GRADE 5 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(s).

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THE NATURE OF SCIENCE AND TECHNOLOGY

Standard: 1	**Students work collaboratively to 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. Students repeat investigations, explain inconsistencies, and design projects.**		
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
The Scientific View of the World			
5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. * observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Discuss the effects of pollutants on their experiments.	Cooperative groups Journal entries	Ecosystems
Scientific Inquiry			
5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited.	Students examine discrepant results.	Analysis of data Journal entry	Ecosystems
The Scientific Enterprise			
5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds.	Students maintain a record-keeping system of their experiments.	Cooperative groups Analysis of collected data	Ecosystems

THE NATURE OF SCIENCE AND TECHNOLOGY

Standard: 1 Students work collaboratively to 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. Students repeat investigations, explain inconsistencies, and design projects.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Technology and Science			
5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Use a stopwatch to record time.	Journal entry	Motion and Design
5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world.	Discuss trade-offs involved in human release of pollutants.	Student research Journal	Ecosystems
5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems.	Create a class web of ecosystems compared to world ecosystems.	Graphic organizer Journal keeping	Ecosystems
5.1.7 Give examples of materials not present in nature, such as cloth, plastic, and concrete, that have become available because of science and technology.	Students read and write about human-made disturbing forces.	Read/Group, Individual Journal writing	Ecosystems

SCIENTIFIC THINKING

Standard: 2 Students use a variety of skills and techniques when attempting to answer questions and solve problems. Students describe their observations accurately and clearly using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, contrast, explain, and justify both information and numerical functions.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Computation and Estimation			
5.2.1 Multiply and divide whole numbers* mentally, on paper, and with a calculator. * whole number: 0,1,2,3, etc.	Find average distance rubber band vehicle traveled.	Record keeping Cooperative group work	Motion and Design
5.2.2 Use appropriate fractions and decimals when solving problems.	Students mix and measure chemicals.	Completion of activity sheet Cooperative group work	Ecosystems
Manipulation and Observation			
5.2.3 Choose appropriate common materials for making simple mechanical constructions and repairing things.	Students design a vehicle to meet certain requirements.	Manipulate materials	Motion and Design
5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. * inference: a train of logic based on observations, leading to an explanation	Set up a science notebook.	Record keeping	Ecosystems Motion and Design Floating and Sinking Microworlds

SCIENTIFIC THINKING

Standard: 2 Students use a variety of skills and techniques when attempting to answer questions and solve problems. Students describe their observations accurately and clearly using numbers, words, and sketches, and are able to communicate their thinking to others. They compare, contrast, explain, and justify both information and numerical functions.

Indicator	Example	Instruction/Assessment Reference	Resources
Manipulation and Observation (cont'd.)			
5.2.5 Use technology, such as calculators or spreadsheets, in determining area and volume from linear dimensions. Find area*, volume*, mass, time, and cost, and find the difference between two quantities of anything. * area: a measure of the size of a two-dimensional region * volume: a measure of the size of a three-dimensional object	Use a stopwatch to record time.	Record keeping	Motion and Design
Communication Skills			
5.2.6 Write instructions that others can follow in carrying out a procedure.	Students plan experiments to study effects of pollution.	Use of scientific method Journal entry	Ecosystems
5.2.7 Read and follow step-by-step instructions when learning new procedures.	Students set up aquarium and terrarium.	Modeling Following directions Journal	Ecosystems
Critical Response Skills			
5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same.	Students build a vehicle following a two-view technical drawing.	Read a blueprint.	Motion and Design

THE PHYSICAL SETTING

Standard: 3 Students continue to investigate changes of the earth and sky. They explore, describe, and classify materials, motion*, and energy*.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
The Universe			
5.3.1 Explain that telescopes are used to magnify distant objects in the sky including the moon and the planets.	Students share prior knowledge of magnifiers and ask more questions.	Reading/Individual, Group Student research	Microworlds
5.3.2 Observe and describe that stars are like the sun, some being smaller and some being larger, but they are so far away that they look like points of light.			
5.3.3 Observe the stars and identify stars that are unusually bright and those that have unusual colors, such as reddish or bluish.			

*motion: change in position of an object in a certain amount of time
*energy: what is needed to make something go

THE PHYSICAL SETTING

Standard: 3 Students continue to investigate changes of the earth and sky. They explore, describe, and classify materials, motion*, and energy*.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
The Earth and the Processes That Shape It			
5.3.4 Investigate that when liquid water disappears, it turns into a gas (vapor)* mixed into the air, and can reappear as a liquid* when cooled, or as a solid* if cooled below the freezing point of water. * gas: matter with no definite shape or volume * liquid: matter with no definite shape but with a definite volume * solid: matter with a definite shape and volume			
5.3.5 Observe and explain that clouds and fog are made of tiny droplets of water.			
5.3.6 Demonstrate that things on or near the Earth are pulled toward it by the Earth's gravity*. * gravity: a force that pulls or attracts objects towards one another	Set up a system to pull their vehicles.	Problem solving approach	Motion and Design
5.3.7 Describe that, like all planets and stars, the Earth is approximately spherical in shape.			

THE PHYSICAL SETTING

Standard: 3 Students continue to investigate changes of the earth and sky. They explore, describe, and classify materials, motion*, and energy*.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Matter* and Energy			
5.3.8 Investigate, observe, and describe that heating and cooling cause changes in the properties of materials, such as water turning into steam by boiling and water turning into ice by freezing. Notice that many kinds of changes occur faster at higher temperatures*. * temperature: a measure of average heat energy that can be measured by using a thermometer			
5.3.9 Investigate, observe, and describe that when warmer things are put with cooler ones, the warm ones lose heat* and the cool ones gain it until they are all at the same temperature. Demonstrate that a warmer object can warm a cooler one by contact or at a distance. *heat: a form of energy			
5.3.10 Investigate that some materials conduct* heat much better than others, and poor conductors can reduce heat loss. * conduction: the movement of heat through matter			

* matter: anything that takes up space and has mass

THE PHYSICAL SETTING

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Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Forces of Nature			
5.3.11 Investigate and describe that changes in speed* or direction of motion of an object are caused by forces*. Understand that the greater the force, the greater the change in motion and the more massive* an object, the less effect a given force will have. *speed: the rate per unit time at which an object moves * force: a push or a pull that can cause a change in the motion of an object * mass: a measure of how much matter is in an object	Compare and discuss how the motion of their vehicles change when more or less weight on a string is used to pull them.	Journal Cooperative group work Class discussion	Motion and Design
5.3.12 Explain that objects move at different rates, with some moving very slowly and some moving too quickly for people to see them.	Draw conclusions about the effect of differently weighted strings on the motion of their string-pulling vehicles.	Class discussion Journal entry	Motion and Design
5.3.13 Demonstrate that the Earth's gravity pulls any object toward it without touching it.	Draw conclusions about the effect of differently weighted strings on the motion of their string-pulling vehicles.	Class discussion Journal entry	Motion and Design

