

Choice Assignment

Choose **one** of the following projects.

A. **To Be a Scientist.** If you could be any kind of scientist, what kind would you be? Why? To be the scientist of your dreams, you can imagine you are any age, have any amount of money, and travel anywhere you need to. Aim to write about a page of three to five paragraphs to answer these questions.

B. **Scientific Experiment.** If you were going to conduct any scientific experiment, what would it be? What would your hypothesis be? If you can do the experiment, do it. If not, imagine the outcome and write what you think it would be. Use the five components of the scientific method to describe your experiment and its outcomes: Question, Hypothesis, Procedure, Observations, and Conclusion.

C. **Survey Experiment.** Some scientific experiments are surveys, which means the scientists get their answers through interviewing people. Create or design a survey about something you want to know. The survey can be one question or many. Carry out your survey with at least ten

people you know. You might want the survey to be confidential and tell the people to put it in your mailbox without their name on it. Sometimes having confidential surveys lets people feel they can be more honest and not be judged for their answers. Use the five components of the scientific method to describe your survey and its outcomes: Question, Hypothesis, Procedure, Observations, and Conclusion.

D. **Animal Observation.** If you have an animal at home, spend some time observing it. When does it like to sleep? To play? Pose a hypothesis about its behavior. Observe it and see if you made correct assumptions. Example: "My dog likes to eat when my family eats," or "My cat only plays with yarn when someone is moving it." Do not try experiments that could hurt the animal or make it uncomfortable. Use the five components of the scientific method to describe your informal experiment and its outcomes: Question, Hypothesis, Procedure, Observations, and Conclusion.

Test Questions

1. What is controlled in a controlled experiment? Provide an example.

   In a controlled experiment, all the variables but the one being tested are controlled. This means they are made consistent in every trial. Variables in a plant experiment might include the amount of sunlight, temperature, amount of water, size of pot, or soil composition.

2. Come up with three questions that could lead to a scientific experiment.

   Answers will vary. Students are encouraged to think broadly about any topic of interest. They may come up with questions about animal behavior, plant growth, nutrition, bike safety, or any other aspect of their lives. Science is everywhere!

3. Come up with a hypothesis to test each of the three questions you posed in the last question.

   The hypotheses should be in statement form, expressing an idea that is testable. For instance, a hypothesis such as "My dog likes me better than my sister because I'm the one who feeds him," is not testable, but "My dog will come when I call more frequently than when my sister calls" is a testable hypothesis. Here are other examples of testable hypotheses:

   - **A sunflower seed planted in a large pot will grow taller than one planted in a small pot.**
   - **It is easier to focus on a task after eating a snack than when hungry.**
   - **A bicycle is easier to maneuver with a heavy load if the load is carried in a bicycle basket rather than in a backpack worn by the cyclist.**

4. What are the five steps of the scientific method? Briefly explain each step.

   1. **Question: in order to form a hypothesis, a question is asked about a phenomenon or behavior that has been observed.**

2. **Hypothesis: the hypothesis is an educated guess as to the cause or reason for the unexplained behavior or phenomenon.**
3. **Procedure: a controlled experiment must be developed and performed, which reduces or eliminates the variables in order to increase the veracity of the results.**
4. **Observations or results: data from the experiment are recorded.**
5. **Conclusion: a conclusion is developed based on interpretation of the results.**

5. Explain the difference between results and conclusion in a scientific experiment.

   Results are the recorded observations from an experiment. A conclusion is an interpretation of the meaning of the results.

Learning Assessment

These assessment rubrics are intended to help track student progress throughout the year. Please remember that these skills continue to develop over time. Parents and teachers can use this space to make notes about the learning the student demonstrates or any skills that might need work.

SKILLS	Developing	Consistent	Competent	Notes
Displays focused observation skills				
Demonstrates knowledge of the scientific method				
Shows understanding of controlled experiments and variables				
Forms a hypothesis based on previous knowledge				
Explains the steps of the scientific method				
Reflects on experiment process and ways to gain more accurate results				

Lesson

2

The Environment

Key Concepts

- Environment
- Observation and change

ASSIGNMENT SUMMARY

- ☐ Record your observation-specific environments.
- ☐ Choice Assignment
- ☐ Complete lesson 2 test.

Your Thoughts

What are some parts of your environment that you know are there but that you can't see? Discuss your ideas with someone and listen to their ideas.

Assignments

1. For this exercise you will be observing three different environments. Pick two places that are natural areas where you can be relatively close to nature. The third place can be anywhere—it's your choice.

