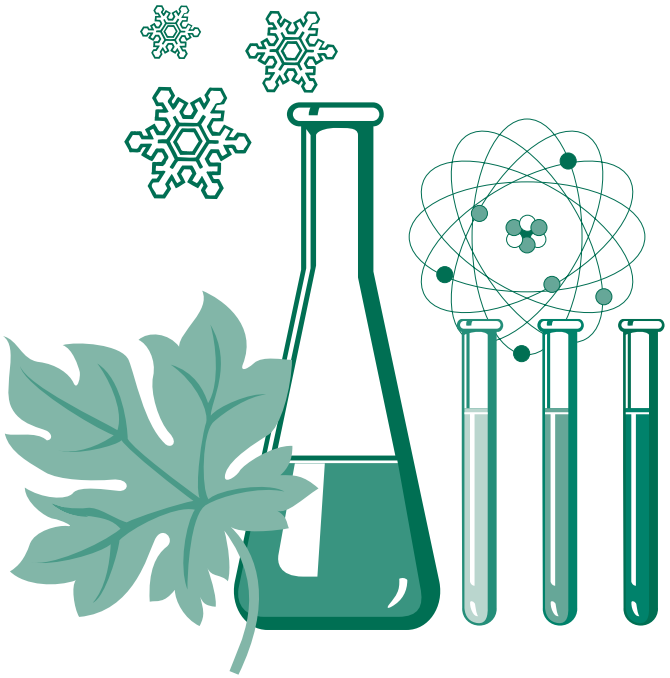

Science Standards of Learning
Curriculum Framework

Commonwealth of Virginia
Department of Education
Richmond, Virginia

Grade Three

Modified to include pacing and resources for instruction by LCPS for School Year 2008-09

Special Thanks to:

Elementary Teachers Serving on the Curriculum Committees

2008-2009 Grade 3 Science
Pacing Guide *At a Glance*

Quarter	Month	Topic	Related SOL	Suggested number of *Lessons	Target Date for Completion
1st	September October	Scientific Investigation†	3.1†	7 & ongoing	October 31, 2008
		Matter	3.3, 3.1	7-10	
		Water Cycle‡	3.9‡, 3.1	3-5	
		Natural Cycles (Sun/Moon/ Earth)	3.8, 3.1	5-7	
2nd	November December January	Metric Measurement	3.1	5-7 (and ongoing)	January 22, 2009
		Energy Resources	3.11, 3.1	5-7	
		Simple and Compound Machines	3.2, 3.1	10-13	
		Environments‡	3.6‡, 3.1	7-10	
3rd	February March April	Animal Adaptations	3.4, 3.1	5-7	April 3, 2009
		Food Chains	3.5, 3.1	5-7	
		Natural Cycles (Animals)	3.8, 3.1	5-7	
4th	April May June	Soil‡	3.7‡, 3.1	5-7	June 19, 2009
		Natural Cycles (Plants)	3.8, 3.1	3-5	
		Survival of Organisms‡	3.10‡, 3.1	5-7	
		Science SOL Review - In addition to 3rd grade Science SOL, other key areas to review are 2.2 Magnets, 1.2 Motion, 2.4 Life Cycles of Butterfly & Frog, 2.6 Weather			2 weeks prior to SOL test

*A lesson is approximately 30 minutes

† Scientific Investigation, Reasoning, and Logic (Science SOL 3.1) is reinforced throughout the year in all science lessons

‡Meaningful Watershed Experience Opportunity

Essential Skills are listed with each SOL in the framework that follows.
All essential skills should be covered with the related SOL.

Introduction to Loudoun County's Science Curriculum

This Curriculum Guide and Framework is a merger of the Virginia Standards of Learning (SOL) and the Science Achievement Standards of Loudoun County Public Schools. Many sections are copies or modifications of Virginia's SOL documents. Suggestions on pacing and resources represent the professional consensus of Loudoun's teachers concerning the implementation of these standards.

Contents

K-12 Safety

In implementing the Science Standards of Learning, students must know how to follow safety guidelines, demonstrate appropriate laboratory safety techniques, and use equipment safely while working individually and in groups.

Safety must be given the highest priority in implementing the K-12 instructional program for science. Correct and safe techniques, as well as wise selection of experiments, resources, materials, and field experiences appropriate to age levels, must be carefully considered with regard to safety precautions for every instructional activity. Safe science classrooms require thorough planning, careful management, and constant monitoring of student activities. Class enrollment should not exceed the designed capacity of the room.

Teachers must be knowledgeable of the properties, use and proper disposal of all chemicals that may be judges as hazardous prior to their use in an instructional activity. Such information is referenced through the MSDS forms (Materials Safety Data Sheets). The identified precautions involving the use of goggles, gloves, aprons, and fume hoods must be followed as prescribed.

While no comprehensive list exists to cover all situations, the following should be reviewed to avoid potential safety problems. Appropriate safety procedures should be used in the following situations:

- Observing wildlife; handling living and preserved organisms; and contact with natural hazards such as poison ivy, ticks, mushrooms, insects, spiders, and snakes
- Field activities in, near, or over bodies of water
- Handling of glass tubing, sharp objects, glassware, and labware
- Natural gas burners, Bunsen burners, and other sources of flame/heat
- Hazards associated with direct sunlight (sunburn and eye damage)
- Use of extreme temperatures and cryogenic materials
- Hazardous chemicals including toxins, carcinogens, flammable and explosive materials
- Acid/base neutralization reactions/dilutions
- Production of toxic gases or situations where high pressures are generated
- Biological cultures, their appropriate disposal, and recombinant DNA
- Power equipment/motors
- High voltage/exposed wiring
- Laser beam, UV, and other radiation

The use of human body fluids or tissues is generally prohibited for classroom lab activities. Further guidance from the following sources may be taken into account:

- OSHA (Occupational Safety and Health Administration)
- ISEF (International Science and Engineering Fair Rules)
- Public health departments and local school division protocols.