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 these organisms. Students explore how organisms satisfy their needs in their environments.**		
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Diversity of Life			
5.4.1 Explain that for offspring to resemble their parents there must be a reliable way to transfer information from one generation to the next.			
5.4.2 Observe and describe that some living things consist of a single cell that needs food, water, air, a way to dispose of waste, and an environment in which to live.	Record and discuss how living things depend on each other.	Keep a journal Class discussion	Ecosystems
5.4.3 Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating. Explain that some organisms' cells, such as human nerve cells and muscle cells, vary greatly in appearance and perform very different roles in the organism.			

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 these organisms. Students explore how organisms satisfy their needs in their environments.**		
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Interdependence of Life and Evolution			
5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.	Record and discuss thoughts about how living things depend on each other.	Class discussion Journal	Ecosystems
5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.	Students identify and discuss some natural and man-made causes that disturb an ecosystem.	Teacher observation Journal writing	Ecosystems
5.4.6 Recognize and explain that most microorganisms do not cause disease and many are beneficial.			
5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.	Students discuss information on plants and animals.	Guided questions Record keeping	Ecosystems
5.4.8 Observe that and describe how fossils can be compared to one another and to living organisms according to their similarities and differences.			
Human Identity			
5.4.9 Explain that like other animals, human beings have body systems.			

THE MATHEMATICAL WORLD

Standard: 5	**Students apply mathematics in scientific contexts. They make more precise and varied measurements in gathering data. Their geometric descriptions of objects are comprehensive, and their graphing demonstrates specific connections. They identify questions that can be answered by data distribution, i.e. "Where is the middle?" and their supporting of claims or answers with reasons and analogies becomes important.**		
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Numbers			
5.5.1 Make precise and varied measurements and specify the appropriate units.	Students make observations and record measurements of materials used.	Record keeping Journal Cooperative group work	Ecosystems
Shapes and Symbolic Relationships			
5.5.2 Show that mathematical statements using symbols may be true only when the symbols are replaced by certain numbers.			
5.5.3 Classify objects in terms of simple figures and solids.			
5.5.4 Compare shapes in terms of concepts, such as parallel and perpendicular, congruence* and symmetry.			
5.5.5 Demonstrate that areas of irregular shapes can be found by dividing them into squares and triangles.			
5.5.6 Describe and use drawings to show shapes and compare locations of things very different in size. * congruence: same size and shape			

THE MATHEMATICAL WORLD

Standard: 5 Students apply mathematics in scientific contexts. They make more precise and varied measurements in gathering data. Their geometric descriptions of objects are comprehensive, and their graphing demonstrates specific connections. They identify questions that can be answered by data distribution, i.e. "Where is the middle?" and their supporting of claims or answers with reasons and analogies becomes important.

Indicator	Example	Instruction/Assessment Reference	Resources
Reasoning and Uncertainty			
5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar.	Students determine variables and controls that effect scientific investigations.	Analysis of models Journals	Ecosystems
5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events.	Students read about pollutants.	Journals	Ecosystems
5.5.9 Show how spreading data out on a number line helps to see what the extremes are, where they pile up, and where the gaps are.	Record class data of group experiments.	Graphing Record keeping Journal entry	Motion and Design
5.5.10 Explain the danger in using only a portion of the data collected to describe the whole.	Students test distance of vehicle and record information.	Direct instruction Model use of skewed information.	Motion and Design

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.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Systems			
5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other.	How living things depend on each other Students manipulate pieces to make vehicle work.	Journal Observation Journal entry	Ecosystems Motion and Design
Models and Scale			
5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.	Identify details that are important in technical drawings.	Drawings	Motion and Design
5.6.3 Recognize and describe that almost anything has limits on how big or small it can be.			

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.			
Indicator	**Example**	**Instruction/Assessment Reference**	**Resources**
Constancy and Change			
5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Attempt to move their vehicle using rubber band energy.	Scientific investigation	Motion and Design

GRADE 5 SCIENCE CURRICULUM GUIDE
UNIT REFERENCE

Unit: Ecosystems
Lesson 1: Getting Started: Thinking About Ecosystems

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW set up their science notebooks, which they will use to record ideas and observations throughout the unit. TLW record and discuss their thoughts about how living things depend on each other. TLW discuss what they would like to find out about how living things depend on each other. TLW observe and discuss a riverbank environment.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.4.2 Observe and describe that some living things consist of a single cell that needs food, water, air, a way to dispose of waste, and an environment in which to live. 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all. 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful. 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other. *inference: a train of logic based on observations, leading to an explanation	Create record keeping journal Notetaking KWL	Riverkeeper by George Ancona The Trip of a Drip by Vicki Cobb The Magic School Bus at the Waterworks by Joanna Cole The Growing Classroom: Garden-Based Science by Roberta Jaffe and Gary Appel Death Is Natural by Laurence Pringle Turning the Tide: Saving the Chesapeake Bay by Tom Horton and William Eichbaum The Incredible Heap by Chris Catton and James Gray

Unit: Ecosystems
Lesson 2: Setting Up the Terrarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW share what they know about a terrestrial environment. TLW think about the aquaria and terraria as models of environments. TLW set up their terraria. TLW make detailed records about the items they have placed in the terraria. TLW predict what will happen to their terraria in the next week.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.1 Make precise and varied measurements and specify the appropriate units. *inference: a train of logic based on observations, leading to an explanation	KWLQ Notetaking Modeling Record keeping	How to Think Like a Scientist by Stephen Kramer The City Kid's Field Guide by Ethan Herberman Keeping Minibeasts: Grasshoppers and Crickets by Barrie Watts Grass and Grasshoppers by Rose Wyler

Unit: Ecosystems
Lesson 3: Setting Up the Aquarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discuss the needs of organisms in an aquatic environment. TLW set up their aquaria by adding gravel, water, elodea, duckweed and algae. TLW observe, quantify, an record information about the organisms they place in their aquaria. TLW read about the role of plants and algae in a pond.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Cooperative group Setting up Lab materials Record keeping Reading-individual/group	Amazing Fish by Mary Ling Usborne First Nature: Creepy Crawlies by Cathy Kilpatrick Keeping Minibeasts: Grasshoppers and Crickets by Barrie Watts Grass and Grasshoppers by Rose Wyler The Tenth Good Thing about Barney by Judith Viorst The City Kid's Field Guide by Ethan Herberman Scavengers and Decomposers: The Cleanup Crew by Pat Hughey

