# GRADE 4 SCIENCE
# CURRICULUM GUIDE

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*Elkhart Community Schools*
*September 2002*

# COURSE DESCRIPTION
# ELEMENTARY SCIENCE

## (Grades 4-6)
## 0460-04, 0460-05, 0460-06

Elementary Science in the intermediate grades provides learning experiences through which students further develop science habits of mind and refine their understanding of simple concepts and principles about the nature of science and technology, the physical setting, the living environment, the human organism, the designed world, and the common themes of science.

These experiences are designed to allow students to:

- indicate a desire to investigate new and alternative ideas;
- accept the results of investigations even when these results require changing previously held positions and opinions;
- be enthusiastic and curious about the ways and ideas of science;
- value the integrity of what is observed by looking at data collected through scientifically valid procedures;
- identify, access, and use information from various reliable and relevant print and non-print sources;
- use basic science concepts to help understand various kinds of scientific information;
- follow and understand scientific and technical instructions;
- begin to evaluate certain "scientific" claims through guided classroom activities and discussion;
- use the appropriate sense(s) to observe objects and events;
- become familiar with devices which can enhance and refine observations;
- separate objects, ideas, and events into appropriate groups according to their characteristics;
- combine both past experiences and present evidence to arrive at logical explanations;
- predict what will happen in a given situation by referring to a series of related observations;
- select appropriate units and measuring devices for the situation;
- designate the results of the measurement accurately in numbers and use common words to express how terms and concepts are understood;
- revise definitions of terms, objects, and events as more experiences with them are acquired;
- formulate specific, appropriate questions and logical guesses concerning related observations;
- select or invent appropriate devices and equipment to accomplish a given scientific task;
- experience the data gathering portion of the experimental process;
- design a model (physical representation, drawing, or mental image) to explain objects and events;
- work cooperatively in groups, with each member accepting a specific role, to solve a problem or reach a goal;
- demonstrate an appreciation of how significant new scientific and technological ideas, discoveries, and inventions have affected our understanding of the world;
- demonstrate, through responsible actions, why care of and concern about the earth's resources are essential;
- consider ethical values, based on the applications of scientific information, when assessing the effects of human actions on the total environment; and
- identify a problem, propose solutions, devise ways to gather information to test the proposed solution and determine the most appropriate solution(

## THE NATURE OF SCIENCE AND TECHNOLOGY

**Standard 1: Students, working collaboratively, carry out investigations. They observe and make accurate measurements, increase their use of tools and instruments, record data in journals, and communicate results through chart, graph, written, and verbal forms.**

| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***The Scientific View of the World*** | | | |
| 4.1.1 Observe and describe that scientific investigations generally work the same way in different places. | TLW observe the characteristics of land snails in a container.<br><br>TLW discover how to light a bulb through observation. | Using reference materials, students can research different kinds of snails.<br><br>Students sketch a drawing of a light bulb. | Animal Studies<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Scientific Inquiry*** | | | |
| 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations. | TLW report on what they have discovered about starch through their individual research. | Research starch | Food Chemistry<br><br>Land and Water<br><br>Animals Studies<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***The Scientific Enterprise*** | | | |
| 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world. | TLW identify and interpret the information on a food label.<br><br>TLW summarize what happens when water from a single source flows over and through land. | Learn how to read a food label. | Food Chemistry<br><br>Land and Water<br><br>Animal Studies<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***The Scientific Enterprise*** | | | |
| 4.1.4 Describe how people all over the world have taken part in scientific investigation for many centuries. | TLW apply their knowledge to real-world situations. | Have students test the suitability of a local soil sample for growing plants. | Land and Water<br><br>Animal Studies |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Technology and Science*** | | | |
| 4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras, can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly. | TLW build a model of land and water to investigate the water cycle (use measuring instrument). | Do Activity #3, p. 35 of Land and Water. | Land and Water<br><br>Animal Studies |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Technology and Science*** | | | |
| 4.1.6 Explain that even a good design may fail even though steps are taken ahead of time to reduce the likelihood of failure. | TLW design and construct dams in their stream tables. | Create labeled, detailed drawings of dams. | Land and Water<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Technology and Science*** | | | |
| 4.1.7 Discuss and give examples of how technology, such as computers and medicines, has improved the lives of many people, although the benefits are not equally available to all. | TLW discuss what they know about electricity. | Make a collage illustrating ways electricity is used in the home. | Electric Circuits |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Technology and Science*** | | | |
| 4.1.8 Recognize and explain that any invention may lead to other inventions. | TLW brainstorm why and how humans build dams. | Research the Hoover Dam and the Answan Dam. | Land and Water |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Technology and Science*** | | | |
| 4.1.9 Explain how some products and materials are easier to recycle than others. | | | Standard not addressed in kits. |

## SCIENTIFIC THINKING

| **Standard 2: Students use a variety of skills and techniques when attempting to answer questions and solve problems. They describe their observations* accurately and clearly, using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, explain, and justify both information and numerical functions.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Computation and Estimation*** | | | |
| 4.2.1 Judge whether measurements and computations of quantities, such as length, area*,volume*, weight, or time, are reasonable.<br><br>*observation: gain information through the use of one or more senses, such as sight, smell, etc.<br>*area: a measure of the size of a two-dimensional region<br>*volume: measure of the size of a three-dimensional object | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Computation and Estimation*** | | | |
| 4.2.2 State the purpose, orally or in writing, of each step in a computation. | | | Standard not addressed in kits. |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Manipulation and Observation*** | | | |
| 4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals. | TLW review different ways to connect the battery, wire, and bulb to get the bulb to light. | Use a transparency to show connections of wire, bulb, and D-cell battery. | Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Communication Skills*** | | | |
| 4.2.4 Use numerical data to describe and compare objects and events. | TLW record, analyze, and discuss the class data, identifying possible reasons for varying results.<br><br>TLW investigate ground water, the amount of water soil components will hold, and run-off. | Students set up a systematic way to organize the test data.<br><br>Use Final Activities 1-3 on p. 85. | Food Chemistry<br><br>Land and Water<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Communication Skills*** | | | |
| 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | TLW observe the test foods and discuss their findings.<br><br>TLW record and discuss the properties of each soil component. | Students set up the main chart that they will use to record data, the Food Results Chart.<br><br>Bring a soil sample from home and compare in a written description. | Food Chemistry<br><br>Land and Water<br><br>Animal Studies<br><br>Electric Circuits |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Critical Response Skills*** | | | |
| 4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | TLW read about starch to learn more about how it affects their health.<br><br>TLW read to learn more about where drinking water comes from. | Students read about and discuss the role starch plays in their diet. | Food Chemistry<br><br>Land and Water<br><br>Animal Studies |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Critical Response Skills*** | | | |
| 4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | TLW record, analyze, and discuss the class data, identifying possible reasons for varying results. | Text Activity, Teacher's Guide pp. 18-21. | Food Chemistry<br><br>Animals Studies<br><br>Electric Circuits |

## THE PHYSICAL SETTING

| **Standard 3: Students continue to investigate changes of the earth and sky and begin to understand the composition and size of the universe. They explore, describe, and classify materials, motion*, and energy*.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Universe*** | | | |
| 4.3.1 Observe and report that the moon can be seen sometimes at night and sometimes during the day.<br><br>*motion: the change in position of an object in a certain amount of time<br>*energy: what is needed to make things move | | | Standard not addressed in kits. |