For more detailed information about safety in science, consult the *LCPS Science Safety Manual*. http://www.intranet.lcps

The Role of Instructional Technology in Science Education

The use of current and emerging technologies is essential to the K-12 science instructional program.

Specifically, technology must

- Assist in improving every student's functional literacy. This includes improved communication through reading/information retrieval (the use of telecommunications), writing (word processing), organization and analysis of data (databases, spreadsheets, and graphics programs), selling one's idea (presentation software), and resource management (project management software).

- Be readily available and used regularly as an integral and ongoing part in the delivery and assessment of instruction.

- Include instrumentation oriented toward the instruction and learning of science concepts, skills, and processes. Technology, however, should not be limited to traditional instruments of science such as microscopes, labware, and data-collecting apparatus but should also include computers, robotics, interactive-optical laser discs, video-microscopes, graphing calculators, CD-ROMs, global positioning systems (GPS), probeware, on-line telecommunication, software and appropriate hardware, as well as other emerging technologies.

- Be reflected in the "instructional strategies" generally developed at the local school division level.

In most cases, the application of technology in science should remain "transparent" unless it is the actual focus of the instruction. One must expect students to "do as a scientist does" and not simply hear about science if they are truly expected to explore, explain, and apply scientific concepts, skills, and processes.

As computer/technology skills are essential components of every student's education, it is important that these skills are a shared responsibility of teachers of all disciplines and grade levels.

Internet Safety

The Internet allows students to learn from a wide variety of resources and communicate with people all over the world. Students should develop skills to recognize valid information, misinformation, biases, or propaganda. Students should know how to protect their personal information when interacting with others and about the possible consequences of online activities such as social networking, e-mail, and instant messaging.

- Students need to know that not all Internet information is valid or appropriate.
- Students should be taught specifically how to maximize the Internet's potential while protecting themselves from potential abuse.
- Internet messages and the people who send them are not always what or who they seem.
- Predators and cyberbullies anonymously use the Internet to manipulate students. Students must learn how to avoid dangerous situations and get adult help.

Cybersafety should be addressed when students research online resources or practice other skills through interactive sites. Science teachers should address underlying principles of cybersafety by reminding students that the senses are limited when communicating via the Internet or other electronic devices and that the use of reasoning and logic can extend to evaluating online situations.

Listed below are ways of integrating the teaching of internet safety with the 3rd Grade Science Virginia Standards of Learning.

Remind students that the senses cannot be used in many online communications.
Five Senses Lesson
http://www.eduref.org/Virtual/Lessons/Health/Body_Systems_and_Senses/BSS0005.html
Use a blindfold to explain the five senses and point out that many senses are absent when using modern communication devices.

Great Communications Inventions *http://www.cybersmartcurriculum.org/lesson_plans/45_21.asp*
This lesson provides students the opportunity to explore modern communications technologies, including the advantages and disadvantages. Internet safety is a natural component to explore.

Remind students that personal observations and opinions may be communicated on the Internet as if they are fact.
Bias Sampling (Scientific) *http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=9&DocID=254*
This lesson focuses on techniques that can bias a seemingly scientific poll or data collection. These same techniques can be used on the Web. Students need to be aware that some Web sites may provide misleading information.

Students using graphs and spreadsheets to explore information could examine Internet cybersafety data.

Additional information about Internet safety may be found on the Virginia Department of Education's Website at
http://www.doe.virginia.gov/VDOE/Technology/OET/internet-safety-guidelines.shtml

Meaningful Watershed Educational Experiences

The "Stewardship and Community Engagement" Commitment of the *Chesapeake 2000* agreement clearly focuses on connecting individuals and groups to the Bay through their shared sense of responsibility and action. The goal of this Commitment formally engages schools as integral partners *to undertake initiatives* in helping to meet the Agreement.

Two objectives developed as part of this goal describe more specific outcomes to be achieved by the jurisdictions in promoting stewardship and assisting schools. These are:

> *Beginning with the class of 2005, provide a meaningful Bay or stream outdoor experience for every school student in the watershed before graduation from high school.*
>
> *Provide students and teachers alike with opportunities to directly participate in local restoration and protection projects, and to support stewardship efforts in schools and on school property.*

There is overwhelming consensus that knowledge and commitment build from firsthand experience, especially in the context of one's neighborhood and community. Carefully selected experiences driven by rigorous academic learning standards, engendering discovery and wonder, and nurturing a sense of community will further connect students with the watershed and help reinforce an ethic of responsible citizenship.

Defining *a Meaningful* Bay or Stream Outdoor Experience

A *meaningful* Bay or stream outdoor experience should be defined by the following.

Experiences are investigative or project oriented.

Experiences include activities where questions, problems, and issues are investigated by the collection and analysis of data, both mathematical and qualitative. Electronic technology, such as computers, probeware, and GPS equipment, is a key component of these kinds of activities and should be integrated throughout the instructional process.

The nature of these experiences is based on learning standards and should include the following kinds of activities.

- Investigative or experimental design activities where students or groups of students use equipment, take measurements, and make observations for the purpose of making interpretations and reaching conclusions.
- Project-oriented experiences, such as restoration, monitoring, and protection projects, that are problem solving in nature and involve many investigative skills.

Experiences are richly structured and based on high-quality instructional design.

Experiences are an integral part of the instructional program.

Experiences are part of a sustained activity.

Experiences consider the watershed as a system.

Experiences involve external sharing and communication.

Experiences are enhanced by natural resources personnel.

Experiences are for all students.

Experiences such as tours, gallery visits, simulations, demonstrations, or "nature walks" may be instructionally useful, but alone do not constitute a *meaningful* experience as defined here.

The preceding text contains excerpts from:
Chesapeake Bay Program Education Workgroup
STEWARDSHIP AND MEANINGFULWATERSHED EDUCATIONAL EXPERIENCES
http://www.chesapeakebay.net/pubs/doc-c2k_meaningful_bay_experience.pdf

The link in found in the Virginia Department of Education Instructional Resources for Science:
http://www.doe.virginia.gov/VDOE/Instruction/Science/

Each LCPS K-12 Science Pacing Guide indicates where the Meaningful Watershed Educational Experiences fit into the Virginia Standards of Learning. Resources for these experiences are cited in the *Resources* section of each standard.