Unit: Ecosystems
Lesson 4: Adding Animals to the Aquarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discuss information on aquatic plants and algae gained through observation and reading. TLW complete their aquaria by adding mosquito fish and snails. TLW continue to record their observations of the plants, algae, and animals in their aquaria and the plants in their terraria. TLW read to learn more about the animals in their aquaria.	5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all. 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful. 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Guided questions Record keeping Reading-individual/group	Amazing Fish by Mary Ling Death is Natural by Laurence Pringle Come Back Salmon: How a Group of Dedicated Kids Adopted a Stream and Brought It Back to Life by Molly Cone Window on the Deep: The Adventures of Underwater Explorer Sylvia Earle by Andrea Conley Water, Water! by Tom Johnson

Unit: Ecosystems
Lesson 5: Observing the Completed Aquarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discuss what they have read and observed about the animals in their aquaria. TLW offer evidence of the dependent and interdependent relationships they have observed in their own ecosystems. TLW predict what changes might occur in both their own aquaria and terraria and in the class sets. TLW read about germination, which they have been observing over the past week or so.	5.4.3 Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating. Explain that some organisms' cells, such as human nerve cells and muscle cells, vary greatly in appearance and perform very different roles in the organism. 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all. 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful. 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.	Classification Use of scientific method Reading-independent/group	Fifty Simple Things Kids Can Do to Save the Earth by The Earth Works Group The Growing Classroom: Garden-Based Science by Roberta Jaffe and Gary Appel Looking at Plants by David Suzuki Plant by David Burnie

Unit: Ecosystems
Lesson 6: Adding Animals to the Terrarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW continue to observe and record plant growth in the terraria. TLW make observations and record descriptions of the animals they add to their terraria. TLW identify and record similarities and differences between crickets and isopods. TLW continue to discuss their concepts of the word "ecosystem". TLW, through reading selections, learn more about crickets and isopods.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.4.3 Observe and explain that some organisms are made of a collection of similar cells that benefit from cooperating. Explain that some organisms' cells, such as human nerve cells and muscle cells, vary greatly in appearance and perform very different roles in the organism. 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all. 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing. 5.5.1 Make precise and varied measurements and specify the appropriate units. *inference: a train of logic based on observations, leading to an explanation	Record keeping Compare/contrast Read–independent/group	The Growing Classroom: Garden-Based Science by Roberta Jaffe and Gary Appel Keeping Minibeasts: Grasshoppers and Crickets by Barrie Watts Keeping Minibeasts: Snails and Slugs by Chris Henwood The City Kid's Fieldguide by Ethan Herberman Scavengers and Decomposers: The Cleanup Crew by Pat Hughey Grass and Grasshoppers by Rose Wyler The Cricket in Times Square by George Seldon

Unit: Ecosystems
Lesson 7: Joining the Terrarium and Aquarium

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW, using information from direct observations and reading, discuss their terrestrial and aquatic ecosystems. TLW explore food chains and consider the impact organisms have on one another. TLW create a class web of their terrestrial ecosystem and compare it with Lesson 5's aquatic web. TLW discuss the webs of both systems and compare them with the world's ecosystems. TLW predict how one ecosystem might influence the other.	5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar.	Record keeping Reading–individual/group Graphic organizer Compare/contrast	The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry The Lorax by Dr. Seuss The Wump World by Bell Peet Grass and Grasshoppers by Rose Wyler Keeping Minibeasts: Grasshoppers and Crickets by Barrie Watts Environmental Atlas for Children by UNICEF The Cricket in Times Square by George Selden The Tenth Good Thing About Barney by Judith Viorst

Unit: Ecosystems
Lesson 8: Upsetting the Stability

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW observe, describe, and compare stable and disturbed ecocolumns. TLW become familiar with pH paper. TLW identify and discuss some natural causes that can disturb an ecosystem. TLW read and write about human-made disturbing forces, or pollutants. TLW reflect on their own learning through a self-assessment.	5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems. 5.1.7 Give examples of materials not present in nature, such as cloth, plastic, and concrete, that have become available because of science and technology. 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all. 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.	Use of scientific method Teacher observation Reading–independent/group Reflective writing	Death is Natural by Laurence Pringle Riverkeeper by George Ancona The Trip of a Drip by Vicki Cobb The Magic Schoolbus at the Waterworks by Joanna Cole The City Kid's Field Guide by Ethan Herberman Scavengers and Decomposers: The Cleanup Crew by Cathy Kilpatrick Water, Water! by Tom Johnston Usborne First Nature: Creepy Crawlies by Cathy Kilpatrick Amazing Fish by Mary Ling

Unit: Ecosystems
Lesson 9: Reporting on Pollutants

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW make presentations about the three pollutants. TLW discuss the trade-offs involved when humans release pollutants into the environment. TLW record, in their science notebooks, important points and questions regarding each presentation. TLW read about three pollutants. TLW observe their ecosystems and record observations.	5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world. 5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.5.1 Make precise and varied measurements and specify the appropriate units. *inference: a train of logic based on observations, leading to an explanation	Student research Record keeping Read-independent/group	Turning the Tide: Saving the Chesapeake Bay by Tom Horton and William Eichbaum Acid Rain Program: Environmental Benefits by U.S. Environmental Protection Agency, Office of Air and Radiation Riverkeeper by George Ancona Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks The Trip of A Drip by Vicki Cobb Fifty Simple Things Kids Can Do to Save the Earth by The Earth Works Group Going Green: A Kid's Handbook to Saving the Planet by John Elkington, Julia Hailes, Douglas Hill, and Joel Makower

Unit: Ecosystems
Lesson 10: Planning Pollution Experiments

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discuss and analyze the causes and effects of three types of pollution. TLW plan experiments to study the effects of pollution. TLW determine variables and controls and prepare to use simulations in a scientific investigation. TLW predict the possible effects of pollutants on their model ecosystems. TLW establish a record keeping system for their experiments.	5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world. 5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems. 5.2.6 Write instructions that others can follow in carrying out a procedure. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events.	Analysis of models Use of scientific method Record keeping	Turning the Tide: Saving Chesapeake Bay by Tom Horton and William Eichbaum Death is Natural by Laurence Pringle Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks Come Back Salmon: How a Group of Dedicated Kids Adopted a Stream and Brought It Back to Life by Molly Cone Window on the Deep: The Adventures of Underwater Explorer Sylvia Earle by Andrea Conley Good Planets Are Hard to Find! by Roma Dehr Garbage by Evan Hadingham and Janet Hadingham