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| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.2 Begin to investigate and explain that air is a substance that surrounds us, takes up space, and whose movements we feel as wind. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.3 Identify salt as the major difference between fresh and ocean waters. | TLW observe frog care and feeding schedules. | Research similarities and differences in the DAF natural vs. classroom habitat. | Animal Studies |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.4 Describe some of the effects of oceans on climate. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the process by which the products of weathering* are moved from one place to another<br>*weathering: breaking down of rocks and other materials on the Earth's surface by such processes as rain or wind | TLW read to learn more about erosion caused by glaciers. | Use Final Activities #1 and #2 in Teacher's Guide p. 96. | Land and Water |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.6 Recognize and describe that rock is composed of different combinations of minerals. | TLW discuss how soil properties affect the ways in which soil is eroded and deposited by water in their stream tables. | Examine soil with hand lenses. | Land and Water |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.7 Explain that smaller rocks come from the breakage and weathering* of bedrock and larger rocks and that soil is made partly from weathered rock, partly from plant remains, and also contains many living organisms.<br><br>*weathering: breaking down of rocks and other materials on the Earth's surface by such processes as rain or wind | TLW investigate what happens to land, and to the water on land, after it rains, | Use Final Activities #1 and #2 in Teacher's Guide p. 51. | Land and Water |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.8 Explain that the rotation of the earth on its axis every 24 hours produces the night-and-day cycle. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***The Earth and the Processes That Shape It*** | | | |
| 4.3.9 Draw or correctly select drawings of shadows and their direction and length at different times of day. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Matter* and Energy*** | | | |
| 4.3.10 Demonstrate that the mass* of a whole object is always the same as the sum of the masses of its parts.<br><br>*mass: the amount of matter in an object | | | Standard not addressed in kits. |

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| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Matter* and Energy*** | | | |
| 4.3.11 Investigate and observe and explain that things that give off light often also give off heat*.<br><br>*heat: a form of energy | TLW learn that electricity can be used to generate heat and light. | Compare model to a light bulb. | Electric Circuits |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Matter* and Energy*** | | | |
| 4.3.12 Investigate, observe, and explain that heat is produced when one object rubs against another, such as one's hands rubbing together. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Matter* and Energy*** | | | |
| 4.3.13 Observe and describe the things that give off heat, such as people, animals, and the sun. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Matter* and Energy*** | | | |
| 4.3.14 Explain that energy in fossil fuels* comes from plants that grew long ago.<br><br>*matter: anything that has mass and takes up space<br>*fossil fuels: a fuel, such as natural gas or coal, that was formed a long time ago from decayed plants and animals | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Forces of Nature*** | | | |
| 4.3.15 Demonstrate that without touching them, a magnet pulls all things made of iron and either pushes or pulls other magnets. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Forces of Nature*** | | | |
| 4.3.16 Investigate and describe that without touching them, material that has been electrically charged pulls all other materials and may either push or pull other charged material. | TLW experiment with semiconductor diodes and learn how they work. | Students will pursue more experiments with electronics by purchasing kits. | Electric Circuits |

## THE LIVING ENVIRONMENT

| **Standard 4: Students learn about an increasing variety of organisms - familiar, exotic, fossil, and microscopic. They use appropriate tools in identifying similarities and differences among them. They explore how organisms satisfy their needs in their environments.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Diversity of Life*** | | | |
| 4.4.1 Investigate, such as by using microscopes, to see that living things are made mostly of cells. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Interdependence of Life and Evolution*** | | | |
| 4.4.2 Investigate, observe, and describe that insects and various other organisms depend on dead plant and animal material for food. | TLW review the living and nonliving elements necessary to the dwarfed African frog's habitat. | Research similarities and differences in the dwarfed African frog's classroom environment and its natural environment. | Animal Studies |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Interdependence of Life and Evolution*** | | | |
| 4.4.3 Observe and describe that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal. | TLW identify specific characteristics of humans that enable them to survive in a variety of habitats. | Students can research the ways humans change their behaviors to live in a variety of environments. | Animal Studies |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Interdependence of Life and Evolution*** | | | |
| 4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow. | TLW create a habitat for the DAF and record all the elements of it. | Research and map the range and distribution of the DAF. | Animal Studies |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Interdependence of Life and Evolution*** | | | |
| 4.4.5 Observe and explain that most plants produce far more seeds than those that actually grow into new plants. | | | Standard not addressed in kits. |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Interdependence of Life and Evolution*** | | | |
| 4.4.6 Explain how in all environments, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones. | TLW discuss human structures and behaviors and how these may relate to living in a variety of habitats. | Students research other animals that live in the natural habitats of the frog, crab, and snail. They find how animals depend on one another. | Animal Studies |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Human Identity*** | | | |
| 4.4.7 Describe that human beings have made tools and machines, such as x-rays, microscopes, and computers, to sense and do things that they could not otherwise sense or do at all, or as quickly, or as well. | | | Standard not addressed in kits. |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Human Identity*** | | | |
| 4.4.8 Know and explain that artifacts and preserved remains provide some evidence of the physical characteristics and possible behavior of human beings who lived a very long time ago. | | Done in our social studies curriculum. | |

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|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Human Identity*** | | | |
| 4.4.9 Explain that food provides energy and materials for growth and repair of body parts. Recognize that vitamins and minerals, present in small amounts in foods, are essential to keep everything working well. Further understand that as people grow up, the amounts and kinds of food and exercise needed by the body may change. | TLW read about starch to learn more about how it affects their health. | Students read about and discuss the role starch plays in their diet. | Food Chemistry |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Human Identity*** | | | |
| 4.4.10 Explain that if germs are able to get inside the body, they may keep it from working properly. Understand that for defense against germs, the human body has tears, saliva, skin, some blood cells, and stomach secretions. Also note that a healthy body can fight most germs that invade it. Recognize, however, that there are some germs that interfere with the body's defenses. | | Done in our health curriculum. | |

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| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Human Identity*** | | | |
| 4.4.11 Explain that there are some diseases that human beings can only catch once. Explain that there are many diseases that can be prevented by vaccinations, so that people do not catch them even once. | | Done in our health curriculum. | |

## THE MATHEMATICAL WORLD

**Standard 5: Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.**

| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Numbers*** | | | |
| 4.5.1 Explain that the meaning of numerals in many-digit numbers depends on their positions. | | | Standard not addressed in kits.<br><br>Met in math curriculum. |

## THE MATHEMATICAL WORLD

**Standard 5: Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.**

| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Numbers*** | | | |
| 4.5.2 Explain that in some situations, "0" means none of something, but in others, it may be just the label of some point on a scale. | | | Standard not addressed in kits.<br><br>Met in math curriculum. |

## THE MATHEMATICAL WORLD

**Standard 5: Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.**

| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Shapes and Symbolic Relationships*** | | | |
| 4.5.3 Illustrate how length can be thought of as unit lengths joined together, area* as a collection of unit squares, and volume* as a set of unit cubes. | | | Standard not addressed in kits.<br><br>Met in math curriculum. |

## THE MATHEMATICAL WORLD

**Standard 5: Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.**

| Indicator | Example | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| ***Shapes and Symbolic Relationships*** | | | |
| 4.5.4 Demonstrate how graphical displays of numbers may make it possible to spot patterns that are not otherwise obvious, such as comparative size and trends.<br><br>*area: a measure of the size of a two-dimensional region<br>*volume: a measure of the size of a three-dimensional object | | | Standard not addressed in kits. |

## THE MATHEMATICAL WORLD

| **Standard 5: Students apply mathematics in scientific contexts. Their geometric descriptions of objects are comprehensive. They realize that graphing demonstrates specific connections between data. They identify questions that can be answered by data distribution.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Reasoning and Uncertainty*** | | | |
| 4.5.5 Explain how reasoning can be distorted by strong feelings. | | | Standard not addressed in kits. |

## COMMON THEMES

| **Standard 6: Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result. They question why change occurs.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Systems*** | | | |
| 4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another. | TLW further their understanding of circuits by constructing a circuit to light a household bulb. | Introduce books on Thomas Edison and the invention of the light bulb. | Electric Circuits |

## COMMON THEMES

| **Standard 6: Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result. They question why change occurs.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Systems*** | | | |
| 4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected. | TLW learn to identify the parts of a bulb and trace the path of electricity. | Make a circuit. | Electric Circuits |

## COMMON THEMES

| **Standard 6: Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result. They question why change occurs.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Models and Scale*** | | | |
| 4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered. | TLW learn how to use a battery holder, a light bulb socket, and their attached Fahnestock clip to build circuits. | Students use a bulb socket, bulb, 2-6 inch wires, D-cell battery, and battery holder to form a circuit. | Electric Circuits |