Many of the resources are from *Lessons from the Bay* and *Virginia's Water Resources a Toolkit for Teachers*. These and other watershed resources are posted on the LCPS intranet at:
http://www.intranet.lcps

Investigate and Understand

Many of the standards in the Science Standards of Learning begin with the phrase "Students will investigate and understand." This phrase was chosen to communicate the range of rigorous science skills and knowledge levels imbedded in each standard. Limiting a standard to one observable behavior such as "describe" or "explain" would have narrowed the interpretation of what was intended to be a rich, highly rigorous, and inclusive content standard.

"Investigate" refers to scientific methodology and implies systematic use of the following inquiry skills:

- Observing
- Classifying and sequencing
- Communicating
- Measuring
- Predicting
- Hypothesizing
- Inferring
- Defining, controlling, and manipulating variables in experimentation
- Designing, constructing, and interpreting models
- Interpreting, analyzing, and evaluating data

"Understand" refers to various levels of knowledge application. In the Science Standards of Learning these knowledge levels include the ability to

- Recall or recognize important information, key definitions, terminology, and facts
- Explain the information in one's own words, comprehend how the information is related to other key facts, and suggest additional interpretations of its meaning or importance
- Apply the facts and principles to new problems or situations, recognizing what information is required for a particular situation, explaining new phenomena with the information, and determining when there are exceptions
- Analyze the underlying details of important facts and principles, recognizing the key relations and patterns that are not always readily visible
- Arrange and combine important information, facts, and principles to produce a new idea, plan, procedure, or product
- Make judgments about information in terms of accuracy, precision, consistency, or effectiveness.

Therefore, the use of "investigate and understand" allows each content standard to become the basis for a broad range of teaching objectives, which the local school division will develop and refine to meet the intent of the Science Standards of Learning.

Science
Standards of Learning

Goals
The purpose of scientific investigation and discovery are to satisfy humankind's quest for knowledge and understanding and to preserve and enhance the quality of the human experience. Therefore, as a result of science instruction, students will be able to:

1. Develop and use an experimental design in scientific inquiry

2. Use the language of science to communicate understanding

3. Investigate phenomena using technology

4. Apply scientific concepts, skills, and processes to everyday experiences

5. Experience the richness and excitement of scientific discovery of the natural world through the historical and collaborative quest for knowledge and understanding.

6. Make informed decisions regarding contemporary issues taking into account the following:
   - public policy and legislation
   - economic costs/benefits
   - validation from scientific data and the use of scientific reasoning and logic
   - respect for living things
   - personal responsibility
   - history of scientific discovery

7. Develop scientific dispositions and habits of mind including:
   - curiosity
   - demand for verification
   - respect for logic and rational thinking
   - consideration of premises and consequences
   - respect for historical contributions
   - attention to accuracy and precision
   - patience and persistence

8. Explore science-related careers and interest.

The Science Standards of Learning are listed successively in the pages that follow. See the pacing guide for teaching sequence.

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student should be able to do when conducting activities and investigations. Note that 25% of items on the 3rd grade SOL assessment measure these skills.

Standard 3.1

The student will plan and conduct investigations in which

a) predictions and observations are made;
b) objects with similar characteristics are classified into at least two sets and two subsets;
c) questions are developed to formulate hypotheses;
d) volume is measured to the nearest milliliter and liter;
e) length is measured to the nearest centimeter;
f) mass is measured to the nearest gram;
g) data are gathered, charted, and graphed (line plot, picture graph, and bar graph);
h) temperature is measured to the nearest degree Celsius;
i) time is measured to the nearest minute;
j) inferences are made and conclusions are drawn; and
k) natural events are sequenced chronologically.

Understanding the Standard

The skills defined in standard 3.1 are intended to define the "investigate" component of all of the other third grade standards (3.2 – 3.11). The intent of standard 3.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed at the third grade. Standard 3.1 does not require a discrete unit on scientific investigation because the inquiry skills that make up the standard should be incorporated in all the other third grade standards. For example, it is not expected that teachers should develop a separate unit on the metric system, but that they should integrate metric measurement through the teaching of the rest of the third grade standards. It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science, as well as more fully grasp the content-related concepts.

Standard 3.1

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Questions frequently arise from observations. Hypotheses can be developed from those questions. Data gathered from an investigation may support a hypothesis. • Complete observations are made using all of the senses. Simple instruments can help extend the senses. • Predictions are statements of what is expected to happen in the future based on past experiences and observations. • In order for data from an investigation to be most useful, it must be organized so that it can be examined more easily. • Charts and graphs are powerful tools for reporting and organizing data. • It is sometimes useful to organize objects according to similarities and differences. By organizing objects in sets and subsets, it may be easier to determine a specific type of characteristic.	In order to meet this standard, it is expected that students should be able to: • develop hypotheses from simple questions. These questions should be related to the concepts in the third grade standards. **Hypotheses should be stated in terms such as "if an object is cut into smaller pieces, then the physical properties of the object and its smaller pieces will remain the same."** • make and communicate predictions about the outcomes of investigations. • make and communicate careful observations. • communicate results of investigations by displaying data in the form of tables, charts, and graphs. Students will construct bar and picture graphs and line plots to display data. (Example: 3.7 - Students should compare types of soil and their effect on plant growth.) • classify objects into at least two major sets and subsets based on similar characteristics such as predator/prey and herbivore, carnivore, and omnivore.