   Sit quietly in each of these places for at least 15 minutes. You are to relax and observe your environment. Pay attention to what you see, hear, smell, and feel. When you are finished, record your observations about each place and what types of things you noticed happening around you. Be specific and describe as many details as you can. Be sure to include any thoughts or feelings that you had while you were observing your environments. You will use these observations for an assignment in lesson 3, so keep them in a safe place.

   a. Visit one of the natural places early in the morning before the world is busy.

   b. Visit the other natural place at dusk, close to the time when the sun sets.

   c. Visit the third place at any time you choose.

   Ideally, the student will have a chance to experience the environment as a whole before reflecting on the specifics. That is why we ask the student to take notes and record

observations and feelings *after* the experience of being in each place, rather than during. Be sure that the student keeps a copy of this observation to use in the next lesson.

Choice Assignment

Choose **one** of the following projects.

These activities will give you practice in making observations.

A. **Weather Journal.** Keep a weather journal for five days. In each entry, describe the cloud patterns, the times the sun and moon rose and set, the temperature, the wind patterns, and any other observations. When the five days are over, answer the following questions:

   - Was there one day that was your favorite in terms of the weather? Which day was it? What was the weather like?
   - If you had the power to make the weather patterns any way you wanted for a week, what would the days be like? Write up your dream weather report for a week's time.

B. **Evening Observations.** How often do you observe the outside environment at night? One evening, at least an hour after the sun has set, go outside without any source of light (no flashlight or candle). If you can, stay out for 20 minutes. Take notice of the changes in your eyesight as it adjusts to the dark. Do you hear different noises at night than you do during the day? Count the number of night sounds you hear or night sights you see. Any surprises? Anything new? Write down your observations when you come back inside. (If you live in a place where there are lots of lights at night, try to find a special time to visit a very dark place at night.)

C. **Blindfold Project.** Go outside with someone you really trust who is willing to be blindfolded. Taking turns, one of you will be blindfolded and the other will act as the seeing-eye guide. The partner who can see should remain beside the blindfolded one, and the two of you should take five minutes to take in what is around you. You can then switch roles. Using your senses of hearing, feeling, tasting, and smelling, what do you observe differently when you can't see? What changes in the environment do you think you would be more aware of during the change of seasons if you were truly blind? What things are you able to notice as a seeing individual? Write two paragraphs describing your observations—one for when you were blindfolded, and one for when you could see. Write a third paragraph explaining the differences between the two ways of observing.

Test Questions

1. Write a definition of *environment* in your own words.

   The environment refers to everything around us. Students will hopefully be able to convey that in their responses.

2. In what ways do YOU react to changes in your environment? List and describe at least three ways. (Example: How do changes in the weather affect you?)

   Students may mention reacting to changes in the weather, in the daylight, or in the social environment (such as acting differently when playing with friends or visiting with grandparents). Students should provide specific examples with their answer.

3. Do all living things change? List changes that you have observed in three living things in your environment recently. (Example: If the season is changing, have you noticed animals around you losing or gaining their winter fur?)

   Yes, all living things change. Examples mentioned might include seeing leaves change color and fall off trees, wildlife growing fatter in preparation for winter, children growing taller, or grass growing longer.

4. Do nonliving things change? List changes that you have observed in three nonliving things in your environment recently. (Example: How has the sky changed today?)

   Nonliving things often change very slowly, but examples might include the shape of a coastline or river after a storm or rainy season, a rotting tree stump being slowly decomposed, a crack in a boulder or sidewalk widening as a plant pushes through it, or the shape of a sand dune changing over time.

Learning Assessment

These assessment rubrics are intended to help track student progress throughout the year. Please remember that these skills continue to develop over time. Parents and teachers can use this space to make notes about the learning the student demonstrates or any skills that might need work.

SKILLS	Developing	Consistent	Competent	Notes
Displays focused observation skills				
Records observations in detail				
Shows awareness of change in the natural world				

Lesson

6

The Seedling

Key Concepts

- Root systems
- Buds

ASSIGNMENT SUMMARY

- ☐ Observe and describe plant roots.
- ☐ Draw and label a picture of the parts of different plants.
- ☐ Explain the functions of the parts of a green plant.
- ☐ Choice assignment
- ☐ Complete lesson 6 test.