## COMMON THEMES

| **Standard 6: Students work with an increasing variety of systems and begin to modify parts in systems and models and notice the changes that result. They question why change occurs.** | | | |
|---|---|---|---|
| **Indicator** | **Example** | **Instruction/Assessment Reference** | **Resource** |
| ***Constancy and Change*** | | | |
| 4.6.4 Observe and describe that some features of things may stay the same even when other features change. | TLW build a model of land and water and use the model to investigate the water cycle. | Draw the water cycle. | Land and Water |

**Unit: Animal Studies**
**Lesson 1: Thinking about Animals and Their Homes**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW discuss the ways they think scientists learn about animals.<br><br>TLW prepare their science notebooks.<br><br>TLW record individually, and then discuss as a group, what they already know about frogs, crabs, and snails.<br><br>TLW compare frogs, crabs, and snails and discuss how the animals are similar to and different from one another.<br><br>TLW, drawing on their past experiences caring for pets, record what they think they need to know about an animal to help it survive in the classroom and how to go about studying the animal in the classroom. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.4 Describe how people all over the world have taken part in scientific investigation for many centuries.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Numerous science trade books are available at the public library on frogs, crabs, and snails. Create a classroom resource library on these organisms for student research. Also check your school media center for additional reference materials.<br><br>Students can construct a class frequency chart of the kinds of pets they have at home. Then students can construct a pictograph or bar graph to represent their data. | AIMS: Critters (Grades K-6)<br><br>AIMS: Field Detectives (Grades 3-6)<br><br>AIMS: Cycles of Knowing and Growing (Grades 1-3)<br><br>Woodlawn Nature Center |

**Unit: Animal Studies**
**Lesson 2: Inviting Animals into the Classroom**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW begin to observe and describe the living and nonliving elements of the school environment.<br><br>TLW, working in groups, read about the natural habitats of the dwarfed African frog, fiddler crab, and land snail.<br><br>TLW apply information from their readings to list the elements necessary for each animal's classroom habitat.<br><br>TLW compare the three animal habitats to identify each animal's basic and special survival needs. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Take the class to a woods, zoo, wetland, field, etc. to learn about various area habitats.<br><br>Students can research various plant/animal habitats. | Habitats by Pamela Hickman<br><br>Cats: In From the Wild by Caroline Arnold<br><br>A Magic School Bus Hops Home by Joanna cole |

**Unit: Animal Studies**
**Lesson 3: Living in Water: Dwarfed African Frogs**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW review the living and nonliving elements necessary to the dwarfed African frog's habitat.<br><br>TLW, in groups, create a habitat for the dwarfed African frog and record all the elements of it.<br><br>TLW discuss frog care and feeding schedules.<br><br>TLW observe their frogs and record questions about them.<br><br>TLW discuss what kinds of observations might be recorded in an animal log.<br><br>TLW discuss the purpose of an animal log and create an animal log checklist. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.3.3 Identify salt as the major difference between fresh and ocean waters.<br>4.4.2 Investigate, observe, and describe that insects and various other organisms depend on dead plant and animal material for food.<br>4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow. | Research and map the range and distribution of the dwarfed African frog.<br><br>Research similarities and differences in the dwarfed African frog's classroom environment and its natural environment | Media Center Resources:<br>The Magic School Bus Hops Home, VHS 1986 (habitats)<br><br>Wetlands: We Need Them, VHS 1849 |

**Unit: Animal Studies**
**Lesson 4: Observing the Frogs More Closely**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW discuss which characteristics are important to study when comparing animals.<br><br>TLW discuss the purpose of scientific drawings and the elements that should be included in a drawing of a frog.<br><br>TLW work in pairs to observe, describe, and record the characteristics of the frog.<br><br>TLW discuss ways to answer their questions about the frog. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Using resources from libraries, students can compare and contrast other species of frogs.<br><br>Students can compare and contrast other kinds of amphibians using reference materials.<br><br>Students can research the dwarfed African frog's key facts including its scientific name, size, breeding, lifestyle, related species, and conservation.<br><br>Students can create a fact book, information cards, or database of dwarfed African frog key facts.<br><br>Students can investigate the life cycle (metamorphosis) of a frog. | Media Center Resources:<br>All About Amphibians, VHS 500 |

**Unit: Animal Studies**
**Lesson 5: Living Where Land and Water Meet: Fiddler Crabs**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW begin a "Habitat Information Table."<br><br>TLW review the necessary elements of a habitat for the fiddler crabs.<br><br>TLW, working together, create a habitat for the fiddler crabs and record the living and nonliving elements in the habitat.<br><br>TLW discuss how to care for the fiddler crabs and establish a feeding schedule.<br><br>TLW read about real-life research on animal behavior and discuss the value of long-term observations and record keeping. | 4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that" or "I just know" and discount such reasons when given by others.<br>4.4.2 Investigate, observe, and describe that insects and various other organisms depend on dead plant and animal material for food.<br>4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow. | Research and map the range and distribution of the fiddler crab.<br><br>Research similarities and differences in the fiddler crab's classroom environment and its natural environment.<br><br>Using reference materials, study the life of a salt marsh or mangrove. | Media Center Resources:<br>Exploring Shoreland Ecosystems, VHS 2819 |

**Unit: Animal Studies**
**Lesson 6: Observing the Fiddler Crabs More Closely**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW, working in pairs, observe, describe, and record the characteristics of the fiddler crab in words and drawings.<br><br>TLW record observations in their animal logs.<br><br>TLW begin a take-home activity that entails analyzing their own habitats. | 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Using resources from the library, students can compare and contrast other species of crabs.<br><br>Using resources from the library, students can compare and contrast different species of crustaceans; for example, lobsters, crayfish, shrimp.<br><br>Students can research the fiddler crabs' key facts, including its scientific name, size, body structure, breeding, lifestyle, related species, and conservation.<br><br>Students can create a fact book, information cards, or database of fiddler crab facts.<br><br>Students can investigate the life cycle of the crab. | Media Center Resources:<br>Mysteries of the Deep–Sea Animal Life (includes sea slugs, hermit crabs, and dolphins)<br>VHS 248 |

**Unit: Animal Studies**
**Lesson 7: Observing the Behavior of the Frogs and Crabs**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW continue to observe and record in their animal logs the crabs' and frogs' behavior.<br><br>TLW share and discuss their observations of the crabs and frogs.<br><br>TLW add information to the brainstorming lists from Lesson 1.<br><br>TLW identify which of their own questions about the crabs and frogs they can now answer. They identify remaining and new questions.<br><br>TLW use a self-assessment to reflect on their learning. | 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Using reference materials, students can compare and contrast frogs and crabs in a Venn diagram or specifically compare the dwarfed African frog with the fiddler crab. | Media Center Resources:<br>The Classification: Order of Things, VHS 1231 |

**Unit: Animal Studies**
**Lesson 8: Living on Land: Snails**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW add what they have learned about the fiddler crabs to the class "Habitat Information Table."<br><br>TLW review the necessary elementary elements of a habitat for land snails.<br><br>TLW, working together, create a habitat for the land snails and record the living and nonliving elements in it.<br><br>TLW discuss how to care for the snails and establish a feeding schedule.<br><br>TLW observe the snails and record questions about them. | 4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly.<br>4.4.2 Investigate, observe, and describe that insects and various other organisms depend on dead plant and animal material for food.<br>4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow. | Compare and contrast the classroom habitat and the natural habitat of the land snail.<br><br>Students can compare and contrast the classroom habitat and/or natural habitat of the dwarfed African frog, fiddler crab, and land snail. | Keepers and Creatures at the National Zoo by Peggy Thompson<br><br>Creatures All Around Us: What's Under That Shed? by Dorothy Souza<br><br>One Day in the Tropical Rainforest by Jean C. George<br><br>Invite a zookeeper, veterinarian, or pet store owner to talk to the class. |

**Unit: Animal Studies**
**Lesson 9: Observing the Land Snails More Closely**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW observe, describe, and record the characteristics of land snails.<br><br>TLW record their questions about land snails.<br><br>TLW use Venn diagrams to compare the elements of the frog, crab, and snail habitats. | 4.1.1 Observe and describe that scientific investigations generally work the same way in different places.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Using reference materials, students can research different kinds of snails.<br><br>Compare and contrast different kinds of mollusks; for example, octopus, squids, clams, slugs, etc.<br><br>Compare and contrast the snail and slug using a Venn diagram.<br><br>Research the life cycle of a snail.<br><br>Land snails are nocturnal; research other nocturnal animals. | VHS: Strange Creatures of the Night |