Standard 3.1 (continued)

Overview	Essential Knowledge, Skills, and Processes
• An inference is a conclusion based on evidence. • Putting natural events in a sequence allows us to notice change over time. • Metric measures, including centimeters, grams, milliliters, and degrees Celsius, are a standard way to record measurements. The metric system is recognized everywhere around the world. • A bar graph can be horizontal or vertical and it compares amounts. Both the X and Y-axis need to be identified. Discrete data is found on a bar graph. • A line graph can be used to show the passing of time or other types of continuous data. Individual pieces of data are plotted and then connected with lines. • A picture graph is similar to bar graphs except it uses symbols to represent quantities.	• sequence natural events chronologically. Example: 3.9 - plant and animal life cycles, phases of the moon, the water cycle, and tidal change. • measure length to the nearest centimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, and time to the nearest minute using the appropriate instrument.

Standard 3.1

Resources	Teacher Notes
Text: "How Scientists Work", Harcourt Science; x – xxiv References, Harcourt Science; R1-R6 Measuring Mass and Volume, Harcourt Science; E20–E29 How Temperature is Measured, Harcourt Science; F20-F23 AIMS: "Metric Scavenger Hunt", Math + Science A Solution AIMS: "Mini Metric Olympics", Math + Science A Solution AIMS: "Eggs –Full of Sound", Primarily Physics Bernstein, Bob. (1988). *Math Thinking Motivators (Good Apple Math Activity Book for Grades 2-7)*. ISBN: 0866534318 Activity: Liquid Measure Dry Leedym Loreen. (2000). *Measuring Penny*. ISBN: 0805065725. Kramer, Stephen and Bond, Felicia. (1987). *How to Think Like a Scientist*. ISBN: 0-690-04565-4. Simon, Seymour. (1998). *Einstein Anderson Science Detective Series*. ISBN: 0-688-1447-0, 0-688-14433-0, 0-688-14443-8, 0-688-14445-1. ***Measuring Length*** ***Measuring Mass*** ***Measuring Volume*** ***Measuring Temperature*** ***Measuring Time and Temperature*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml**	

Hypothesize This! ***Did You Observe That?*** ***Based on What I Know, I Predict*** ***Classifying with Class*** ***Using Tables, Charts, and Graphs*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Force and Motion
This strand focuses on students understanding of what force, motion, and energy are and how the concepts are connected.

Standard 3.2

The student will investigate and understand simple machines and their uses. Key concepts include

a) types of simple machines (lever, screw, pulley, wheel and axle, inclined plane, and wedge);
b) how simple machines function;
c) compound machines (scissors, wheelbarrow, and bicycle); and
d) examples of simple and compound machines found in the school, home, and work environment.

Understanding the Standard

This standard introduces students to six types of simple machines, their uses, and examples of these six machines found in everyday environments. These simple machines function to make doing work easier. Activities should focus on identifying the six simple machines, explaining how they operate, and locating examples in everyday life that make a task easier at home, school, and in the workplace. The students should have experiences using the simple and compound machines to determine how each makes a task easier. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.2

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Simple machines are tools that make work easier. Examples of tasks made easier include lifting a heavy weight, moving a heavy object over a distance, pushing things apart, changing the direction of a force, or holding an object together. • The six simple machines are the lever, inclined plane, wedge, wheel and axle, screw, and pulley. • The **lever** is a stiff bar that moves about a fixed point (fulcrum). It is a simple machine that is used to push, pull, or lift things. Examples include a seesaw, a crowbar, and a shovel. • The **inclined plane** is a flat surface that is raised so one end is higher than the other. The inclined plane helps move heavy objects up or down. An example is a ramp. • The **wedge** is wide at one end and pointed at the other to help cut or split other objects. Examples include a knife or ax.	In order to meet this standard, it is expected that students should be able to: • identify and differentiate the six types of simple machines (lever, screw, pulley, wheel and axle, inclined plane, and wedge). • analyze the application and explain the function of each of the six types of simple machines. An example would be that an inclined plane is a ramp to make it easier for a heavy object to be moved up or down. • differentiate and classify specific examples of simple machines found in school and household items. These include a screwdriver, nutcracker, screw, flagpole pulley, ramp, and seesaw. • design and construct an apparatus that contains a simple machine. • identify the simple machines that compose a compound machine.

Standard 3.2 (continued)

Overview	Essential Knowledge, Skills, and Processes
• The **wheel and axle** consists of a rod attached to a wheel. A wheel and axle makes it easier to move or turn things. Examples include bicycle wheels, roller skates, and a doorknob. • The **screw** is an inclined plane wrapped around a cylinder or cone. A common use of the screw is to hold objects together. Examples include a jar lid and a wood screw. • The **pulley** is a wheel that has a rope wrapped around it. Pulleys can be used to lift heavy objects by changing the direction or amount of the force. Examples include a flagpole. • A compound machine is a combination of two or more simple machines. Examples include scissors, wheelbarrow, and bicycle.	• identify and classify the simple machines which compose a compound machine, such as scissors, wheelbarrows, and bicycles.

Standard 3.2

Resources	Teacher Notes
Text: Harcourt Science; Unit F, Ch. 3, Lesson 1, 2, 3 AIMS: "Wedge Ease", Machine Shop AIMS: "Take It Easy", Popping with Power AIMS: "Fulcrums on the Move", Popping with Power AIMS: "Level the Lever", Popping with Power Lampton, Christopher and Nicklaus, Carol (I). (1991). *Bathtubs, Slides, Roller Coasters: Simple Machines That Are Really Inclined Planes*. ISBN: 1-878841-23-8. Kerr, Bob. (1999). *Mechanical Harry*. ISBN: 083682248X Mole, Karen Bryant. *Forces*. ISBN: 1575721082. Web based interactive lessons with teacher plans. Simple Machines and The Odd Ball Machine **http://www.edheads.org/** Videos: Physical Science for Children: All About Simple Machines Sunburst Real World Science: Simple Machines Bill Nye: Simple Machines Lego Dacta Kits for loan from the Smithsonian Naturalist Center in Leesburg. 703.779.9714 Laser Disks Windows on Science, Physical Science, Volumes 1, 2, and 3 (Not available in all schools.)	