Assignments

1. Carefully pull up one of each of the seedlings from the last lesson. Notice that they do not look exactly the same, but they are all similar in that they have three main parts. If you have a magnifying glass or a microscope, examine the seedlings' roots to see if you can identify the root hairs. Using the diagrams and text in this lesson, identify each of the parts of each seedling. How are the root structures different? Are they fibrous or taproot systems? Record your observations.

   Students' answers will vary, but be sure that their description of the plant's parts includes stems, leaves, and roots.

2. For this assignment, you will need a head of cabbage or a Brussels sprout (which is like a tiny cabbage and is closely related), a bunch of celery, and a bulb of garlic. Ask for parental assistance, if needed, to slice each of them in half, top to bottom. Draw a picture of the exposed parts of each and label the parts that you can identify. (Then use the vegetables for your dinner, if you like!)

   Drawings will vary, but be sure they are labeled. The discovery in this assignment will be in identifying and noting the variety and utility of terminal buds and the tiny lateral buds that have not yet developed because we harvest the terminal buds before lateral buds can grow.

3. Explain the functions of the parts of a green plant:

   a. Leaves

      The leaves increase surface area for catching the maximum amount of sunlight to make food.

b. Stem

The stem connects leaves, which make food, and roots, which absorb water and minerals. Each of these plant parts needs what the other gets so the stem is the transport system. It also holds up the leaves, moving them to where there is light.

c. Roots

The root system anchors the plant in the soil.

d. Root hairs

The tiny root hairs vastly increase the surface area and absorb water.

e. Bud

A bud keeps growth on hold until the time is right, and then starts new growth for both stems and leaves.

f. Bud scale

Bud scales are special tiny, hard leaves that protect lateral buds.

Choice Assignment

Choose **one** of the following projects.

A. **Inspect Roots.** If you have a yard or access to a nearby field, go outdoors with a trowel or small shovel and find some common grasses and weeds that you can recognize, such as dandelions, clover, and the grass in your lawn or field. Dig up a small clump or a single plant of at least three different types. (Be careful not to break off the root when you dig it up.) Gently shake off the soil and examine the root structures. Look more closely with a magnifying glass. Does it have one main taproot, or many smaller, fibrous roots? Draw a color picture of each plant with its roots and label the type of root structure for each plant. (After you finish, you can replant the plants if they are not too wilted. Be sure to give them some water, as they will have dried out.)

B. **Research Carnivorous Plants!** In the beginning of this lesson, you learned that plants are the only organisms that can make their own food. While this is true, there are some plants that trap and digest other organisms (usually insects). Using books found at your local library, or internet resources, find out what specialized mechanisms these plants have that enable them to capture and eat bugs. Write a three-paragraph paper describing how they do this. Use the names of some of the plants you learned about. Do any of these plants live near you? Have you ever seen any? Please refer to the introduction for suggestions about how to complete a research paper. Don't forget to proofread your work and to write a works cited page.

C. **Identify Edible Roots and Shoots.** Make a list of all the vegetables, grains, and fruits that your family eats. Then take a trip to a grocery store and look for the plants on your list. Try to identify what part of a plant each of the food items represents. Write down the part next to each name. Some foods might be hard to figure out. When you eat broccoli, for example, you are eating

clusters of tiny flower buds. If that green broccoli head had been left in the field where it grew, in a few days it would have become a mass of yellow flowers! Which plant parts are there more of on your list? Probably, your family eats a mixture of roots, stems, leaves, buds, flowers, and seeds of all types.

D. **Witness Plant Power.** Try a true test of the amazing power of roots. For this activity you will need several beans, plaster-of-Paris, and a paper cup. Soak the beans overnight to prepare them.

When the beans have been soaked, pour plaster-of-Paris (which should be prepared as a liquid according to the instructions on the package) into a paper cup, filling it about halfway. Then place a few beans on the plaster and continue to fill the cup. Be sure the beans are located halfway down.

In a few days, you will be witness to a plant's strength and determination to grow! (The plants should have broken through the plaster-of-Paris. If they did not, be sure you soaked the beans overnight and prepared the plaster correctly.)

Test Questions

1. What are the two main types of root systems? Describe each one in your own words.

   The two main types of root systems are tap root and fibrous. Fibrous root systems consist of many thin, branched roots, which are all similar in size. Tap root systems usually have one large, main root with many secondary roots growing off it in all directions.

2. What are the main functions of roots in green plants? Name and describe three functions.

   Roots absorb water and minerals from the soil through tiny root hairs. Roots provide structure and support for the plant so that it won't fall over or get blown away. Roots also serve as a storage area for food, such as minerals and carbohydrates, which help the plant grow.