Unit: Ecosystems
Lesson 11: Setting Up Our Pollution Experiments

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW test and record the pH of their ecosystems. TLW implement their pollution experiments. TLW mix and measure chemicals. TLW maintain the record keeping system they established for their experiments.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.2.2 Use appropriate fractions and decimals when solving problems. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Record keeping Lab experiment	Going Green: A Kid's Handbook to Saving the Planet by John Elkington and Julia Hailes Fifty Simple Things Kids Can Do to Save the Earth by The Earth Works Group Death is Natural by Laurence Pringle Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks Come Back Salmon: How a Group of Dedicated Kids Adopted a Stream and Brought It Back to Life by Molly Cone Window on the Deep: The Adventures of Underwater Explorer Sylvia Earle by Andrea Conley

Unit: Ecosystems
Lesson 12: Observing Early Effects of Pollution

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW observe and record the effects pollutants have on the ecosystems used in the experiment. TLW observe and discuss the control ecocolumn. TLW connect the death of the producers to the viability of the consumers within the ecocolumn. TLW state reasons why plants are important in experiments and continue to develop a sense of respect toward plants.	5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar.	Student observation Record keeping Problem-solving approaches	Death is Natural by Laurence Pringle Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks Come Back Salmon: How a Group of Dedicated Kids Adopted a Stream and Brought It Back to Life by Molly Cone Window on the Deep: The Adventures of Underwater Explorer Sylvia Earle by Andrea Conley

Unit: Ecosystems
Lesson 13: Where Do the Pollutants Go?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW, as a team, discuss the effects of pollutants on their ecosystems and make final observations. TLW, as a team, review the data collected from the pollution experiments. TLW, as a team, use their data to draw and support conclusions.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Cooperative groups Analysis of collected data Conclusions drawn	Death is Natural by Laurence Pringle Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks Come Back Salmon: How a Group of Dedicated Kids Adopted a Stream and Brought It Back to Life by Molly Cone Window on the Deep: The Adventures of Underwater Explorer Sylvia Earle by Andrea Conley Good Planets Are Hard to Find by Roma Dehr and Ronald Bazar Usborne Science and Experiments: Ecology by Richard Spurgeon

Unit: Ecosystems
Lesson 14: What Happened to Our Ecosystem? Coming to Conclusions

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW report on their team experiments. TLW pool and analyze, as a class, its data on the effects of each pollutant. TLW draw conclusions, as a class, about the effects of each pollutant. TLW examine discrepant results. TLW read about the Chesapeake Bay.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited. 5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Presentation of investigation Compare/contrast Read-independent/group	Turning the Tide: Saving the Chesapeake Bay by Tom Horton and William Eichbaum Acid Rain Program: Environmental Benefits by U.S. Environmental Protection Agency, Office of Air and Radiation Riverkeeper by George Ancona Protecting Endangered Species by Felicity Brooks Protecting Trees and Forests by Felicity Brooks The Trip of A Drip by Vicki Cobb Fifty Simple Things Kids Can Do to Save the Earth by The Earth Works Group Going Green: A Kid's Handbook to Saving the Planet by John Elkington, Julia Hailes, Douglas Hill, and Joel Makower

Unit: Ecosystems
Lesson 15: Examining a Real Environmental Problem

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW work in groups to define a problem from different points of view. TLW identify possible solutions to pollution problems. TLW define the term "trade-off" and identify the trade-offs involved in specific solutions.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world. 5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems.	Cooperative groups Discovery learning Think, pair, share	The Sierra Club Kid's Guide to Planet Care and Repair by Vicki McVey Usborne Science and Experiments: Ecology by Richard Spurgeon Water Pollution by Darlene Stille Oil Spills by Children's Press Ozone Hole by Children's Press Trash! by Charlotte Wilcox The Wump World by Bill Peet The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry The Lorax by Dr. Seuss

Unit: Ecosystems
Lesson 16: Holding the Mini-Conference: A Look At Trade-Offs

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW present an environmental problem from a particular point of view and propose solutions. TLW evaluate other groups' points of view and solutions. TLW examine their own lives and how they can help find solutions to some of the world's environmental problems.	5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited. 5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.5 Explain that technology extends the ability of people to make positive and/or negative changes in the world. 5.1.6 Explain how the solution to one problem, such as the use of pesticides in agriculture or the use of dumps for waste disposal, may create other problems.	Debates Critical thinking End reflections	The Sierra Club Kid's Guide to Planet Care and Repair by Vicki McVey Usborne Science and Experiments: Ecology by Richard Spurgeon Water Pollution by Darlene Stille Oil Spills by Children's Press Ozone Hole by Children's Press Trash! by Charlotte Wilcox The Wump World by Bill Peet The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry The Lorax by Dr. Seuss

Unit: Floating and Sinking **Lesson 1: What Do We Know About Floating And Sinking?**			
Objective	**Indicator**	**Instruction/Assessment Reference**	**Resources**

TLW prepare a science notebook that they will use to record their ideas throughout the unit. TLW brainstorm why they think things float and sink. TLW observe an object that both floats and sinks and then record their observations and ideas about how this could happen.	5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.3 Classify objects in terms of simple figures and solids. *inference: a train of logic based on observations, leading to an explanation	Brainstorming Guiding Questions Cooperative Group work Compare/contrast	Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor

Unit: Floating and Sinking
Lesson 2: Making And Testing Predictions About Familiar Objects

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW make predictions and explain their thinking about whether a variety of objects will float or sink. TLW test their predictions and record results. TLW discuss their observations and ideas about whether the objects float or sink.	5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail. 5.6.3 Recognize and describe that almost anything has limits on how big or small it can be. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Experimenting: Lab investigation Note-taking Guiding Questions	Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer

Unit: Floating and Sinking
Lesson 3: Which Things Float? Which Things Sink?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW make predictions and explain their thinking about whether each object in a set will float or sink. TLW test their predictions and record results. TLW discuss and compare the results of their investigations. TLW apply results of the floating test to rank the objects from lightest to heaviest.	5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. 5.3.13 Demonstrate that the Earth's gravity pulls any object toward it without touching it. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Notetaking Experimenting: Lab investigation Compare-contrast	Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer The Book of Think (Or How to Solve a Problem Twice Your Size) by Marilyn Burns "The Pasta Paradigm" by Jim Sconyers from Science Scope 1/97 "Salt Crystals: Exploring the Scientific Method" by John McBride and Roy Villanueva from Science Scope 1/97 "Toying with Inquiry" by John Park from Science Scope 4/92