Simple an d Compound Machines Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Matter
This strand focuses on the description, physical properties, and basic structure of matter**.**

Standard 3.3

The student will investigate and understand that objects are made of materials that can be described by their physical properties. Key concepts include

a) objects are made of one or more materials;
b) materials are composed of parts that are too small to be seen without magnification; and
c) physical properties remain the same as the material is reduced in size.

Understanding the Standard

Students should understand that all objects are made of materials that have observable physical properties. Every object that takes up space is made of matter. Materials can be different colors, shapes, textures, or sizes. They can be hard or soft. The properties of objects can be used to sort or classify them. If materials are broken down into smaller parts, each of these smaller parts still has the same physical properties as the original material. (Clear examples include plastics, metal, paper, and ice. Substances that are coarse mixtures, i. e., many types of rock, will not be good examples.) This standard introduces the concept that materials are made up of smaller parts that are too small to be seen without magnification. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.3

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Objects are made of one or more materials. • All materials are composed of parts too small to be seen without magnification. • Physical properties remain the same even if a material (e.g., plastic, paper, metal, ice) is reduced in size.	In order to meet this standard, it is expected that students should be able to: • infer that objects are made of one or more materials based on observations of the physical properties that are common to each individual object. • compare the physical properties of smaller pieces of a material to those physical properties of the material. • conclude that materials have their own set of physical properties that are observable. • explain that physical properties are observable characteristics that make objects different from each other. • design an investigation to determine if the physical properties of a material will remain the same if the material is reduced in size.

Standard 3.3

Resources	Teacher Notes
Text: Harcourt Science; Unit E, Chapter 1, Lessons 1 and 2 Unit E, Chapter 2, Lessons 1 and 2 Use of web based text resources at: http://harcourtschool.com States of Matter Activity (pass code from textbook required) Martin, Jacqueline and Azarian, Mary (I). (1998). *Snowflake Bentley*. Caldecott Winner. ISBN: 0395861624. Laser disk Windows On Science, Primary Science, Volume 3 (Not available in all schools.) Video Bill Nye: Matter ***Matter Matters*** ***Investigating Matter: Size*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Life Processes
This strand focuses on the life processes of plants and animals and the specific needs of each.

Standard 3.4

The student will investigate and understand that behavioral and physical adaptations allow animals to respond to life needs. Key concepts include

a) methods of gathering and storing food, finding shelter, defending themselves, and rearing young; and
b) hibernation, migration, camouflage, mimicry, instinct, and learned behavior.

Understanding the Standard

Students will compare and contrast the physical and behavioral characteristics of different animals that allow the animals to adapt and respond to life needs. The students will need to describe specific examples of how animals gather food, find shelter, defend themselves, and rear young. The concepts of hibernation, migration, camouflage, mimicry, instinct, and learned behavior are specific ways in which animals respond to their environment. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.4

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Physical adaptations help animals survive in their environment. Examples include camouflage and mimicry. • Behavioral adaptations allow animals to respond to life needs. Examples include hibernation, migration, instinct, and learned behavior. • In order to survive, animals act in different ways to gather and store food, find shelter, defend themselves and rear their young. • Some animals go into a deep winter sleep in which their body activities slow down and they can live off stored food (hibernation). • Some animals go on a long distance journey from one place to another as seasons change (migration). • Various animals blend into their environments to protect themselves from enemies.	In order to meet this standard, it is expected that students should be able to: • describe and explain the terms hibernation, migration, camouflage, mimicry, instinct, and learned behavior. • give examples of methods that animals use to gather and store food, find shelter, defend themselves, and rear young. • compare the physical characteristics of animals, and explain how the animals are adapted to a certain environment. • explain how an animal's behavioral adaptations help it live in its specific habitat. • design and construct a model of a habitat for an animal with a specific adaptation. • distinguish between physical and behavioral adaptations of animals.

Standard 3.4 (continued)

Overview	Essential Knowledge, Skills, and Processes
• Some animals look like other animals to avoid being eaten. This adaptation helps protect them from their predators. (For example, the viceroy butterfly tastes good to birds, but the monarch butterfly tastes bad. Because the viceroy looks like the monarch butterfly, it is safer from predators.) • Some animals are born with natural behaviors they need to survive in their environments. These behaviors are not learned but instinctive, such as a beaver building a dam or a spider spinning a web. • Some behaviors need to be taught in order for the animal to survive, such as a bear cub learning to hunt.	• create (model) a camouflage pattern for an animal living in a specific dry land or water-related environment. (Relates to 3.6.) • compare and contrast instinct and learned behavior.

Standard 3.4

Resources	Teacher Notes
Text: Harcourt Science; Unit A, Chapter 2, Lessons 1, 2, 4, 5 Unit B, Chapter 2, Lesson 1 AIMS: "Hide and Seek", Critters Also in Vol 18, No. 1 (1989, page 120) AIMS: Now You See Them, Now You Don't", Critters Cannon, Janell. (1997). *Verdi*. ISBN: 0329026801. Collard, Sneed B. and Jenkins, Steve. (1997). *Animal Dads*. ISBN: 0-590-03502-9. Fowler, Allan. (1998). *Hard-to-See Animals*. ISBN: 051620548x. Hirschi, Ron and Manglesen, Thomas. (1990). *Winter*. ISBN: 0881061344. Hunter, Anne. (1997). *Possum's Harvest Moon*. ISBN: 059012703. Otto, Carolyn and Lloyd, Megan. (1996). *What Color Is Camouflage? (Let's-Read-and-Find-Out Science 1)*. ISBN: 0064451607 Sayre, April Pulley and Bash, Barbara. (2001). *Dig, Wait Listen: A Desert Toad's Tale*. ISBN: 0-688-16614-8. Yolen, Jane and Schoenherr, John. (1987). *Owl Moon*. Caldecott Winner. ISBN: 0399214577.	

http://www.enchantedlearning.com Project Learning Tree: Can It Be Real? pp. 30-34 ***Animal Adaptations: Needs*** ***Animal Adaptations: Physical Characteristics*** ***Animal Adaptations: Defenses*** ***Animal Adaptations: Mimicry*** ***Animal Adaptations: Camouflage*** ***Animal Adaptations: Migration and Hibernation*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***Grasses, Grasses Everywhere*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Living Systems
This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell.

