



Organisms Pacing Guide¹

Use the information below to assist you in determining the amount of time needed to complete the entire unit. These recommendations assume the **average science class period is 45 to 60 minutes in length**. We recommend teaching science a minimum of three sessions per week in order to maintain consistency and keep students engaged. Many teachers accomplish this by rotating a science unit with a social studies unit, enabling you to teach more science sessions in one week and finish the unit in fewer weeks. We highly recommend that all teachers participate in the Expository Writing and Science Notebooks Program in order to further develop students' science understandings, as well as their scientific thinking and writing skills. To implement the science-writing curriculum requires, for most lessons, a separate 20 to 30 minutes for a science-writing mini-lesson and independent writing time. Time for these mini-lessons is not included in this pacing guide.

Lesson and Common Assessments (see corresponding pages in the Instructional Guide for lesson planning)	Recommended Number of Periods	GLEs Addressed/Big Idea(s) of the Lesson	Considerations for Planning	Recommended Applications and Extensions
<p>Lesson 1: Sharing What We Know About Organisms/CBA A</p> <p>Students complete a pre-assessment about what they think a living thing needs in order to stay alive. Then, they brainstorm lists of organisms and ways that plants and animals are alike and different.</p>	1-2	<p>GLE This lesson is a pre-assessment of students' prior knowledge in preparation of the Organisms unit. It introduces ideas that will meet GLEs in later lessons.</p> <p>Big Idea: All organisms have certain basic needs, such as water, light air, shelter, space and temperature, which must be met by their habitat in order for them to survive.</p>	<ul style="list-style-type: none"> • This lesson can be taught in two parts. Engage & Encounter and Explore & Investigate in the first period, and Reflect & Explain and Apply & Extend during the second period. • Save the charts for use in later lessons. As students learn more during the unit, refer back to the charts and ask if any of their thoughts need to be revised. 	<ul style="list-style-type: none"> • Extensions 1 and 2 on page 20 in the Teacher's Manual are good. • Keeping a class tally of the types and numbers of living things students observe is a great source for graphing.
<p>Lesson 2: Observing and Describing Seeds</p> <p>Students observe 4 different seeds using their senses. They do an extension activity where they sort seeds according to different characteristics.</p>	1	<p>GLE 1.1.1 Understand simple properties of common natural and manufactures materials and objects.</p> <ul style="list-style-type: none"> • <i>Sort common objects by multiple simple properties (e.g. size and shape).</i> <p>1.2.3 Know that common materials are made of smaller parts.</p> <ul style="list-style-type: none"> • <i>Show that people use magnifiers to observe things they cannot see with their eyes.</i> <p>2.1.2 Understand how to plan and conduct simple investigations following all safety rules.</p> <ul style="list-style-type: none"> • <i>Make observations about characteristics of properties.</i> <p>Big Idea: All living things have specific characteristics. Organisms grow, change, and die over time.</p>	<ul style="list-style-type: none"> • Materials note: Sunflower seeds have been replaced by rye grass seeds. • Do not tell the students the names of the seeds. Focus them instead on characteristics of the seeds that they can observe with their senses. In lesson 6, students will discover the names of the seeds/plants. • Before lesson 2.5, soak two lima bean seeds per student. 	<p><i>Sorting Seeds:</i> Giving students an opportunity to sort seeds according to different characteristics will help them focus on the characteristics of color, size, shape, and texture. This should be done with seeds you have collected. There are not enough seeds in the kit for this purpose.</p>

¹ Pacing Guide for use with the *ORGANISMS* Teachers Manual, National Academy of Science (1996)