**Unit: Animal Studies**
**Lesson 10: How Do Animals Respond to a Change in Their Habitats?**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW use the observations in their animal logs as a basis for discussing the daily behaviors of the three animals.<br><br>TLW identify elements of the animals' habitats that could change.<br><br>TLW outline an experiment to test animals' responses to a change in one element in their habitats.<br><br>TLW, working in groups, predict, test, observe, and record each animal's response to a change in its habitat.<br><br>TLW discuss how their test results relate to each animal's normal behavior. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Since snails are nocturnal animals, students can reverse the snails' schedule. Try raising the moisture level in the habitat, darkening the habitats with a box and/or dark cloth during the day and then removing it at night, and placing the habitat in a lightened area.<br><br>Investigate other changes to the environment; for example, heat, noise.<br><br>Use the frogs to investigate learned behavior. Try to get the frogs to respond to a stimulus that is associated with feeding other than the spoon that has been used to feed them; for example, try using a flashlight or tapping the tank immediately before feeding. Eventually, the frog should respond with just this stimulus. | Turtle Watch by George Ancona |

**Unit: Animal Studies**
**Lesson 11: Observing Humans Closely**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW discuss where and how their basic needs are met in their homes.<br><br>TLW discuss whether their school habitat meets all their basic needs.<br><br>TLW observe, describe, and record human characteristics.<br><br>TLW brainstorm why they think humans can live in many different environments. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Illustrate the diversity in human characteristics by creating a dichotomous key with the class. Ask the students to divide themselves into two groups by traits/characteristics, such as straight hair or curly hair. Then taking each group separately, divide again using two more characteristics, such as hair coloring, length, etc. Continue dividing the group until each student in the class is in a group all by him/herself. | Island of Blue Dolphins by Scott O'Dell |

**Unit: Animal Studies**
**Lesson 12: Researching Animal Behavior**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW use their animal logs to select a specific animal behavior to study in detail.<br><br>TLW discuss potential research questions and identify those that can be answered only through behavioral observation.<br><br>TLW, working in pairs, outline the plan they will follow to conduct their research.<br><br>TLW design a log sheet to record their observations.<br><br>TLW begin research on a particular animal's specific behavior. | 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that…" or "I just know" and discount such reasons when given by others. | Students can write a research report on their research findings on a particular animal's specific behavior for their language arts portfolio.<br><br>Using the record sheets for this lesson, groups of students can research a human behavior.<br><br>Using the record sheets for this lesson, individual students can research the behavior of their family pet.<br><br>Invite a veterinarian or animal behaviorist to the class to discuss animal behavior. | Media Center Resources:<br>Innate and Learned Behavior: How Do They Know That? VHS 1235<br><br>Invite an animal behaviorist to the class. (Woodlawn Nature Center) |

**Unit: Animal Studies**
**Lesson 13: Part 1: What Makes an Animal Special?**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW identify specific characteristics of humans that enable them to survive in a variety of habitats.<br><br>TLW discuss human structures and behaviors and how these may relate to living in a variety of habitats.<br><br>TLW continue to conduct research on a specific animal behavior. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.4.3 Observe and describe that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal.<br>4.4.4 Observe and describe that some source of energy is needed for all organisms to stay alive and grow.<br>4.4.6 Explain how in all environments, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones. | Students can research the ways humans change their behaviors to live in a variety of environments on land, under the sea, and in space. Focus on the unusual places humans live and ways they need to change in order to survive.<br><br>Suggest that students research animals that live in the natural habitats of the frog, crab, and snail. How do these animals depend on one another for survival?<br><br>Discuss food webs and food chains. | None |

**Unit: Animal Studies**
**Lesson 14: Part 2: What Makes an Animal Special?**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW identify structures and behaviors that enable their animals to survive in the habitats.<br><br>TLW read about the frog, crab, and snail to learn facts about these animals not easily observable in the classroom.<br><br>TLW use their own observations and experiences to support information they have read about the frog, crab, and snail.<br><br>TLW record the ways certain structures and behaviors help animals survive in the habitats. | 4.1.1 Observe and describe that scientific investigations generally work the same way in different places.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that." or "I just know" and discount such reasons when given by others. | Create dioramas or murals of the habitats of the frog, fiddler crab, or land snail. | Media Center Resources:<br>Animal Vision: Eye of the Beholder Frog, VHS 1227 |

**Unit: Animal Studies**
**Lesson 15: There's No Place Like Home**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW identify and discuss how the animals' structures and behaviors are similar and different.<br><br>TLW discuss and compare the animal structures and behaviors that illustrate differences between life in different habitats.<br><br>TLW read about an animal that can alter its environment to survive. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Reading Selection: <u>What Makes Beavers Special</u>? | Media Center Resources:<br>Beaver Valley, VHS 245<br>The Beaver Pond Habitat |

**Unit: Animal Studies**
**Lesson 16: Presenting Our Research**

| Objective | Indicator | Instruction/Assessment Referenced | Resource |
|---|---|---|---|
| TLW (those who studied the same animal behavior) discuss their research results with one another.<br><br>TLW determine whether another team's findings support their own observations.<br><br>TLW make oral presentations to communicate their results.<br><br>TLW present one reason why they may have been unable to answer their research question. | 4.1.1 Observe and describe that scientific investigations generally work the same way in different places.<br>4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that..." or "I just know" and discount such reasons when given by others. | A written copy of their research can be used for the fourth grade language arts portfolio entry for Research Reports.<br><br>Dissect owl pellets to find and reconstruct the skeletons of an owl's prey. | Video: Wildlife Survivors: Camouflage and Mimicry |

**Unit: Food Chemistry**
**Lesson 1: Thinking About Foods We Eat**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW prepare their science notebooks for record keeping.<br><br>TLW record individually and then discuss as a group what they already know about the foods they eat and what they would like to learn.<br><br>TLW work in groups and draw upon their daily experiences with food to identify and categorize the foods they eat for breakfast, lunch, and dinner. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world | Text Activity, T. G., pp. 8-9<br><br>Find articles about foods in newspapers and magazines and share information with the class.<br><br>Introduce the food pyramid and its system of classifying foods.<br><br>Use a map of Indiana and show where different kinds of foods are grown.<br><br>Find out about the kinds of meals people ate at different times in history. How do they compare with meals today?<br><br>Take a field trip to a supermarket.<br><br>Students share what they already know about foods and discuss what they would like to learn.<br><br>Students organize their list of foods into different categories. | Food Pyramid Bulletin Board Set, Trend Food Guide Pyramid #T-1874<br><br>Teacher and Student Resources located in the T. G. Bibliography pp. 117-119<br><br>Invite an area nutritionist to visit the class. Contact Elkhart General Hospital or YMCA.<br><br>VHS795 – Voyage to Better Health: Nutrition |

**Unit: Food Chemistry**
**Lesson 2: Identifying Healthy Foods: Getting Ready**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW discuss why they think certain foods are "healthy," and propose ways to find out more about the contents of foods.<br><br>TLW organize the food testing equipment they will use throughout the unit, and become familiar with how they should use it to obtain accurate test results.<br><br>TLW observe the test foods and discuss their findings. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Text Activity T. G., pp. 12-13<br><br>Have students find out more about the foods they are testing-where they come from, where grown, how harvested, etc. T. G. p. 14<br><br>Determine where the foods they are testing fit on the food pyramid.<br><br>Students set up their laboratory equipment and notebooks.<br><br>Students set up the main chart that they will use to record data, the Food Results Chart.<br><br>Students put foods into their category charts and discuss what they know about these foods. | Background information in Teacher's Edition, pp. 23-24.<br><br>Dietary Guidelines Appendix D. Teacher's Edition, pp. 181-182.<br><br>Improving America's Diet & Health: Food & Nutrition Board, Institute of Medicine<br><br>How Did We Find Out About Vitamins? New York: Walker & Co. |

| **Unit: Food Chemistry**<br>**Lesson 3: Testing Liquids for Starch** | | | |
|---|---|---|---|
| **Objective** | **Indicator** | **Instruction/Assessment Reference** | **Resource** |

| | | | |
|---|---|---|---|
| TLW report on what they have discovered about starch through their individual research.<br><br>TLW make predictions, test the liquids for the presence or absence of starch, and record their results on the Starch Test for Liquids Table.<br><br>TLW analyze their test data to establish a positive and negative test for starch.<br><br>TLW record, analyze, and discuss the class data, identifying possible reasons for varying results. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Text Activity, T. G., pp. 18-21<br><br>Extension – determine whether the color results of the iodine test is an indicator of how much starch is in a food. T. G. p. 21<br><br>Students observe and collect data on the way iodine interacts with different foods.<br><br>Students set up a systematic way to organize the test data.<br><br>Students establish that iodine is a useful test for starch. | Health Skills For Life, Goal #4, "Selecting Foods for a Meal" – Activity 1 |