Unit: Floating and Sinking
Lesson 4: Measuring Weight With A Spring Scale

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW calibrate a spring scale with paper clips. TLW practice weighing with the calibrated spring scales. TLW compare their results and discuss their observations.	5.2.3 Choose appropriate common materials for making simple mechanical constructions and repairing things. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.5 Use technology, such as calculators or spreadsheets, in determining area and volume from linear dimensions. Find area*, volume*, mass, time, and cost, and find the difference between two quantities of anything. 5.5.1 Make precise and varied measurements and specify the appropriate units. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail. *inference: a train of logic based on observations, leading to an explanation *area: a measure of the size of a two-dimensional region *volume: a measure of the size of a three-dimensional object	Modeling Cooperative group work Manipulating Lab equipment Compare/contrast	Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer The Book of Think (Or How to Solve a Problem Twice Your Size) by Marilyn Burns "The Pasta Paradigm" by Jim Sconyers from Science Scope 1/97 "Salt Crystals: Exploring the Scientific Method" by John McBride and Roy Villanueva from Science Scope 1/97 "Toying with Inquiry" by John Park from Science Scope 4/92

Unit: Floating and Sinking
Lesson 5: Weighing Floaters And Sinkers

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW use the spring scale to weigh their collection of objects. TLW compare and discuss results and determine an average measure of weight for each object. TLW create a class graph to show the weights of all the objects. TLW compare size with weight and discuss any questions raised.	5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.3 Classify objects in terms of simple figures and solids. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.	Lab investigation Compare/contrast Graphing Notetaking	Why Can't You Unscramble an Egg? and Other Not Such Dumb Questions About Matter by Vicki Cobb Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer The Book of Think (Or How to Solve a Problem Twice Your Size) by Marilyn Burns "The Pasta Paradigm" by Jim Sconyers from Science Scope 1/97

Unit: Floating and Sinking
Lesson 6: Making A Sinker Float

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW investigate whether changing the shape of a piece of clay has an effect on its weight. TLW explore ways to change the shape of a ball of clay so that the clay floats. TLW discuss and compare the designs of their clay boats.	5.2.3 Choose appropriate common materials for making simple mechanical constructions and repairing things. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other. *inference: a train of logic based on observations, leading to an explanation	Lab investigation Compare-contrast Guided questions	Why Can't You Unscramble an Egg? and Other Not Such Dumb Questions About Matter by Vicki Cobb The Book of Think (Or How to Solve a Problem Twice Your Size) by Marilyn Burns "Archimedes The Greek Streaker" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Reimer "Predicting Float Lines" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Remier Messing Around With Water Pumps and Siphons by Bernie Zubrowski "The All New Water Revue" by Martha Monroe from Science and Children 1/90

Unit: Floating and Sinking
Lesson 7: Investigating Boat Design

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW create their own record charts. TLW investigate and record how many marbles different clay boats can keep afloat. TLW record and discuss their observations about design.	5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.	Modeling Create a chart Lab investigation Investigation Problem solving Notetaking	"Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97 Ships by Richard Humble Floating and Sinking by Terry Jennings The Way Things Work by David Macaulay Sink or Swim! The Science of Water by Barbara Taylor

Unit: Floating and Sinking
Lesson 8: Does Size Affect Buoyancy?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discuss the design of clay boats that floated and apply this design to foil boats. TLW use their sense of touch to explore the buoyant force of the water on the foil boats and relate this to the size of each boat. TLW predict and test how many marbles each boat will be able to keep afloat. TLW observe how much of the boat moves below the surface of the water as marbles are added. TLW discuss and read about boat designs.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. *inference: a train of logic based on observations, leading to an explanation	Use of scientific method Student research	"Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97 Ships by Richard Humble Floating and Sinking by Terry Jennings The Way Things Work by David Macaulay Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris "Whale Sharks: Gentle Monsters of the Deep" National Geographic magazine, 12/92 Paddle-to-the-Sea by Clancy Holling

Unit: Floating and Sinking
Lesson 9: Measuring The Buoyant Force

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW predict the amount of buoyant force on fishing bobbers of three different sizes. TLW test their predictions by using a spring scale to measure the buoyant force on the three fishing bobbers. TLW discuss and compare their observations and conclusions.	5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. 5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events.	Use of scientific method Cooperative group work Record keeping	Ships by Richard Humble Floating and Sinking by Terry Jennings The Way Things Work by David Macaulay Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris "Whale Sharks: Gentle Monsters of the Deep" National Geographic magazine, 12/92 Paddle-to-the-Sea by Clancy Holling "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97

Unit: Floating and Sinking
Lesson 10: What Happens To The Water?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW calibrate a tube to use as a measuring tool. TLW observe that water is displaced when objects are placed in it. TLW measure and record changes in water level caused by holding various objects under water. TLW compare and discuss water displacement associated with objects that are of the same volume but different weights.	5.2.3 Choose appropriate common materials for making simple mechanical constructions and repairing things. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. 5.5.1 Make precise and varied measurements and specify the appropriate units. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail. *inference: a train of logic based on observations, leading to an explanation	Create lab instruments Cooperative group work Record keeping Compare and contrast	"Archimedes The Greek Streaker" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Reimer "Predicting Float Lines" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Remier Messing Around With Water Pumps and Siphons by Bernie Zubrowski "The All New Water Revue" by Martha Monroe from Science and Children 1/90 Floating and Sinking by Terry Jennings The Way Things Work by David Macaulay Sink or Swim! The Science of Water by Barbara Taylor

Unit: Floating and Sinking
Lesson 11: How Much Do Objects Weigh Under Water?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW predict and measure the change in apparent weight of objects when they are submerged. TLW construct a graph that compares the apparent weights of the objects when they are submerged and when they are out of water. TLW discuss and compare their observations and conclusions.	5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.	Use of scientific method Record keeping Graphing Cooperative group work	"Archimedes The Greek Streaker" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Reimer "Predicting Float Lines" from Historical Connections in Mathematics Volume I by Wilbert Reimer and Luetta Reim er Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Inquiring Minds Want to Know: by Carolyn Keys from Science Scope 2/96 "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97