<p>Lesson 2.5: Observing Lima Beans</p> <p>Students look at a lima bean seed that has been soaked overnight. They place the seeds and a damp paper towel in plastic bags and observe them over the new several days.</p>	2	<p>GLE 1.1.1 Understand simple properties of common natural and manufactures materials and objects. 1.2.3 Know that common materials are made of smaller parts. 1.2.7 Understand the life cycles of plants and differences between inherited and acquired characteristics.</p> <ul style="list-style-type: none"> • <i>Describe that young plants and animals grow to resemble their parents as they mature into adults.</i> <p>2.1.2 Understand how to plan and conduct simple investigations following all safety rules. Big Idea: All living things have specific characteristics. Organisms grow, change, and die over time.</p>	<ul style="list-style-type: none"> • This lesson has been added to the unit in order to fill the gap between observing a dry seed and then planting it to see what happens. • Before lesson 3, soak the kidney bean and the green pea seed overnight. 	<p>As a center activity, students could soak and look inside other beans (kidney beans, etc.) and draw what they observe.</p>
<p>Lesson 3: Planting Our Seeds</p> <p>Students plant one type of seed and observe it over a week or two.</p>	1+	<p>GLE 2.1.1 Understand how to ask a question about objects, organisms, and events in the environment. 2.1.5 Understand how to record and report investigations, results and explanations. Big Idea: All living things go through a life cycle where they grow, change, and die over time.</p>	<ul style="list-style-type: none"> • This lesson is spread over a week or so depending on how fast the plants grow. The students observe their seeds every few days and record their observations in a log. • Do not use the planting cards blackline masters in the manual. Show students how to make a “Scientist’s Log” instead. • Do not introduce the term “photosynthesis” in this unit. It is more developmentally appropriate for students to understand that plants need light in order to grow and be healthy. • Save some potting soil for lesson 3.5. 	
<p>Lesson 3.5: Conducting a Fair Test to Find Out about Seeds’ Needs</p> <p>Students set up a fair test to see whether plans need light in order to grow and be healthy.</p>	1+	<p>GLE 1.3.8 Know that most living things need food, water and air.</p> <ul style="list-style-type: none"> • <i>Observe and record or demonstrate that plants need light.</i> <p>2.1.2 Understand how to plan and conduct a simple investigation following all safety rules.</p> <ul style="list-style-type: none"> • <i>Make predictions of the results of the investigation.</i> • <i>Plan and conduct an observational investigation that collects information about characteristics or properties.</i> • <i>Collect data using simple equipment and tools that extend the senses (e.g., rulers).</i> <p>Big Idea: Scientists ask questions, conduct investigations, and use their observations as evidence in making explanations about organisms. All organisms have certain basic needs that must be met by their habitat</p>	<ul style="list-style-type: none"> • Modification: This lesson is not in the manual. It has been added to give students another opportunity to design a fair test. The lesson should be based on one of the student questions from the previous lesson. • This lesson is spread over a week or two. Students will observe these seeds after they have observed the seeds they planted in lesson 3. • The easiest thing for students to understand is two extremes: light and no light. • Before lesson 4, have students collect some leaves to place in the terrariums. 	