**Unit: Food Chemistry**
**Lesson 4: Testing Foods for Starch**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW predict which of their foods contain starch and then test the foods to see if their predictions are correct.<br><br>TLW record and organize test data on both individual Record Sheets and a class "Foods Test Table."<br><br>TLW record in their notebooks discoveries and questions about starch. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students use the starch test to see which foods contain starch.<br><br>Students record and organize their data on the "Food Results Chart." | Text Activity, T. G., pp. 24-26<br><br>Extension: Students can test other foods for starch, T. G. p. 26 |

**Unit: Food Chemistry**
**Lesson 5: Learning More about Starch**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW analyze and discuss class results from testing foods for starch.<br><br>TLW retest foods that provided discrepant results and reexamine their conclusions about which foods contain starch.<br><br>TLW read about starch to learn more about how it affects their health. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students share the results of the starch test.<br><br>The class examines the entire group's results, discusses them, and reaches a consensus about which foods tested positive for starch.<br><br>Students read about and discuss the role starch plays in their diet. | Text Activity T. G. pp. 30-31<br><br>Extension:<br>Record foods they think contain starch, T. G. p. 31<br><br>Groups of or individual students choose one starchy food to research. T. G. pp. 30-31<br><br>Discuss or journal what life would be like without starchy foods.<br><br>Health Skills for Life Goal 4, "Selecting Foods for a Meal" Activities 1 & 4<br><br>Being Healthy, Chapter 4, "Making Healthful Food Choices", pp. 98, 99 |

**Unit: Food Chemistry**
**Lesson 5: Learning More about Starch (continued)**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| | 4.4.9 Explain that food provides energy and materials for growth and repair of body parts. Recognize that vitamins and minerals, present in small amounts in foods, are essential to keep everything working well. Further understand that as people grow up, the amounts and kinds of food and exercise needed by the body may change. | | |

**Unit: Food Chemistry**
**Lesson 6: Testing Liquids for Glucose**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW make predictions, test liquids for the presence or absence of glucose, and record their results on a Glucose Test for Liquids Table.<br><br>TLW analyze their test results to establish a positive and negative test for glucose.<br><br>TLW record and discuss their findings about the test for glucose.<br><br>TLW research and record factual information about glucose. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students learn how to perform a chemical test for glucose.<br><br>Students continue to develop their experimental techniques and their ability to organize information. | Health Skills For Life, Goal 4, "Selecting Foods For A Meal", Activity 1<br><br>Text Activity, T. G. pp. 36-38 |

**Unit: Food Chemistry**
**Lesson 7: Testing Foods for Glucose**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW share with the class what they have learned about glucose through individual research.<br><br>TLW make and record predictions about the foods they think do and do not contain glucose.<br><br>TLW apply the glucose test to their foods and compare the range of test results with their predictions.<br><br>TLW record in their notebooks discoveries and questions about glucose. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students test to determine which foods contain glucose.<br><br>Students organize their data on a chart.<br><br>Students discuss discrepant results and draw conclusion from their data. | Text Activity, T. G. pp. 39-41<br><br>Extension:<br>Students can test other foods for glucose, T. G. p. 41 |

**Unit: Food Chemistry**
**Lesson 8: Learning More about Glucose**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW analyze and discuss their results from testing the foods for glucose.<br><br>TLW retest foods for which there were discrepant results among groups.<br><br>TLW read and write about the role glucose plays in their diets.<br><br>TLW use a Venn diagram to compare starch with glucose. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students discuss the glucose test results and discuss discrepancies.<br><br>Students learn about the relationship between starch and glucose.<br><br>Students learn more about the importance of carbohydrates in the diet. | Text Activity, T. G. pp. 46-50<br><br>Extension:<br>T. G. p. 46. Students can research the disease diabetes.<br><br>You Can't Catch Diabetes From A Friend" by Susan Adler: Triad Scientific Publishers, ISBN 0-900472-3-9.<br><br>Health Skills For Life, Goal 4 "Selecting Foods For A Meal", Activities 1, 4<br><br>Being Healthy, Chapter 4, pp. 98-99 |

**Unit: Food Chemistry**
**Lesson 9: Testing Liquids for Fats**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW design a data table to record results from the fats test.<br><br>TLW make predictions and test the liquids for the presence or absence of fats.<br><br>TLW record and discuss their findings about the fats test.<br><br>TLW use their analysis of the test data and establish a positive and negative test for fats.<br><br>TLW research basic facts about fats. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students use a simple test for fats.<br><br>Students learn some of the properties of fats.<br><br>Students continue to collect and organize their data in a useful way. | Text Activity, T. G. pp. 52-54<br><br>Extension:<br>T. G. p. 54, Students can look at a bottle of Italian dressing and describe what they see. What predictions can they make about the two layers? What happens when they shake the bottle? What happens after it sits awhile? Student can test each layer for fat.<br><br>T. G. p. 54. Students can research how fats and oils are extracted from different foods. |

**Unit: Food Chemistry**
**Lesson 10: Testing Foods for Fats**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW share what they have learned about fats through individual research.<br><br>TLW design a data table to record their results for testing foods for fats.<br><br>TLW make and record predictions of the foods they think do and do not contain fats.<br><br>TLW apply the fats test to their foods, record and analyze results, and compare the range-off results with their predictions.<br><br>TLW record in their notebooks their observations, discoveries, and questions about fats and the test for fats, and then share these in a class discussion. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students make some predictions about which foods contain fats.<br><br>Students apply the "grease spot" test to the eight foods.<br><br>Students learn which foods are high in fats. | Text Activity, T. G. pp. 56-58<br><br>Extension:<br>T. G. p. 58. Students can test other foods for fat.<br><br>They can compare test results from cream, whole milk, and skim milk.<br><br>Can compare test results of low fat items with high fat counterparts. |

**Unit: Food Chemistry**
**Lesson 11: Learning More About Fats**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW analyze their results from testing their foods for fat and discuss why different results may have occurred.<br><br>TLW retest foods for which results vary.<br><br>TLW read and write about the role fats play in their diets.<br><br>TLW compare fats with carbohydrates through class discussion and writing. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students discuss class results about the fat content of the eight foods.<br><br>Students learn about how fat affects their health.<br><br>Students learn how fats from animals and plants differ, and how they affect our health. | Text Activity, T. G. pp. 60-61<br><br>Extension:<br>T. G. p. 61. Students should find articles about fats to create a bulletin board to spark class discussion.<br><br>Healthy Skills For Life, Goal #4, Activity 1, 4<br><br>Being Healthy, Chapter 4, pp. 98-99 |

**Unit: Food Chemistry**
**Lesson 12: Testing Liquids for Proteins**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW make predictions, test liquids for the presence or absence of protein, and record results on data tables they have designed.<br><br>TLW analyze the data they collect to establish a positive and negative test for protein.<br><br>TLW record and discuss their findings about the test for protein.<br><br>TLW research basic facts about proteins. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students share what they know about proteins.<br><br>Students learn how to use protein test paper (Coomassie Blue) to identify which liquids contain proteins. | Vocabulary: Coomassie Blue<br><br>Text Activity, T. G. pp. 67-70<br><br>Extension:<br>T. G. p. 68 Separate protein in milk.<br><br>Students can write a research report on how milk is processed.<br><br>Health Skills For Life, Goal 4, "Selecting Foods for a Meal", Activity 1 |