Standard 3.5

The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include

a) producer, consumer, decomposer;
b) herbivore, carnivore, omnivore; and
c) predator - prey.

Understanding the Standard

This standard focuses on student understanding of the food chain in water and land environments. It focuses on the types of relationships among living things and their dependence on each other for survival. The strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, 1.4, 1.5, 2.4, 3.4, 4.4, and 6.7. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.5

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • A food chain shows a food relationship among plants and animals in a specific area or environment. • Terrestrial organisms are found on land habitats such as deserts, grasslands, and forests. Aquatic organisms are found in water habitats such as ponds, marshes, swamps, rivers, and oceans. • A green plant makes it own food from sunlight, air, and water. Green plants are **producers**. • A consumer is an animal that eats living organisms (plant or animal). • Certain organisms break down decayed plants and animals into smaller pieces that can be used again by living things. These organisms are **decomposers**. • A food chain, which shows part of a food web, can have an animal that eats only plants (herbivore). It can have an animal that eats only other animals (carnivore). It can also have an animal that eats both plants and animals (omnivore). • An animal can hunt other animals to get its food (predator). • An animal can be hunted by another animal for food (prey).	In order to meet this standard, it is expected that students should be able to: • distinguish among producers, consumers, herbivores, omnivores, carnivores, and decomposers. • create and interpret a model of food chain showing producers and consumers. • explain how a change in one part of a food chain might affect the rest of the food chain. • identify sequences of feeding relationships in a food chain. • differentiate between predators and prey. • infer that most food chains begin with a green plant.

Standard 3.5

Resources	Teacher Notes
Text: Harcourt Science; Unit B, Chapter 2, Lessons 2, 3 AIMS: "Food Chains", Critters AIMS: "Earthworms", Critters AIMS: "Catch Me If You Can", Critters Pallotta, Jerry and Biedrzycki, David (I). (2000). *Dory Story*. ISBN: 0881060755. Silverstein, Alvin. (1998). *Food Chains*. ISBN: 076133002X http://www.bbc.co.uk/schools/revisewise/ See food chain activity, lesson and quiz Video – The Magic School Bus Gets Eaten ***Food Chains – Producers, Consumers, and Decomposers*** ***What's for Dinner*** ***Are You a Predator or Prey?*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***Bay and Pond Food Webs*** ***Stream Creatures: Clues to Stream Health*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html**	

Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Living Systems
This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell.

Standard 3.6

The student will investigate and understand that environments support a diversity of plants and animals that share limited resources. Key concepts include

a) water-related environments (pond, marshland, swamp, stream, river, and ocean environments);
b) dry-land environments (desert, grassland, rain forest, and forest environments); and
c) population and community.

Meaningful Watershed Experience Opportunity

Understanding the Standard

Students should become familiar with several specific examples of aquatic and terrestrial environments and the plants and animals unique to them. The environments to be discussed are the pond, marshland, swamp, stream, river, and ocean for water-related environments and desert, grassland, rain forest, and forest for dry-land environments. Water-related and dry-land environments contain many types of plants and animals that often compete for the same natural resources. These resources are often shared. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.6

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Water-related environments include those with fresh water and salt water. Examples include ponds, marshes, swamps, streams, rivers, and oceans. • Dry-land related environments include deserts, grasslands, rain forests, and forests. • There are distinct differences among pond, marshland, swamp, stream, river, ocean, desert, grassland, rainforest, and forest environments. • A **population** is a group of organisms of the same kind that live in the same place. Examples of a population are a group of swans in a pond, a school of fish in a river, and a herd of cattle in the grassland. • A **community** is all of the populations that live together in the same place. An example of a dry land community would be a forest made up of trees, squirrels, worms, rabbits, and hawks. An example of a water-related community would be an ocean made up of fish, crabs, and seaweed. • Organisms compete for the limited resources in their specific environments.	In order to meet this standard, it is expected that students should be able to: • describe major water-related environments and examples of animals and plants that live in each. • describe major dry-land environments and examples of animals and plants that live in each. • compare and contrast water-related and dry-land environments. • distinguish between a population and a community. • explain how animals and plants use resources in their environment. • analyze models or diagrams of different water-related environments in order to describe the community of organisms each contains and interpret how the organisms use the resources in that environment. • analyze models or diagrams of different dry-land environments in order to describe the community of organisms each contains and interpret how the organisms use the resources in that environment. • predict what would occur if a population in a specific environment were to die.

Standard 3.6

Resources	Teacher Notes
Text: Harcourt Science; Unit B, Chapter 1, Lessons 1, 2, 3, 4, 5 AIMS: "Who's Home in the Biome", Critters AIMS: "Census Takers", Critters Behrens, June. (1989). *Dolphins*. ISBN: 0516005170. Cole, Joanna and Degen Brue. (1996). *Magic School Bus All Dried Up – A Book About Deserts*. (Magic School Bus series). ISBN: 0590508318. Leatherwood, Stephen and Randal Reeves. (1987). *The Sea World Book of Dolphins*. ISBN: 0512719571. Laurence, Pringle. (2001). *Dragon in the Sky: The Story of a Green Darner Dragonfly*. ISBN: 0531333159 Pallotta, Jerry and Biedrzycki, David (I). (2000). *Dory Story*. ISBN: 0881060755. Rogers, Sally and Mathis, Melissa Bay. (1998). *Earthsong*. ISBN: 0525456735. Silver, Donald M. and Wynne, Patricia J.. (1997). *One Small Square: Swamp*. ISBN: 0070579261 PB. Videos The Magic School Bus Gets Eaten Magic School Bus in the City	