Unit: Floating and Sinking
Lesson 12: How Much Does Water Weigh?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW weigh a cylinder of water with a spring scale. TLW graph the weight of the cylinder of water on the class graph. TLW compare the weight of the water with the weight of the other cylinders. TLW construct individual graphs to represent the weights of the solid cylinders and water. TLW discuss the relationship between the weight of water and the phenomena of floating and sinking.	5.5.1 Make precise and varied measurements and specify the appropriate units. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail. 5.6.3 Recognize and describe that almost anything has limits on how big or small it can be.	Record keeping Cooperative group work Compare/contrast	Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris "Inquiring Minds Want to Know" by Carolyn Keys from Science Scope 2/96 "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97 Messing Around With Water Pumps and Siphons by Bernie Zubrowski Janice VanCleave's Earth Science for Every Kid 101 Easy Experiments That Really Work by Janice VanCleave

Unit: Floating and Sinking
Lesson 13: Dissolving Salt In Water

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW predict what will happen when they mix salt and water. TLW test their predictions. TLW observe and describe the changes that occur in salt and water when the two are mixed. TLW observe and describe the changes in salt water over time. TLW compare the weight of salt water with the weight of fresh water. TLW form hypotheses that explain their results.	5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements. *inference: a train of logic based on observations, leading to an explanation	Use of scientific method Record keeping Compare/contrast	How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris "Inquiring Minds Want to Know" by Carolyn Keys from Science Scope 2/96 "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97 Janice VanCleave's Earth Science for Every Kid 101 Easy Experiments That Really Work by Janice VanCleave

Unit: Floating and Sinking
Lesson 14: How Is Salt Water Different From Fresh Water?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW predict which objects will float in salt water. TLW test their predictions and record their results. TLW apply information about the weight of salt water to make predictions about whether a variety of objects will float or sink in salt water. TLW add the weight of the salt water to the class graph. TLW discuss why objects that sink in fresh water can float in salt water.	5.5.1 Make precise and varied measurements and specify the appropriate units. 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar. 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.	Use of scientific method Record keeping Student research	How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris "Inquiring Minds Want to Know" by Carolyn Keys from Science Scope 2/96 "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97 Janice VanCleave's Earth Science for Every Kid 101 Easy Experiments That Really Work by Janice VanCleave

Unit: Floating and Sinking
Lesson 15: Constructing A Hydrometer

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW construct a hydrometer. TLW make predictions about how high the hydrometer will float in salt water. TLW use a hydrometer to compare salt water and fresh water. TLW extend their ideas about hydrometers through reading and discussion.	5.2.3 Choose appropriate common materials for making simple mechanical constructions and repairing things. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Build a lab experiment Discovery learning Compare/contrast Use of created instrument Extension in Appendices	"96 Hydrometer" from Janice VanCleave's Earth Science for Every Kid 101 Easy Experiments That Really Work by Janice VanCleave How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Messing Around With Water Pumps and Siphons by Bernie Zubrowski "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97

Unit: Floating and Sinking
Lesson 16: Working With Mystery Cylinders

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW develop a statement that generalizes how to use data to determine whether an object will float. TLW weigh mystery cylinders with the spring scale. TLW predict the floating behavior of mystery cylinders. TLW test their predictions and record their results. TLW compare the mystery cylinders to objects that they have tested in earlier lessons.	5.2.6 Write instructions that others can follow in carrying out a procedure. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail. 5.6.3 Recognize and describe that almost anything has limits on how big or small it can be. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Practice Cooperative groups Use scientific method Paper/pencil test -multiple choice -short answer -construct graph	The Way Things Work by David Macaulay Janice VanCleave's Earth Science for Every Kid 101 Easy Experiments That Really Work by Janice VanCleave How to Think Like a Scientist Answering Questions by the Scientific Method by Stephen Kramer Floating and Sinking by Terry Jennings Sink or Swim! The Science of Water by Barbara Taylor Doing What Scientists Do: Children Learn to Investigate Their World by Ellen Doris Messing Around with Water Pumps and Siphons by Bernie Zubrowski "Fighting Student Misconceptions: Three Effective Strategies" by Dianna Liggitt-Fox from Science Scope 2/97

Unit: Microworlds **Lesson 1: Observing a Penny**			
Objective	**Indicator**	**Instruction/Assessment Reference**	**Resources**

TLW share their prior knowledge of magnifiers and ask more questions about them. The teacher assesses students' prior knowledge of magnifiers. TLW set up a notebook to record their observations and ideas. TLW learn to use hand lenses. TLW discover something new in an everyday object.	5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.3.1 Explain that telescopes are used to magnify distant objects in the sky including the moon and the planets. 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other. *inference: a train of logic based on observations, leading to an explanation	Compare/contrast Cooperative group work	Penny Polishing – Extensions p. 12 Teacher's Manual – Microworlds Bibliography Appendix F Appendix C – pp. 99-101 Appendix B – p. 98

Unit: Microworlds
Lesson 2: Communicating Your Observations

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW have more practice making detailed observations. TLW record their observations in both words and sketches. The teacher evaluates students' observational skills.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.6 Describe and use drawings to show shapes and compare locations of things very different in size. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Reflection – oral/written Drawing Notetaking Informal observation	Vocabulary: observations properties inference opinion Extensions: Secret Object – p. 17, #1 Cinquin Poem – p. 18, #2 Bring in Lost and Found ad from newspaper. Read with class some descriptions of lost objects. Point out that people who place these ads state as many physical characteristics of lost objects as they can. (Characteristics are properties.) Science, Silver Burdett & Ginn In groups, do and then discuss p. 57 property ditto from Science, Silver Burdett & Ginn.