**Unit: Food Chemistry**
**Lesson 13: Testing Foods for Proteins**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW share with the class what they have learned about proteins through individual research.<br><br>TLW design a data table to record their results of testing foods for protein.<br><br>TLW make and record predictions of the foods they think do and do not contain proteins.<br><br>TLW apply the protein test to their foods, record and analyze results, and compare the range of results with their predictions.<br><br>TLW record and organize observations, discoveries, and questions about proteins and the test for proteins in their notebooks, and then they share these in a class discussion. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same. | Students apply the protein test to the eight foods.<br><br>Students learn to interpret results from the developed protein test paper by comparing them with those of the baseline tests. | Text Activity, T. G. pp. 72-76<br><br>Students can test other foods for proteins. |

**Unit: Food Chemistry**
**Lesson 14: Learning More about Proteins**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW analyze and discuss the protein test results of the class as a whole and retest foods for which test results differed.<br><br>TLW create Venn diagrams of the different nutrients in their test foods and discuss the relationship between nutrients and healthy foods.<br><br>TLW read about proteins as an important part of diet.<br><br>TLW apply what they have learned about starch, glucose, fats, and proteins to solve a hypothetical problem. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students discuss the class's protein test results.<br><br>Students learn why proteins are important to the diet. | Text Activity, T. G. pp. 78-83<br><br>Extension:<br>T. G. p. 79 Students can use a Venn diagram to illustrate which foods contain both protein and starch.<br><br>Students can research diets in different parts of the world. How do different cultures get protein? What problems do people around the world face in getting enough protein?<br><br>Students can research the possible consequences of large amounts of protein in the diet.<br><br>Health Skills for Life, Goal 4, "Selecting Foods for a Meal" Activity 1, 4<br><br>Being Healthy, Chapter 4, pp. 98-99 |

**Unit: Food Chemistry**
**Lesson 15: Examining Labels: Making the Connection**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW identify and interpret the information on a food label.<br><br>TLW compare the nutrient information from their foods test results with the nutrient information on labels for those foods.<br><br>TLW read about several vitamins and discuss why information about certain vitamins is listed on food labels. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students learn how to read labels.<br><br>Students use labels as a source of information about the substances present – or not – in the foods they eat every day.<br><br>Students learn about vitamins. | Text Activity, T. G. pp. 87-101<br><br>Extension:<br>T. G. p. 89. Discuss other resources available on the nutritional value of foods.<br><br>Students can pick foods and write a commercial or rhyming jingle that describes the nutrients and why someone should eat it.<br><br>Health Skills for Life, Goal 4, "Selecting Foods for a Meal" Activities 2, 3, 4, and 5<br><br>Being Healthy, Chapter 4, pp. 102-115 |

**Unit: Food Chemistry**
**Lesson 16: What is in a Marshmallow? Applying What We Have Learned**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW predict which nutrients – starch, glucose, fats, and proteins – they think are present in a marshmallow.<br><br>TLW design a test table for recording the results of four nutrient tests on a marshmallow.<br><br>TLW apply the tests learned in the unit to the marshmallow and compare their test results with information found on a marshmallow package label.<br><br>TLW record their findings about the nutritional content of the marshmallow in their notebooks and share in a class discussion about healthy foods. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Students use the tests learned in this unit to test a marshmallow for nutrients. | Text Activity, T. G. pp. 104-105 |

**Unit: Electric Circuits**
**Lesson 1: Thinking About Electricity and Its Properties**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW learn brainstorming techniques.<br><br>TLW discuss what they know about electricity and what they would like to learn.<br><br>TLW review important safety rules about using electricity. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.7 Discuss and give examples of how technology, such as computers and medicines, has improved the lives of many people, although the benefits are not equally available to all.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Make a collage illustrating ways electricity is used in the home.<br><br>Write a story about what life would be like without electricity.<br><br>See Appendix B for a chart of evaluating student progress during the unit.<br><br>List of information of what students know about electricity, and a list of questions of what students want to learn about electricity. | Books for teachers and students are listed in the bibliography, Appendix G. and pp. 113-115.<br><br>Check with Indiana Michigan Power Company for ordering films related to electricity.<br><br>A Guidebook for Cooperative Learning Techniques for Creating More Effective Schools. |

**Unit: Electric Circuits**
**Lesson 2: What Electricity Can Do**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW discover how to light a bulb using a simple battery, a piece of wire, and a small bulb.<br><br>TLW set up a notebook for their observations. | 4.1.1 Observe and describe that scientific investigations generally work the same way in different places.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Students set up a notebook for their observations. They will continue to write in the notebook for all the lessons. A pocket folder works well because additional worksheets and drawings can be easily added.<br><br>Vocabulary:<br>circuit<br><br>Students sketch a drawing of a light bulb in their notebook to compare with drawings in later lessons. | Introduction to Electronics by Pam Beasant<br><br>Electricity by Philip Chapman<br><br>Wires & Watts: Understanding & Using Electricity by Irwin Math |

**Unit: Electric Circuits**
**Lesson 3: A Closer Look at Circuits**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW review different ways to connect the battery, the wire, and the bulb to get the bulb to light.<br><br>TLW explore alternative ways to create a circuit. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals.<br><br>4.6.4 Observe and describe that some features of things may stay the same even when other features change.<br>4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals. | Students complete Activity Sheet 1.<br><br>Add to list of things students want to learn about electricity.<br><br>Use a transparency to show connections of wire, bulb, and D-cell battery. | Introduction to Electronics by Pam Beasant<br><br>Electricity by Philip Chapman |

**Unit: Electric Circuits**
**Lesson 4: What is Inside a Light Bulb?**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW further their understanding of circuits by constructing a circuit to light a household bulb.<br><br>TLW learn to identify the parts of a bulb and to trace the path of electricity through a bulb. | 4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals.<br>4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected. | Introduce books on Thomas Edison and the invention of the light bulb.<br><br>Vocabulary:<br>Filament | The Light Bulb by Sharon Cosner<br><br>Thomas Alva Edison, Young Inventor by Louis Sabin |

**Unit: Electric Circuits**
**Lesson 5: Building a Circuit**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW learn how to use a battery holder, a light bulb socket, and their attached Fahnestock clip – devices that will help them build circuits.<br><br>TLW gain more experience working with circuits. | 4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals.<br>4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered. | Vocabulary:<br>Fahnestock clip<br><br>Students complete Activity Sheet 2, p. 35.<br><br>Use a transparency to illustrate Fahnestock clips, p. 31.<br><br>Students use a bulb socket, bulb, 2 6-in. wires, D-cell battery, and battery holder to make a complete circuit. | Create a center in the room for students to practice making circuits. Encourage sketching circuits in notebooks. |

**Unit: Electric Circuits**
**Lesson 6: What's Wrong With the Circuit?**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW build a circuit tester.<br><br>TLW think about different ways to use their circuit testers.<br><br>TLW learn a troubleshooting technique to check their circuits. | 4.6.4 Observe and describe that some features of things may stay the same even when other features change.<br>4.1.6 Explain that even a good design may fail even though steps are taken ahead of time to reduce the likelihood of failure.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected. | In a learning center, place 3 or 4 circuits, each of which has a different fault such as a loose connection, a burned-out bulb or a drained battery. Have students figure out what's wrong.<br><br>Have students interview their parents about a problem that they solved around the house. Have students write about the strategy that was used.<br><br>Vocabulary:<br>1. circuit tester<br>2. troubleshooting<br><br>Students complete Activity Sheet 3, p. 42 | Interview:<br>Parents<br>Family members |

**Unit: Electric Circuits**
**Lesson 7: Conductors and Insulators**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW develop an understanding of the behavior of electrical conductors and insulators.<br><br>TLW learn how to use a circuit tester to identify conductors and insulators. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br><br>4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another. | Check circuits-circuit tester, p. 45<br><br>Have students make their charts in their notebooks before they begin testing. It may be helpful to devise a worksheet for students to fill in if some students have difficulty copying a lot of information.<br><br>Students should continue to test other materials and keep a record in their notebooks.<br><br>Vocabulary:<br>1. conductors<br>2. insulators<br><br>Safety reminder:<br>Never put wires into electrical wall sockets. | Packs of conductors and insulators<br><br>Provide other materials for students to test in learning center. Remind students to record data in notebooks. |