Magic School Bus Cold Feet Magic School Bus Mussel Beach Bill Nye Birds Bill Nye Amphibians Bill Nye Animal Locomotion Bill Nye Reptiles Bill Nye Invertebrates Bill Nye Marine Animals Laser Discs Windows On Science, Primary Science, Volume 3 Windows On Science, Life Science, Volume 2 (Not available in all schools.) ***Animal Adaptations: Needs*** ***Animal Adaptations: Physical Characteristics*** ***Animal Adaptations: Defenses*** ***Animal Adaptations: Mimicry*** ***Animal Adaptations: Camouflage*** ***Animal Adaptations: Migration and Hibernation*** ***Check It Out!*** ***Wet and Dry*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***A River Runs Through It*** ***Captain John Smith's Chesapeake Bay*** ***Succession & Forest Habitats*** ***Bay and Pond Food Webs*** ***Native vs. Non-native Species: Who Will Win?***	

Wasting Water ***Wetlands: Here All Year?*** ***Stream Creatures: Clues to Stream Health*** ***Muddying the Waters*** ***Grasses, Grasses Everywhere*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Interrelationships in Earth/Space Systems
This strand focuses on student understanding of how Earth systems are connected, and how the Earth interacts with other members of the solar system.

Standard 3.7

The student will investigate and understand the major components of soil, its origin, and importance to plants and animals including humans. Key concepts include

a) soil provides the support and nutrients necessary for plant growth;
b) topsoil is a natural product of subsoil and bedrock;
c) rock, clay, silt, sand, and humus are components of soils; and
d) soil is a natural resource and should be conserved.

Understanding the Standard

Students should know that most plants grow in soil, and that people and many other animals are dependent on plants for food. The nutrients in soil are materials that plants and animals need to live and grow. Soil takes a long time to form; therefore, it should be conserved. Soil is made up of humus, silt, rock, and sand. Humus is decayed (once living) matter in soil. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.7

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Soil is important because many plants grow in soil and it provides support and nutrients for the plants. • Over many years, weather, water, and living things help break down rocks and create soil (weathering). • Nutrients are materials that plants and animals need to live and grow. • Rock, clay, silt, sand, and humus are components of soil. • Topsoil is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth. • Subsoil and bedrock are layers of soil under the topsoil and are formed over a long period of time by the action of water. • Subsoil and bedrock are not as good for growing plants as topsoil. • Humus is decayed matter in soil. It adds nutrients to the soil. It is located in the topsoil. • Clay contains tiny particles of soil that hold water well and provides nutrients.	In order to meet this standard, it is expected that students should be able to: • observe and recognize that soil, as a natural resource, provides the support and nutrients necessary for plant growth. • explain how soil forms over time. • analyze and describe the different components of soil including rock fragments, clay, silt, sand, and humus. • comprehend the key terminology related to soil including humus, nutrients, topsoil, and bedrock. • interpret and illustrate a basic diagram showing major soil layers including bedrock, subsoil, and topsoil. • design an investigation to compare how different types of soil affect plant growth. This includes organizing data in tables and constructing simple graphs. • collect, chart, and analyze data on soil conservation on the school grounds. • evaluate the importance of soil to people. • describe how soil can be conserved.

Standard 3.7 (continued)

Overview	Essential Knowledge, Skills, and Processes
• Sand is made up of small grains of worn-down rock, has few nutrients, and does not hold water well. • Silt is made up of very small broken pieces of rock. Its particles are larger than clay and smaller than sand. • Since soil takes a long time to form, it should be conserved (not wasted).	

Standard 3.7

Resources	Teacher Notes
Text: Harcourt Science; Unit C, Chapter 1, Lessons 1, 2; Chapter 3, Lessons 1, 2, 3 AIMS: "What Do Plants Need to Grow", Primarily Plants AIMS: "Soil Study", Primarily Earth AIMS: "Sandpile", Primarily Earth AIMS: "The Earth Has What We Need", Primarily Earth AIMS: "We Use Rocks and Minerals", Primarily Earth Beech, Linda and Carolyn Bracken. (1995). *Magic School Bus Meets the Rot Squad: A Book About Decomposition*. ISBN: 0590400231. Cole, Joanna. (1987). *The Magic School Bus Inside the Earth*. ISBN: 0590407597. Cronin, Doreen. (2003). *Diary of a Worm*. 006000150X Tomecek, Steve. (2002). *Dirt*. 0792282043 Laser Discs Windows On Science, Primary Science, Volume 1 Windows On Science, Earth Science, Volume 2 Windows On Science, Life Science, Volume 1 (Not available in all schools.) Sedimentators (study of Sedimentary rocks) on loan from the Smithsonian Naturalist Center in Leesburg. 703.779.9714 Use QX3 Computer Microscopes to examine soil.	

http://www.brainpop.com/ Erosion (requires subscription) ***Digging In*** ***From Rock to Soil*** ***Drain This!*** ***S.O.S. Save Our Soil*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***Does It Soak Right In?*** ***Types of Pollution*** ***Muddying the Waters*** ***Grasses, Grasses Everywhere*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Earth Patterns, Cycles, and Change
This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur, both quickly and over time

Standard 3.8

The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include

a) patterns of natural events (day and night, seasonal changes, phases of the moon, and tides); and
b) animal and plant life cycles.