		in order for them to survive.		
<p>Lesson 4: Observing Woodland Plants</p> <p>Students observe two woodland plants – moss and a tree seedling. They set up and plant them in a terrarium.</p>	2	<p>GLE 1.1.6 Understand characteristics of living organisms.</p> <p>1.2.1 Understand that things are made of parts that go together.</p> <p>2.1.4 Understand that models represent real objects, events, or processes.</p> <ul style="list-style-type: none"> • <i>Create a simple model of a common object, event or process [aquarium represents pond; terrarium represents woodland habitat].</i> <p>Big Idea: All organisms have specific characteristics. All organisms have certain basic needs that must be met in order for them to survive.</p>	<ul style="list-style-type: none"> • For additional information on the care of woodland plants, refer to Appendix A, p. 213 in the manual. • Do not use recording sheets 4A and 4B. Students should record their observations in their Science Notebooks. • Have a digital camera on hand to record what the terrariums look like in the beginning. • Students should observe the terrariums every day even when you aren't teaching science. • Save the leftover soil for lesson 9. 	
<p>Lesson 5: Observing Freshwater Plants</p> <p>Students observe two freshwater plants – hornwort and duckweed. They set up and “plant” them in an aquarium.</p>	2	<p>GLE 1.1.6 Understand characteristics of living organisms.</p> <p>1.2.1 Understand that things are made of parts that go together.</p> <p>2.1.4 Understand that models represents real objects, events, or processes.</p> <p>Big Idea: All organisms have specific characteristics. All organisms have certain basic needs that must be met in order for them to survive.</p>	<ul style="list-style-type: none"> • The freshwater plants have been changed from the ones listed in the manual to hornwort and duckweed. • Have a digital camera on hand to record what the aquariums look like in the beginning. • Students should observe the aquariums every day even when you aren't teaching science. <p>Keep a holding tank of aged, dechlorinated water on hand at all times. See Appendix A in the manual for more information.</p>	
<p>Lesson 6: How Have Our Seeds Changed?</p> <p><u>Session 1</u>: Students observe their plants one last time, compare their plants to someone else's, and figure out which seed they planted.</p> <p><u>Session 2</u>: Students observe the plants from the fair test and discuss what plants need in order to grow and be healthy.</p>	2	<p>GLE 1.1.5 Understand physical properties of Earth materials.</p> <p>1.1.6 Understand characteristics of living organisms.</p> <p>1.2.7 Understand that plants and animals have life cycles.</p> <p>1.1.6 Understand characteristics of living organisms.</p> <p>1.3.8 Know that most living things need food, water and air.</p> <ul style="list-style-type: none"> • <i>Explain how plants and animals obtain food (e.g. plants make food from sunlight, air, water, mineral nutrients).</i> <p>2.1.3 Understand how to construct a reasonable explanation using evidence.</p> <p>2.2.2 Understand that observations and measurements are used by scientists to describe the world.</p> <p>3.2.4 Understand how humans depend on the natural environment.</p> <ul style="list-style-type: none"> • <i>Describe what organisms obtain from their environment (e.g. school plant needs water and light).</i> <p>Big Idea: All organisms have certain basic needs that must be met in order for them to survive, such as water, light, air, food, space, shelter, and a specific range of temperature. All</p>	<p>Plants may be sent home with students or kept in a classroom garden after this lesson. If you send the plants home with students, send the letter to parents with directions for transplanting, found on pages 86-87 in the manual.</p>	<p>You might want to continue to keep these plants in the darkness so that students can really see the difference between a healthy plant and a weak plant.</p>