**Unit: Electric Circuits**
**Lesson 8: Making a Filament**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW construct a device similar to a light bulb.<br><br>TLW learn that electricity can be used to generate heat and light. | 4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals.<br>4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered.<br><br>4.3.11 Investigate and observe and explain that things that give off light often also give off heat*.<br><br>*heat: a form of energy | Vocabulary:<br>Nichrome wire<br><br>Safety reminders, p. 50<br><br>Be sure wire is no more than 1". Do not get clay on ends of wire.<br><br>Compare model to a light bulb. | The Light Bulb by Sharon Cosner<br><br>Thomas Alva Edison, Young Inventor by Louis Sabin |

**Unit: Electric Circuits**
**Lesson 9: Hidden Circuits**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW use a circuit tester to locate hidden conductors.<br><br>TLW develop confidence in their own problem-solving skills. | 4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | A group of students may want to devise an answer board. (See p. 55 in teacher manual.) | Instructions for boxes – Appendix E<br><br>Keep several boxes in learning center with a circuit tester. |

**Unit: Electric Circuits**
**Lesson 10: Deciphering a Secret Language**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW learn the symbols used in circuit diagrams.<br><br>TLW practice translating electrical components into symbols.<br><br>TLW practice using circuit diagrams to construct real circuits. | 4.2.4 Use numerical data to describe and compare objects and events.<br><br>4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals. | Display figure 10-2 on transparency. Explain and discuss.<br><br>Have students practice using symbols from figure 10-3. Cover symbols and monitor student's understanding of symbols. | Secret language symbols, p. 61 |

**Unit: Electric Circuits**
**Lesson 11: Exploring Series and Parallel Circuits**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW build a series and a parallel circuit.<br><br>TLW learn to identify series and parallel circuits and begin to use this knowledge to describe their own circuits. | 4.2.3 Make simple and safe electrical connections with various plugs, sockets, and terminals. | Compare the brightness of bulbs connected in series and parallel circuits. (See pp. 66-67 in teacher's manual.)<br><br>Vocabulary:<br>1. series<br>2. parallel | Electricity by Philip Chapman |

**Unit: Electric Circuits**
**Lesson 12: Learning About Switches**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW construct a switch and learn why switches are important.<br><br>TLW apply what they have learned about series and parallel circuits to devise a plan for a flashlight. | 4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered.<br><br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Use figure 12-1 to illustrate a paper clip switch.<br><br>Use figure 12-2 to illustrate the switch in a series circuit.<br><br>Make a switch with a circuit.<br><br>Students make a plan for a flashlight using electrical symbols. | In learning center, provide aluminum foil, wooden clothespins, and find a stapler to challenge students to invent a different switch. |

**Unit: Electric Circuits**
**Lesson 13: Constructing a Flashlight**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW construct a flashlight.<br><br>TLW discuss the similarities and differences between series and parallel circuits. | 4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered.<br><br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world. | After completion of a flashlight, make a drawing in notebook. Have students use correct symbols to demonstrate how flashlight works. | Introduction to Electronics by Pam Beasant |

**Unit: Electric Circuits**
**Lesson 14: Working With a Diode**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW experiment with semiconductor diodes and learn how they work.<br><br>TLW learn the symbol for semiconductor diodes used in circuit diagrams.<br><br>TLW discover the relationship between the passage of current through the diode and the positive and negative terminals of the battery. | 4.3.16 Investigate and describe that without touching them, material that has been electrically charged pulls all other materials and may either push or pull other charged material. | Some students may pursue more experiments with electronics by purchasing kits at electronics stores.<br><br>Vocabulary<br>semiconductor diodes | Introduction to Electronics by Pam Beasant |

**Unit: Electric Circuits**
**Lesson 15: Planning to Wire a House**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW work in teams to use knowledge gained during the unit to draw up plans for wiring a house.<br><br>TLW consider different strategies for making an effective wiring scheme. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Have students bring in boxes with dividers for their 4-room houses. | A visit from an electrician would be helpful while students are designing and wiring their houses. |

**Unit: Electric Circuits**
**Lesson 16: Wiring and Lighting the House**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW apply what they have learned about series and parallel circuits.<br><br>TLW use all the skills and information they have gained to work in teams to wire and light a house. | 4.6.1 Demonstrate that in an object consisting of many parts, the parts usually influence or interact with one another.<br>4.6.2 Show that something may not work as well, or at all, if a part of it is missing, broken, worn out, mismatched, or incorrectly connected.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered. | A challenging problem for some students is to use a single-pole, double-throw switch. (See p. 87, teacher's manual)<br><br>See p. 90 in the teacher's manual for ways students can display their houses and other learning activities for parents and/or other classrooms.<br><br>After completing their houses, each group can give a presentation to the class. This would include an explanation of how they wired their house and any problems that occurred.<br><br>An after-school visitation by parents is possible. | Use Appendix A for assessment. |

**Unit: Land and Water**
**Lesson 1: Thinking About Land and Water**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW set up science notebooks.<br><br>TLW record and discuss what they already know about land and water.<br><br>TLW discuss what they would like to find out about land and water.<br><br>TLW observe and describe photographs showing the interaction of land and water. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations. | Survey parents about vacation places with unusual landforms.<br><br>Observe land around home and school. | A Field Guide to Geology by David Lambert |

**Unit: Land and Water**
**Lesson 2: The Water Cycle: Modeling Land and Water**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW discuss the concept of modeling.<br><br>TLW build a model of land and water and use the model to investigate the water cycle.<br><br>TLW record and discuss their observations.<br><br>TLW read to learn more about the water cycle. | 4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras, can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br>4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered.<br>4.6.4 Observe and describe that some features of things may stay the same even when other features change.<br>*erosion: the picking up and moving away of weathered rock and soil | Draw the water cycle.<br><br>Do Activity #3, p. 35 | AIMS, Water, Precious Water – A Collection of Water Activities |

**Unit: Land and Water**
**Lesson 3: Modeling Rain on Land**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW simulate the effects of rain on land.<br><br>TLW investigate what happens to land, and to the water on land, after it rains.<br><br>TLW record and discuss their observations. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br>4.3.7 Explain that smaller rocks come from the breakage and weathering* of bedrock and larger rocks and that soil is made partly from weathered rock, partly from plant remains, and also contains many living organisms.<br><br>*erosion: the picking up and moving away of weathered rock and soil<br>*weathering: processes, such as wind, rain, etc., that break apart rock | Have students research rain forests.<br><br>Use Final Activities 1 - 2 in Teacher's Edition, p. 51 | The Trip of a Drip by Vikki Gobb |

**Unit: Land and Water**
**Lesson 4: Investigating Streams**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW conduct their first stream table investigation and record observations.<br><br>TLW summarize what happens when water from a single source flows over and through land.<br><br>TLW discuss similarities and differences among their streams. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the picking up and moving away of weathered rock and soil | Have children research diatomaceous earth.<br><br>List songs that contain the word water, lands, stream, or river.<br><br>Use string to measure objects that are not linear.<br><br>Use Plaster of Paris™ to create a permanent record of their stream. | Rivers of the World by Eberland Czaya<br><br>Our World: Rivers and Lakes by Theodore Rowland-Entwistle |

**Unit: Land and Water**
**Lesson 5: Examining Earth Materials**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW observe and compare four soil components.<br><br>TLW record and discuss the properties of each soil component.<br><br>TLW discuss how soil properties affect the ways in which soil is eroded and deposited by water in their stream tables. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.3.6 Recognize and describe that rock is composed of different combinations of minerals. | Each student brings a soil sample from home and compare.<br><br>Examine soil with hand lens. | Soil from home |