3. What role do leaves play in the function of a plant?

   The leaves spread out to create more surface area to collect energy from the sun, which the plant needs to make food.

4. Name at least three parts of plants that are commonly eaten by humans. Give two examples of each.

   Hopefully, students will think of their own examples based on what they commonly eat. Some examples might include the following:

   Buds: Brussels sprouts, cabbage, celery

   Roots: turnips, carrots, beets

   Leaves: lettuce, kale, spinach

Flower buds: broccoli, cauliflower

Seeds: beans, sunflower seeds

Learning Assessment

Use assessment rubrics to track student progress and to make notes about the learning the student demonstrates or any skills that might need work.

SKILLS	Developing	Consistent	Competent	Notes
Displays focused observation skills				
Records observations in detail				
Collects data over time				
Creates accurate, labeled, scientific drawings				
Demonstrates knowledge of root structure and function in plants				
Identifies functions of roots and leaves				

Lesson

17

Simple Animals

Key Concepts

- Sponges
- Cnidarians
- Worms
- Mollusks

ASSIGNMENT SUMMARY

- ☐ Identify traits and give examples of different types of animals.
- ☐ Draw a picture of a coral reef.
- ☐ Choice assignment
- ☐ Complete lesson 17 test.

Assignments

1. List two important traits of each of the following phyla. (Note the special structures described throughout the lesson that differentiate these phyla from each other.) Give an example of a common animal from each phylum:

   a. Porifera

   Aquatic, pores, no tissues, stationary as adults, mobile when first hatched, sexual and asexual reproductive capacities, skeleton made of hard, needlelike structures called spicules, eats microorganisms like bacteria, algae, small protozoa, eggs, etc., by filtering water into the external pores then out through centralized channels. Examples: sponges, such as the yellow branching sponge, irregular reddish-orange sponge, breadcrumb sponge, etc.

   b. Cnidaria (Coelenterata)

   Aquatic, cells organized into tissues (digestive, muscle, nerve, and sensory), central cavity with mouth and stinging tentacles, eats macroorganisms and, as adults, some are stationary and some are mobile. Examples: hydras, corals, anemones, jellyfish.

   c. Platyhelminthes

   Flatworms, mostly parasitic, tissues organized into organ systems, heads with light-sensing eyespots, mouths but no anus, strongly regenerative. Examples: tapeworm, planaria, flukes.

d. Nematoda

Roundworms, some parasitic, some aquatic, some terrestrial, tissues organized into organ systems (including complete digestive system with mouth and anus), tip of proboscis hooked, blood vessels contract. Examples: ascarids, guinea worm, eelworm, pinworm.

e. Annelida

Terrestrial and aquatic, segmented and therefore very diverse (allows for specialization of function for different segments), tissues organized into organ systems. Examples: earthworm, ragworm, clamworm, leech.

f. Mollusca

Most are aquatic, some terrestrial, soft bodied; tissues organized into organ systems, specialized organs (especially effective excretory organs called nephridia—small tubules to collect and discharge wastes), foot (muscle used for burrowing or movement), radula (chitin-based, hard raspy tongue used to scrape), mantle (thick muscular cover), secretes shell in shelled mollusks. Examples: ground slug, squid, snail, clam, mussel, octopus, cuttlefish, sea slug, nautilus, moon snail, periwinkle, file shell, scallop.

2. Draw a picture that shows a coral reef. See if you can show it in different stages—show how it forms, how it gets food, and how algae help it. Label your drawing and use colored pencils to make it more realistic.

Tiny hard coral animals, called polyps, live inside a hard skeleton often made of calcium. As generations of these tiny animals die and leave their hard skeletons behind, new animals build upon their remains, eventually forming a reef. Each species makes a different pattern. Most species of hard corals obtain food by reaching out of their protective houses with tentacles at night, to catch zooplankton, which are tiny drifting animals that also come out at night. Algae help by living inside the corals' "houses" and providing food produced by photosynthesis, in return for a protected home.

Student drawings should show accurate detail and use color authentically, based on research. Drawings should be labeled to indicate the different phases of the coral life cycle.

Choice Assignment

Choose **one** of the following projects.

A. **An Underwater Color Community.** Use the pictures in this lesson and other pictures from resource books to help you with ideas for an underwater scene with sponges, jellyfish, hydra, coral, sea anemones, clams, snails, and worms. You can use a fine-tipped pen or pencil to do your "simple animal" drawings, because they should be accurate in terms of showing each animal's physical features.