		organisms go through a life cycle, where they grow, change, and die over time.		
<p>Lesson 7: Observing Freshwater Snails</p> <p>Students observe freshwater snails and add them to their aquariums.</p>	1	<p>GLE 1.1.6 Understand characteristics of living organisms.</p> <p>1.2.1 Understand that things are made of parts that go together.</p> <p>1.2.6 Know that living things are made of small parts.</p> <p>Big Idea: All organisms have specific characteristics. All organisms have certain basic needs that must be met by their habitat in order for them to survive.</p>	<ul style="list-style-type: none"> • There is good background information on snails on pages 89-91 in the Teacher’s Manual. • Keep all of the charts so that students can add new information and observations over the next few days. 	<ul style="list-style-type: none"> • Provide time for ongoing observations for the snails. • Add new observations and questions to the class charts.
<p>Lesson 8: Observing Cloud Fish: How Do They Compare with the Snails</p> <p>Students observe the cloud fish and complete a Venn diagram showing how they are similar to and different from the freshwater snails.</p>	1+	<p>GLE: same as lesson 7</p> <p>Big Idea: All organisms have specific characteristics. All organisms have certain basic needs that must be met by their habitat in order for them to survive.</p>	The guppies have been replaced by cloud fish because they survive better in the classroom. See content information in the back of the Instructional Guide for information on cloud fish.	Provide time for ongoing observations of the aquaria.
<p>Lesson 9: Observing Isopods</p> <p>Students observe pill bugs and sow bugs and begin a Venn diagram.</p>	1	<p>GLE same as lesson 7</p> <p>Big Idea: All organisms have specific characteristics. All organisms have certain basic needs that must be met by their habitat in order for them to survive.</p>	<ul style="list-style-type: none"> • You may receive sow bugs in addition to pill bugs. Any bugs that can’t roll into a ball are sow bugs. • Do not tell students that isopods need to be in a moist environment. They will discover this in lesson 9.5 when they conduct a fair test. • Students will complete the Venn diagram after they observe the mystery animals in lesson 10. 	
<p>Lesson 9.5 – Conducting a Fair Test to Find out About the Needs of Isopods</p> <p>Students create a fair test to investigate whether isopods need moist or dry soil in their habitat.</p>	1-2	<p>GLE 2.1.2 Understand how to plan and conduct simple investigations following all safety rules.</p> <p>2.1.3 Understand how to construct a reasonable explanation using evidence.</p> <p>2.1.5 Understand how to record and report investigations, results, and explanations.</p> <p>2.2.1 Understand that all scientific observations are reported accurately even when the observation contradicts expectation.</p> <p>2.2.2 Understand observations and measurement are used by scientists to describe the world.</p> <p>2.2.3 Understand that similar investigations may not produce similar results.</p> <p>Big Idea: All animals have certain basic needs that must be met by their habitat in order for them to survive. Scientists ask questions, conduct investigations, and use their observations as evidence in making explanations about organisms.</p>	This lesson has been added in order to give students another opportunity to plan and conduct an investigation.	Students can read <i>A Pill Bug’s Life</i> to answer some of their questions about isopods. A language arts lesson is included in the Instructional Guide. This lesson should be done outside of science time.

<p>Lesson 10: Mystery Animals</p> <p>Students observe a mystery animal (mealworm larva) and compare them to the isopods using a Venn diagram.</p>	<p>1 long session or 2 shorter sessions</p>	<p>GLE 1.1.6 Understand characteristics of living organisms. 1.2.6 Know that living things are made of small parts. 1.2.7 Understand that plants and animals have life cycles. Big Idea: Some organisms go through a life cycle in which the organism’s physical characteristics metamorphose, changing greatly in appearance.</p>	<ul style="list-style-type: none"> • Do not teach lesson 10 as it is written in the manual. Mealworm beetles have replaced the Bess Beetles and Millipedes so that students can observe a 4-stage life cycle. • Do not tell the students what the mystery animals are. • If some of your mealworms are already in the pupa or adult stages, do not show them to the students in this lesson. • In this lesson, the class will complete the Venn diagram that you started in lesson 9. • Make booklets where students can record the changes they observe through drawing and writing. 	
<p>Lesson 10.5: Observing Over Time and Identifying the Mystery Animals</p> <p>Students make predictions about how the mystery animals will change. They observe the mystery animals over the next several weeks and do research in order to identify the mystery animal.</p>	<p>1+</p>	<p>GLE 1.2.7 Understand that plants and animals have life cycles.</p> <ul style="list-style-type: none"> • <i>Observe and describe the life cycle of a plant or animal [describe the life cycle of a mealworm beetle-egg, larva, pupa, mealworm beetle or adult].</i> <p>2.2.5 Know that ideas in science change as new scientific evidence arises.</p> <ul style="list-style-type: none"> • <i>Tell how scientific inquiry results in facts, unexpected findings, ideas, evidence and explanations.</i> <p>Big Idea: Some organisms go through a life cycle in which the organism’s physical characteristics metamorphose, changing greatly in appearance.</p>	<p>The research part of this lesson is best done during language arts time as it is mostly reading.</p>	<p>Students should observe the mystery animals until someone notices that an animal looks different.</p>
<p>Lesson 11: What is Happening in the Aquarium?/Assessment B: Aquarium Habitat</p> <p>Students observe the changes in the aquaria.</p>	<p>1+</p>	<p>GLE 1.3.8 Know that most living things need food, water, and air. 1.3.10 Know that plants and animals need a place to live.</p> <ul style="list-style-type: none"> • <i>Observe and show how organisms live in a specific place (e.g. fish live in a pond).</i> <p>2.1.4 Understand that models represent real objects, events or processes.</p> <ul style="list-style-type: none"> • <i>Describe how a model of something is similar to the real thing and how it is different.</i> <p>Big Idea: All organisms go through a life cycle, where they grow, change, and die over time. All organisms have certain basic needs that must be met by their habitat in order for them to survive.</p>	<ul style="list-style-type: none"> • See page 133 in the Teacher’s Manual for all the possible changes that may have occurred in the aquaria over time. • Modification: Instead of the final activities on page 136 in the Teacher’s Manual, students discuss what freshwater plants and animals need to stay healthy. 	<p>Have students complete Classroom Based Assessment B.</p>