**Unit: Land and Water**
**Lesson 6: Where Does the Water Go? Looking at Ground Water and Runoff**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW investigate ground water, the amount of water soil components will hold, and runoff.<br><br>TLW apply their findings from today's investigation to the water and land in their stream tables.<br><br>TLW read to learn more about where their drinking water comes from. | 4.2.4 Use numerical data to describe and compare objects and events.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the picking up and moving away of weathered rock and soil | Use Final Activities 1 - 3 in Teacher's Edition, p. 85 | Field trip to waste water treatment plant<br><br>The Magic School Bus at the Waterworks by Joanna Cole |

**Unit: Land and Water**
**Lesson 7: Where Does the Soil Go? Looking at Erosion and Deposition**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW conduct a second table investigation.<br><br>TLW apply a strategy to track the speed of runoff and the movement of soil.<br><br>TLW record their observations in words and drawings.<br><br>TLW, in groups, compare and discuss their observations and draw conclusions about erosion and deposition.<br><br>TLW read to learn more about erosion caused by glaciers. | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the picking up and moving away of weathered rock and soil | Use Final Activities #1 & 2 in Teacher's Edition, p. 96 | Glaciers: Rivers of Ice pp. 100-101, Teacher's Edition<br><br>Student Activity Book, pp. 39-40<br><br>Where Go the Boats? by Robert Louis Stevenson |

**Unit: Land and Water**
**Lesson 8: Bird's Eye View: Looking at the Parts of a Stream**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW create aerial drawings of their stream tables.<br><br>TLW, in groups, share their drawings with the class and discuss similarities and differences among the drawings.<br><br>TLW create a class drawing of their stream table results and establish a common vocabulary for the parts of a stream system.<br><br>TLW prepare their drawings for a "Big Book of Streams."<br><br>TLW view and interpret photographs of land and water. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world. | Use Assessment in Teacher's Edition, p. 111 | Photographs of land/water<br><br>Maps – include topographic maps to compare aerial views |

**Unit: Land and Water**
**Lesson 9: When Streams Join: Modeling Tributaries**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW conduct a stream table investigation using a stream source cup with three holes.<br><br>TLW record their observations in words and drawings.<br><br>TLW reflect on their own learning through a self-assessment. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world. | Final Activities #1, p. 119 Teacher's Edition<br><br>Student Self-Assessment A<br><br>Have students locate the major drainage basins in North America. | Rivers by Norman Carlisle and Madelyn Carlisle |

**Unit: Land and Water**
**Lesson 10: Rushing Rivers: Exploring Flow**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW brainstorm ways to model a rushing river and predict ways in which a rushing river might alter the land.<br><br>TLW, using their stream tables, investigate, observe, and discuss the effects of fast-flowing water on land.<br><br>TLW compare land formations caused by fast-flowing rivers with those caused by slow-moving streams and predict the load each kind of stream will carry.<br><br>TLW view and interpret photographs of fast- and slow-moving water on the basis of concepts of land and water investigated in the unit. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the picking up and moving away of weathered rock and soil | Final Activities #1, 2, 3<br>Teacher's Edition, pp. 129-130<br><br>Use extension activities Teacher's Edition, p. 131. | Record Sheet 4-A<br><br>Cylinders of runoff<br><br>Photographs of land/water |

**Unit: Land and Water**
**Lesson 11: Hills and Rocks: How Nature Changes the Direction and Flow of Water**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW reflect on their ideas about land and water and brainstorm ways that land can affect the direction and flow of water.<br><br>TLW conduct a stream table investigation to explore how natural land features affect the direction and flow of water.<br><br>TLW discuss and compare the results of their investigation.<br><br>As an optional activity, TLW create an aerial drawing for their "Big Book of Streams." | 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding* of rock and soil in some areas and depositing them in other areas.<br><br>*erosion: the picking up and moving away of weathered rock and soil | Review procedures on pp. 143-144.<br><br>Make predictions of what might happen in lesson. Record in notebooks.<br><br>After following instructions, draw aerial drawings, compare drawings, and discuss outcomes. | Use string to measure distance of stream. Compare to distance "as the crow flies."<br><br>Research length of a well-known river. Use maps, scale.<br><br>Have rocks available. |

**Unit: Land and Water**
**Lesson 12: Dams: How Humans Change the Direction and Flow of Water**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW brainstorm why and how humans build dams.<br><br>TLW predict the effects of dams on the direction and flow of water in their stream tables.<br><br>TLW design and construct dams in their stream tables.<br><br>TLW test the effects of dams in their stream tables.<br><br>TLW read to learn more about dams. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.6 Explain that even a good design may fail even though steps are taken ahead of time to reduce the likelihood of failure.<br>4.1.8 Recognize and explain that any invention may lead to other inventions.<br>4.2.6 Support statements with facts found in print and electronic media, identify the sources used, and expect others to do the same.<br>4.2.7 Identify better reasons for believing something than "Everybody knows that ..." or "I just know" and discount such reasons when given by others. | Final Activities #1 & 2 Teacher's Edition, p. 150<br><br>Research the Hoover Dam and the Aswan Dam.<br><br>Create labeled, detailed drawings of dams. | Take a field trip to the St. Joe River Dam on Johnson Street in Elkhart, Indiana. |

**Unit: Land and Water**
**Lesson 13: Exploring Slope**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW predict how slope might affect the direction and flow of water on land.<br><br>TLW use a stream table to explore the effects of sloped land on stream development.<br><br>TLW compare their results with their predictions.<br><br>TLW compare the results of this investigation with results collected in Lessons 4 and 10.<br><br>TLW record and discuss their observations. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.6 Explain that even a good design may fail even though steps are taken ahead of time to reduce the likelihood of failure. | Final Activities #1, Teacher's Edition, p. 164<br><br>Assessment Record Sheet 4-A<br><br>Prepare for Lesson 14, Final Activities #2. | seed 2 cups<br><br>humas 1 cup<br><br>Find/investigate/discuss effects of surface runoff created by roads. |

**Unit: Land and Water**
**Lesson 14: Plants: Protecting Sloped Land from Erosion**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW brainstorm possible roles of plants in land and water interactions.<br><br>TLW predict and investigate how plants affect water flow and erosion.<br><br>TLW record, discuss, and compare results.<br><br>TLW apply their knowledge to real-world situations. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.4 Describe how people all over the world have taken part in scientific investigation for many centuries. | Final Activities #1, 2, 3, Teacher's Edition, p. 173<br><br>Challenge students to research transpiration.<br><br>Have students test the suitability of a local soil sample for growing plants. | None |

**Unit: Land and Water**
**Lesson 15: Planning Our Homesites: Designing and Building a Landscape**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW design landscapes for their stream tables.<br><br>TLW build landscapes according to their designs.<br><br>TLW predict how their landscapes will be affected by local runoff and select homesites on the basis of these predictions. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.6 Explain that even a good design may fail even though steps are taken ahead of time to reduce the likelihood of failure. | Final Activities #1 & 2, Teacher's Edition, p. 184<br><br>Assessment, Teacher's Edition, p. 185<br><br>Have students research how the Grand Canyon formed. (How has the Colorado River affected this landscape?) | The Practical Geologist by Dougal Dixon<br><br>The Field Guide to Geology by David Lambert<br><br>Mountains by Alan Collinson |

**Unit: Land and Water**
**Lesson 16: Protecting Our Homesites: Testing the Interactions of Land and Water**

| Objective | Indicator | Instruction/Assessment Reference | Resource |
|---|---|---|---|
| TLW test the effect of flowing water on their stream table landscapes.<br><br>TLW discuss and compare their predictions and results.<br><br>TLW analyze, on the basis of concepts discussed in the unit, the location of their homesites and make adjustments as needed.<br><br>TLW reflect on the unit activities and brainstorm how they can apply what they have learned to their world.<br><br>TLW read to learn more about a house designed and built with the land and water in mind. | 4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.<br>4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.<br>4.1.4 Describe how people all over the world have taken part in scientific investigation for many centuries. | Assessment, Teacher's Edition, p. 194.<br><br>Final Activities #1 & 2, p. 193.<br><br>Post-Unit Assessment, Teacher's Edition, pp. 201-203. | Record sheets<br><br>Notebook entries<br><br>Photo cards |

**GRADE 4 SCIENCE CURRICULUM GUIDE**
**UNIT REFERENCE**