As you are putting your underwater-color-community together, use the information in this lesson to help you figure out what additional plants or animals should be a part of the scene. These additions can be the food sources for the simple animals or other matter they rely upon for survival. Color your scene and label the animals. Imagine you are scuba diving or snorkeling and you can see the animals waving in the flow of the water!

B. **Find Pet Parasites.** Worm parasites are quite common in domesticated animals, such as cats and dogs, due to what they eat, roll in, and sniff. For this activity you will call or visit a local veterinarian to ask about the parasites that affect animals living in homes. Before calling or making an appointment, make a list of at least five questions you have about these parasitic creatures. You might want to inquire about how they affect the health of the animals, if humans can get parasites, how to get rid of them, etc. When you talk to the vet, let them know what you are studying and that you are thankful for the help. When you complete your interview, write up your findings and discuss what you have learned with your home teacher.

C. **Research Species.** Using books found in your local library or from internet resources, research one or two individual species from each of the two groups of phyla below, and write and illustrate one page on each animal:

1. Platyhelminthes, Nematoda, or Annelida (choose at least one)
2. Porifera, Cnidoria (Coelenterata), or Mollusca (choose at least one)

D. **Find Wiggly Worms.** For those who are daring and worm friendly, here is an activity that involves worm handling. With the help of worms, you can create nutrient-rich soil from your organic waste matter or yard debris. To begin, you will need a plastic or wooden box about the size of a shoebox. For a container this size, you will need about 25 worms; the bigger the box, the more worms you might want to add. If the box is going to be in a place that is warmer than 65°, you will need red worms; if the temperature will be between 50° to 60°, you can use earthworms. You can dig up the worms yourself, buy some from a bait store, or purchase them from a garden center.

On the bottom of the box, put several inches of shredded newspaper or garden soil and sand. Make sure the base you use is lightly moistened. When the base of newspaper or soil and sand is down, puncture a few air holes in your container and add your worms. Be sure your container closes securely so the worms won't get out.

You can do this project indoors or outdoors (in warm weather), and the worms should stay put if you are maintaining them with enough materials to make rich garden soil. Add organic matter to your worm box, such as leaves, grass, or fruit or vegetable leftovers (no meat!). You must feed them regularly, but don't overwhelm them with too many food materials. The worms will eat the organic matter, pass it through their digestive system, and "poop" out fertile soil.

In about two months from the start of your worm-keeping project, the worms will have created a soil that any gardener will be thankful for. You can use the soil or give it away, and continue keeping the worms if you like. Otherwise, let the worms go in a safe place outdoors where they can

burrow into soil. Keep a daily log of what you do in your project, and write a full description of what happens as time goes on.

Test Questions

1. Sponges belong to the phylum Porifera. What does this word mean, and how does it describe the anatomy of a sponge?

   Porifera means "having holes." Sponges are simple animals full of tiny pores, through which water flows, carrying tiny organisms that the sponge filters and traps, and then eats. Modern cellulose sponges were based on the anatomy of animal sponges, which are still used in parts of the world today.

2. Why do members of the phylum Cnidaria have tentacles that contain stinging cells? How do they use the stinging cells?

   Cnidarians have stinging cells on their tentacles in order to catch food. The stinging cells stun the small animals that are touched by them, and then the Cnidarian uses its tentacles to grasp the food and push it through the mouth into the body cavity.

3. As you learned, coral reefs are formed by many tiny animals called polyps. How do the polyps get food from the water? How do algae help the polyps?

   Coral polyps have tentacles that reach out and grasp tiny animals that drift by the reef. Algae help corals by producing food through photosynthesis while living inside the protection of the corals' hard casing.

4. Many types of worms are parasites. What aspect of their behavior classifies them as parasites?

   Many worms are classified as parasites because they live off their host organism and do some kind of harm, causing sickness or death.

5. Name two ways in which earthworms are beneficial to other organisms.

   Earthworms are food for many other animals, including birds. Their casings, excrement, dead bodies, and burrowing activities all help make soil more fertile, and provide food for soil organisms.

6. Name two common members of the phylum Mollusca.

   Some common members of the phylum Mollusca are the clam, octopus, squid, snail, and slug. Students might think of others from their research.

Learning Assessment

Use assessment rubrics to track student progress and to make notes about the learning the student demonstrates or any skills that might need work.