Unit: Microworlds
Lesson 3: Learning About Lenses

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW experiment with different shapes to learn which ones magnify. TLW discover the properties common to all objects that act as magnifiers.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Discovery learning Classifying	Extensions p. 24 (#3 could use salt, sugar, or colored water)

Unit: Microworlds
Lesson 4: Looking Through Lenses

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW have more experiences with magnifying lenses. TLW review the properties of magnifying lenses. TLW become more aware of the process of focusing a lens. TLW begin to become aware of how much of an object is in the field of view.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures.	Discovery learning Guiding questions Paper Test -Multiple choice -Short answer	

Unit: Microworlds
Lesson 5: Learning to Use the Microscope

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW acquire background information about the microscope. TLW learn the functions of the parts of a microscope. TLW learn how to adjust the light and how to focus the microscope. TLW develop the concept of a field of view.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Guiding questions Modeling Experimentation/lab investigation	Possible Research Topics: Anton Leeuwenhoek History of Microscopes Microchips Medical microbots Microwaves

Unit: Microworlds
Lesson 6: Practicing With the Microscope

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW continue making careful and detailed observations. TLW continue developing their understanding of the field-of-view concept. TLW practice using the microscope with easily managed objects.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Lab investigation Drawing Comparing/contrast	Vocabulary optical mixture Research Topics pointillism George Seurat Paul Signac Extensions – pp. 40-41 #1 – Use pointillism art form to create a picture #2 – postage stamp

Unit: Microworlds
Lesson 7: The Field of View

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW come to a fuller understanding of what is meant by field of view. TLW predict the size of their field of view based on past experience. TLW measure objects in hair-widths. TLW make more precise measurements in millimeters.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Guided learning Lab investigations Paper test -Short answer	Vocabulary field of view micrometer Extensions – p. 46 1 & 2

Unit: Microworlds
Lesson 8: Preparing Slides

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW learn to prepare wet-mount slides for their microscopes. TLW learn to prepare well slides. TLW learn to focus up and down over the surface of an object that has depth.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Analysis of exemplars Samples/models Experimentation Lab investigation	Vocabulary wet mount slides sell slide depression slide Extensions – p. 53 bring in seeds and spices

Unit: Microworlds
Lesson 9: What Is It?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW identify unknown specimens through observation. TLW apply their skills viewing three-dimensional objects under the microscope. TLW prepare their own well slides properly.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Read aloud Product assessment investigation	<u>Extensions</u> p. 59, #1-#4 1. Hint = grow salt crystals over the weekend

Unit: Microworlds
Lesson 10: Exploring Common Objects

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW make their own discoveries as they observe specimens they are interested in. TLW practice preparing slides of different types. TLW perfect their light adjustment and focusing techniques.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Experimentation – lab investigation	Extensions – pp. 64-65 #1 - #4, Robert Hooke selection

Unit: Microworlds
Lesson 11: Looking Inside An Onion

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW examine and describe the internal structure of an onion. TLW observe and describe the cells in an onion.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same.	Compare/contrast Independent work Notetaking Drawing	Vocabulary cell volvox Extensions – p. 70 #1 - #3 Discussions of cell–supplement Use Silver Burdett & Ginn Science, Teacher's Manual pp. 4-5, #1, #2, and application

Unit: Microworlds
Lesson 12: Looking at Living Things: Volvox

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW learn the best way to handle living, moving creatures and how to prepare slides for them. TLW use the microscope to observe these creatures.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Modeling Experimentation- Lab investigation Drawing Notetaking	Vocabulary volvox green algae flagella flagellate euglena Extensions pp. 75-76 Silver Burdett & Ginn Science 1. Changes in Populations, pp. 91-93 Experiment: What factors affect size of populations? 2. Chapter 4, "Living Communities" 3. pp. 12-14, Food Making in a Leaf - Photosynthesis

Unit: Microworlds
Lesson 13: Looking At Living Things: Blepharisma

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW continue practicing their microscope skills on living organisms. TLW recognize individual microbes on their slide. TLW observe an organism reproducing by the process of binary fission.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Classifying Experimentation Lab investigation	Vocabulary cilia ciliates Blepharisma binary fission Paramecium Extensions p. 80

Unit: Microworlds
Lesson 14: Looking At Living Things: Vinegar Eels

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW use their microscope skills to observe a very fast-moving organism. TLW experiment with methods for slowing down the vinegar eel.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Experimentation Lab investigation Notetaking	Vocabulary Vinegar eel pasteurize pasteurization sterilize Extension – p. 84 Silver Burdett & Ginn Science pp. 34-38, Worms

Unit: Microworlds
Lesson 15: Looking at Living Things: Hay and Grass Infusions I

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discover that microbes have developed in the hay and grass infusions. TLW begin to record their discoveries. TLW work independently and display a degree of ease and skill in working with the materials. The teacher begins to evaluate student progress.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.4.6 Recognize and explain that most microorganisms do not cause disease and many are beneficial. *inference: a train of logic based on observations, leading to an explanation	Independent work Experiment- Lab investigation Formal observations Checklist of student progress in skill development	Vocabulary microbes decompose decomposition bacteria Extension – p. 88

Unit: Microworlds
Lesson 16: Looking at Living Things: Hay and Grass Infusions II

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW observe in greater detail the microbes in the hay and grass infusions. TLW make more complete and detailed records of their observations. TLW display ease and skill in working with the materials.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. *inference: a train of logic based on observations, leading to an explanation	Drawing Notetaking Experimentation Paper & pencil assessment of skills	Extensions – p. 91 Films E1 – "Cells: A First Film" 10 minutes/color E137 – "Ecology of Ponds" 8 minutes/color J80 – "Life in a Drop of Water" 10 minutes/color Video VHS688 – "Fresh Water Pond" 16 minutes/color Show films after the discovery with the microscopes to reinforce the children's science work. Otherwise, the films do the science work, not the children.

Unit: Microworlds
Lesson 1: Observing a Penny

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW share their prior knowledge of magnifiers and ask more questions about them. The teacher assesses students' prior knowledge of magnifiers. TLW set up a notebook to record their observations and ideas. TLW learn to use hand lenses. TLW discover something new in an everyday object.	5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.3.1 Explain that telescopes are used to magnify distant objects in the sky including the moon and the planets. 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other. *inference: a train of logic based on observations, leading to an explanation	Compare/contrast Cooperative group work	Penny Polishing – Extensions p. 12 Teacher's Manual – Microworlds Bibliography Appendix F Appendix C – pp. 99-101 Appendix B – p. 98

Unit: Microworlds
Lesson 2: Communicating Your Observations

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW have more practice making detailed observations. TLW record their observations in both words and sketches. The teacher evaluates students' observational skills.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.5.6 Describe and use drawings to show shapes and compare locations of things very different in size. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Reflection – oral/written Drawing Notetaking Informal observation	Vocabulary: observations properties inference opinion Extensions: Secret Object – p. 17, #1 Cinquin Poem – p. 18, #2 Bring in Lost and Found ad from newspaper. Read with class some descriptions of lost objects. Point out that people who place these ads state as many physical characteristics of lost objects as they can. (Characteristics are properties.) Science, Silver Burdett & Ginn In groups, do and then discuss p. 57 property ditto from Science, Silver Burdett & Ginn.