<p>Lesson 12: What’s Happening in the Terrarium?/ Assessment C: Terrarium Habitat</p> <p>Students observe the changes in the terrariums.</p>	1	<p>GLE same as for lesson 11 Big Idea: All organisms go through a life cycle, where they grow, change, and die over time. All organisms have certain basic needs that must be met by their habitat in order for them to survive.</p>	<ul style="list-style-type: none"> • This lesson is similar to lesson 11. • See page 141 in the Teacher’s Manual for all the possible changes that may have happened in the terraria over time. 	<ul style="list-style-type: none"> • Have students complete CBA C. • See page 145, Extension 5 in the Teacher’s Manual for great outdoor explorations. • Appendix D outlines several different outdoor activities that introduce students to the diversity of life around them.
<p>Lesson 13: Freshwater and Woodland Plants: How Do They Compare?</p> <p>Students use a Venn diagram to compare freshwater and woodland plants.</p>	1	<p>GLE 1.3.8 Know that most living things need food, water, and air. 1.3.10 Know that plants and animals need a place to live. Big Idea: Plants have similarities and differences, but all plants have certain basic needs that must be met by their habitat in order for them to survive – light, water, air, specific range of temperature, and space to live.</p>	Save the plants Venn diagram and the class list of “Needs of Plants” for lesson 15.	The reading selection: <i>Four Amazing Plants</i> in the final activities may be done during language arts class.
<p>Lesson 14: Freshwater and Woodland Animals: How Do They Compare?</p> <p>Students use a Venn diagram to compare freshwater and woodland animals.</p>	1	<p>GLE same as for lesson 13 Big Idea: Animals have similarities and differences, but all animals have certain basic needs that must be met by their habitat in order for them to survive – light, water, air, specific range of temperature, and space to live.</p>	Save the animal Venn diagram and the class list of “Needs of Animals” for lesson 15.	
<p>Lesson 15: How Are Plants and Animals Alike and Different?/ Assessment D</p> <p>Students use a Venn diagram to compare plants and animals. Then, they complete a box and t-chart showing how they are alike and different.</p>	1	<p>GLE 1.3.8 Know that most living things need food, water, and air. Big Idea: Plants and animals have some characteristics in common and some that are different. Since both plants and animals are organisms, they have certain basic needs that must be met by their habitat in order for them to survive.</p>	Modification: It is not recommended to have groups of 4-6 students complete their own Venn diagrams. Instead, complete it as a whole class.	
<p>Lesson 16: Taking a Look at Ourselves/ Post Assessment</p> <p>Students look at how humans are similar and different from each other and then compare the similarities of humans to the similarities of other plants and animals. Students will complete the post assessment where they write about the things all organisms need to live.</p>	1 long lesson or two shorter sessions	<p>GLE same as for lesson 15 Big Idea: Humans are animals. Humans are similar to other organisms in that they have basic needs that must be met by their habitat and they go through a life cycle where they grow, change, and die.</p>	<ul style="list-style-type: none"> • As in the previous lesson it is not recommended to have groups of 4-6 students complete their own Venn diagrams. Instead, complete it as a whole class. • The post assessment matches the pre-assessment given in lesson 1. 	