SKILLS	Developing	Consistent	Competent	Notes
Creates detailed, labeled scientific drawings				
Differentiates between different types of simple organisms				
Provides specific examples to support statements				

Lesson

23 Ecology and the Environment

Key Concepts

- Ecosystem
- Habitat

ASSIGNMENT SUMMARY

- ☐ Choose an animal or plant and describe its habitat.
- ☐ Describe your own personal habitat.
- ☐ Choice assignment
- ☐ Complete lesson 23 test.

Assignments

1. Choose an animal or plant and describe its habitat. You can use your own knowledge, or you can conduct research using a book or the internet. Aim to write two or three paragraphs.

   When describing habitat, students should include the following information such as climate (including temperature ranges and amount of precipitation), terrain (what the land surface is like or the condition of the water), other organisms that share the habitat, size (how extensive the habitat is), and how the animal interacts with others in its species. Look for specific details.

2. Describe your own personal habitat. Include all of the elements described in the lesson including sources of food, water, other living organisms, climate, environment, etc.

   Encourage broad definitions of the elements listed above. For instance, the human habitat includes buildings and interactions with other humans, as well as animals and plants.

Choice Assignment

Choose **one** of the following projects.

A. **Video Production.** You will need a video camera for this assignment. As film director for this ecological video, you will need to locate and explore four different habitats before filming. Notice the living and nonliving things in each of these habitats, taking special note of the relationships between different energy sources, the landscape, and the level of sunlight and moisture. Look for both large and small habitats, remembering that even the space under a mushroom cap is a separate mini-habitat.

After becoming familiar with these places, make your own ecological video with narration. You can put different scenes to music, take on a new voice, or add whatever nature-enhancing aspect you wish. Share the video with your family members and friends.

B. **Nature Drawing.** Go on a habitat expedition outdoors. Look for one animal, one plant, and one nonliving thing's habitat. These can be in different habitats or all in the same one. Carefully observe each habitat. Using crayons or colored pencils, draw each living and nonliving thing in its home, making certain to show any element you think is important to the habitat. While you are reflecting and creating your drawings, think about which one could exist in almost any area in the world. Which could exist in both Antarctica and the state of Florida? Which, if any, could you also find in a desert and in the rain forest? How about a mile down the road? As you are drawing, really think about how your living and nonliving things came to "choose" their particular habitat. Write up your thoughts and share them with your home teacher.

C. **Research Endangered Species.** Do some research to find out about some of the plants and animals that aren't adapting very well to our changing environment, and the loss of their habitats. Choose one or two species and write a short essay about their specific needs, why they have become endangered, and what is being done to help protect them and their habitats. You can use library magazines, nature books, newspaper articles, and nature videos.

Test Questions

1. What do we mean when we say that living and nonliving things in the environment are interrelated?

   Living things could not live without an environment to live in and use for food and shelter. All organisms are affected by and affect the living and nonliving things in their environment. This interrelationship is the study of ecology.

2. How is the study of ecology different from that of other sciences?

   The study of ecology is different from that of other sciences in that it deals primarily with how other sciences interconnect.

3. Describe, in your own words, what a habitat is.

   A habitat is an environment in which the conditions are right for an organism to live and reproduce. Be sure the student understands the concept of "limiting factors": an organism can only live where the conditions are right for that organism's particular needs.

4. Why does an ecosystem need to be in balance? Give an example of an ecosystem out of balance.

   An ecosystem must be in balance to work because all the organisms are dependent upon one another for survival. If there are too many or too few of a key organism or natural resource, all the other organisms in that ecosystem will be affected. An example of an ecosystem out of balance is an island where there are deer and wolves as well as many

other smaller animals and plants. If all the wolves are removed, there is no longer a major predator to keep the deer population in balance. Deer (and other herbivores, such as mice, voles, rabbits, and groundhogs) reproduce freely and there is no check on their populations. Soon they have eaten all the plant material on the island, and their populations crash as they starve to death. Be sure the student understands the key concepts.

5. An ecosystem needs a source of energy to keep it going. What is the source of energy for all ecosystems? (Hint: We learned this in lesson 22.)

   The correct answer to this question is the sun.

Learning Assessment

Use assessment rubrics to track student progress and to make notes about the learning the student demonstrates or any skills that might need work.

SKILLS	Developing	Consistent	Competent	Notes
Demonstrates knowledge of animal habitats				
Shows awareness of role and importance of a balanced ecosystem				
Identifies ways in which an ecosystem can be out of balance				
Shows understanding of relationship between living and nonliving things in an environment				