Unit: Microworlds
Lesson 3: Learning About Lenses

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW experiment with different shapes to learn which ones magnify. TLW discover the properties common to all objects that act as magnifiers.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Discovery learning Classifying	Extensions p. 24 (#3 could use salt, sugar, or colored water)

Unit: Microworlds
Lesson 4: Looking Through Lenses

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW have more experiences with magnifying lenses. TLW review the properties of magnifying lenses. TLW become more aware of the process of focusing a lens. TLW begin to become aware of how much of an object is in the field of view.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures.	Discovery learning Guiding questions Paper Test -Multiple choice -Short answer	

Unit: Microworlds
Lesson 5: Learning to Use the Microscope

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW acquire background information about the microscope. TLW learn the functions of the parts of a microscope. TLW learn how to adjust the light and how to focus the microscope. TLW develop the concept of a field of view.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Guiding questions Modeling Experimentation/lab investigation	Possible Research Topics: Anton Leeuwenhoek History of Microscopes Microchips Medical microbots Microwaves

Unit: Microworlds
Lesson 6: Practicing With the Microscope

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW continue making careful and detailed observations. TLW continue developing their understanding of the field-of-view concept. TLW practice using the microscope with easily managed objects.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Lab investigation Drawing Comparing/contrast	Vocabulary optical mixture Research Topics pointillism George Seurat Paul Signac Extensions – pp. 40-41 #1 – Use pointillism art form to create a picture #2 – postage stamp

Unit: Microworlds
Lesson 7: The Field of View

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW come to a fuller understanding of what is meant by field of view. TLW predict the size of their field of view based on past experience. TLW measure objects in hair-widths. TLW make more precise measurements in millimeters.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.5.1 Make precise and varied measurements and specify the appropriate units.	Guided learning Lab investigations Paper test -Short answer	Vocabulary field of view micrometer Extensions – p. 46 1 & 2

Unit: Microworlds
Lesson 8: Preparing Slides

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW learn to prepare wet-mount slides for their microscopes. TLW learn to prepare well slides. TLW learn to focus up and down over the surface of an object that has depth.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.6.4 Investigate, observe, and describe that things change in steady, repetitive, or irregular ways, such as toy cars continuing in the same direction and air temperature reaching a high or low value. Note that the best way to tell which kinds of change are happening is to make a table or a graph of measurements.	Analysis of exemplars Samples/models Experimentation Lab investigation	Vocabulary wet mount slides sell slide depression slide Extensions – p. 53 bring in seeds and spices

Unit: Microworlds
Lesson 9: What Is It?

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW identify unknown specimens through observation. TLW apply their skills viewing three-dimensional objects under the microscope. TLW prepare their own well slides properly.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Read aloud Product assessment investigation	<u>Extensions</u> p. 59, #1-#4 1. Hint = grow salt crystals over the weekend

Unit: Microworlds
Lesson 10: Exploring Common Objects

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW make their own discoveries as they observe specimens they are interested in. TLW practice preparing slides of different types. TLW perfect their light adjustment and focusing techniques.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Experimentation – lab investigation	Extensions – pp. 64-65 #1 - #4, Robert Hooke selection

Unit: Microworlds
Lesson 11: Looking Inside An Onion

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW examine and describe the internal structure of an onion. TLW observe and describe the cells in an onion.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same.	Compare/contrast Independent work Notetaking Drawing	Vocabulary cell volvox Extensions – p. 70 #1 - #3 Discussions of cell–supplement Use Silver Burdett & Ginn Science, Teacher's Manual pp. 4-5, #1, #2, and application

Unit: Microworlds
Lesson 12: Looking at Living Things: Volvox

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW learn the best way to handle living, moving creatures and how to prepare slides for them. TLW use the microscope to observe these creatures.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Modeling Experimentation- Lab investigation Drawing Notetaking	Vocabulary volvox green algae flagella flagellate euglena Extensions pp. 75-76 Silver Burdett & Ginn Science 1. Changes in Populations, pp. 91-93 Experiment: What factors affect size of populations? 2. Chapter 4, "Living Communities" 3. pp. 12-14, Food Making in a Leaf - Photosynthesis

Unit: Microworlds
Lesson 13: Looking At Living Things: Blepharisma

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW continue practicing their microscope skills on living organisms. TLW recognize individual microbes on their slide. TLW observe an organism reproducing by the process of binary fission.	5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations*. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.7 Read and follow step-by-step instructions when learning new procedures. *observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.	Classifying Experimentation Lab investigation	Vocabulary cilia ciliates Blepharisma binary fission Paramecium Extensions p. 80

Unit: Microworlds
Lesson 14: Looking At Living Things: Vinegar Eels

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW use their microscope skills to observe a very fast-moving organism. TLW experiment with methods for slowing down the vinegar eel.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.	Experimentation Lab investigation Notetaking	Vocabulary Vinegar eel pasteurize pasteurization sterilize Extension – p. 84 Silver Burdett & Ginn Science pp. 34-38, Worms

Unit: Microworlds
Lesson 15: Looking at Living Things: Hay and Grass Infusions I

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW discover that microbes have developed in the hay and grass infusions. TLW begin to record their discoveries. TLW work independently and display a degree of ease and skill in working with the materials. The teacher begins to evaluate student progress.	5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. 5.2.7 Read and follow step-by-step instructions when learning new procedures. 5.4.6 Recognize and explain that most microorganisms do not cause disease and many are beneficial. *inference: a train of logic based on observations, leading to an explanation	Independent work Experiment- Lab investigation Formal observations Checklist of student progress in skill development	<u>Vocabulary</u> microbes decompose decomposition bacteria <u>Extension</u> – p. 88

Unit: Microworlds
Lesson 16: Looking at Living Things: Hay and Grass Infusions II

Objective	Indicator	Instruction/Assessment Reference	Resources
TLW observe in greater detail the microbes in the hay and grass infusions. TLW make more complete and detailed records of their observations. TLW display ease and skill in working with the materials.	5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds. 5.1.4 Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.4 Keep a notebook to record observations and be able to distinguish inferences* from actual observations. *inference: a train of logic based on observations, leading to an explanation	Drawing Notetaking Experimentation Paper & pencil assessment of skills	Extensions – p. 91 Films E1 – "Cells: A First Film" 10 minutes/color E137 – "Ecology of Ponds" 8 minutes/color J80 – "Life in a Drop of Water" 10 minutes/color Video VHS688 – "Fresh Water Pond" 16 minutes/color Show films after the discovery with the microscopes to reinforce the children's science work. Otherwise, the films do the science work, not the children.

GRADE 5 SCIENCE CURRICULUM GUIDE
UNIT REFERENCE