Understanding the Standard

This standard focuses on students understanding that many events on Earth happen in cycles or patterns. Examples of these patterns are day turning into night and night into day. Seasons cycle from fall to winter to spring to summer and back to fall. Light reflecting from the sun causes the moon to appear illuminated. The phases of the moon appear in sequence as the moon makes one revolution around the Earth. Seasons are caused by the tilt of the Earth as it revolves around the sun. The main cause of the tides (high and low) is the gravitational attraction between the Earth and the moon. Plants and animals also undergo life cycles from birth to death. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.8

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • A cycle is a repeated pattern. A sequence is a series of events that occur in a natural order. • The pattern of day and night is caused by the rotation of the Earth. One complete rotation occurs every 24 hours. The part of the Earth toward the sun has daylight while the part of the Earth away from the sun has night. • The pattern of seasonal changes takes place because the Earth's axis is tilted toward or away from the sun during its revolution around the sun. The Earth takes 365 days, or one year, to make one revolution. • The cycle of phases of the moon occurs as the moon makes one revolution around the Earth. The shapes we see follow a pattern.	In order to meet this standard, it is expected that students should be able to: • explain how some events in nature occur in a pattern or cycle such as the seasons, day and night, phases of the moon, tides, and life cycles. • recognize that the relationships that exist between and among the Earth, sun, and moon result in day and night, seasonal changes, phases on the moon, and the tides. • model and describe how the Earth's rotation causes day and night. • model and describe how the sun's rays strike the Earth to cause seasons. • observe, chart, and illustrate phases of the moon, and describe the changing pattern of the moon as it revolves around the Earth.

Standard 3.8 (continued)

Overview	Essential Knowledge, Skills, and Processes
• The tides follow a pattern of two high and two low tides every 24 hours. This pattern is caused (for the most part) by the gravitational attraction between the Earth and the moon. • Plants and animals undergo life cycles. For example, frogs begin as eggs in water. The eggs grow into tadpoles, tadpoles eventually become frogs, and adult frogs lay eggs to start the life cycle over again. In the plant life cycle, a seed grows into a new plant that forms seeds. Then the new seeds repeat the life cycle.	• analyze data from simple tide tables to determine a pattern of high and low tides. • explain the pattern of growth and change that organisms, such as the butterfly and frog, undergo during their life cycle.

Standard 3.8

Resources	Teacher Notes
Text: Harcourt Science; Unit A, Chapter 1, Lessons 3, 4, Unit D, Chapter 2, Lesson 3; Chapter 3, Lessons 1, 2; Chapter 1, Lesson 1 AIMS: "Sunny-Side Up", Overhead and Underfoot AIMS: "My Mealworm", Critters AIMS: "Brine Shrimp", Critters AIMS: "It's In the Bag", Primarily Plants AIMS: "A Seed Grows", Primarily Plants Branley, Franklyn. (1986). *What Makes Day and Night*. ISBN: 0064450503 Gibbons, Gail. (1994). *Frogs*. ISBN: 082341346. Gibbons, Gail. (1996). *The Reason for the Seasons*. ISBN: 0823411745. Gibbons, Gail. (1988). *The Seasons of Arnold's Apple Tree*. ISBN: 0152712453. Gibbons, Gail. (1993). *From Seed to Plant*. ISBN: 0823410250 Hewett, Joan. (2001). *A Tiger Cub Grows Up*. ISBN: 0822500892 Worth, Bonnie. (2001). *Oh Say Can You Seed*. ISBN: 0375810951	

http://www.enchantedlearning.com (frog and butterfly life cycle worksheets) **http://home.hiwaay.net/~krcool/Astro/moon/moonphase/** ***Time and Tide*** ***The Phases of the Moon*** ***As the World Turns, Rotates, and Revolves*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***Succession & Forest Habitats*** ***Stream Creatures: Clues to Stream Health*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Earth Patterns, Cycles, and Change
This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur, both quickly and over time

Standard 3.9

The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include

a) the energy from the sun drives the water cycle;
b) processes involved in the water cycle (evaporation, condensation, precipitation);
c) water is essential for living things; and
d) water supply and water conservation.

Meaningful Watershed Experience Opportunity

Understanding the Standard

This standard introduces students to the movement of water on the Earth by evaporation, condensation, and precipitation which is called the water cycle. All the water on Earth is part of the water cycle. Water is stored in ponds, lakes, streams, rivers, ground water, and the oceans. Water is essential to maintain life on Earth and should be conserved as a natural resource. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.9

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The water cycle is the movement of water from the ground to the air and back to the ground by evaporation, condensation, and precipitation. The energy that drives this cycle comes from the sun. • During the water cycle, liquid water is heated and changed to a gas (evaporation). The gas is cooled and changed back to a liquid (condensation). A liquid or a solid falls to the ground as precipitation. • Our water supply is limited on Earth. Pollution reduces the amount of usable water; therefore, our supply should be conserved carefully. • Water is a simple compound essential for life on Earth. Living cells are mostly water. In each cell, the chemicals necessary for life are dissolved in water.	In order to meet this standard, it is expected that students should be able to: • identify the sun as the origin of energy that drives the water cycle. • describe the processes of evaporation, condensation, and precipitation as they relate to the water cycle. • construct and interpret a model of the water cycle. • identify major water sources for a community, including rivers, reservoirs, and wells. Describe the major water sources for the local community. • explain methods of water conservation in the home and school. • analyze possible sources of water pollution in their neighborhoods, at school, and in the local community. This includes runoff from over-fertilized lawns and fields, oil from parking lots, eroding soil, and animal waste. • appraise the importance of water to people and to other living things. • realize living things get water from the environment in different ways.

Standard 3.9

Resources	Teacher Notes
Text: Harcourt Science; Unit D, Chapter 1, Lessons 1, 2, AIMS: "Moving Raindrops in the Water Cycle", Water Precious Water AIMS: "The Mini Water Cycle", Water Precious Water AIMS: "Moving Water", Water Precious Water AIMS: "Pond Today, Meadow Tomorrow", Water Precious Water AIMS: "Were You Aware", Water Precious Water AIMS: "Drip Drop Flip Flop", Water Precious Water AIMS: "A Little Cup Will Do It", Water Precious Water Berger, Melvin. (2001). *Water, Water Everywhere*. ISBN: 0824953126 Frasier, Debra. (2004). *Incredible Water Show*. ISBN: 0152162879 Locker, Thomas. (1997) *Water Dance*. ISBN: 0152163964 Stille, Darlene R. (2005). *Solids, Liquids and Gases*. ISBN: 1592962254 Videos The Magic School Bus Water All Over Bill Nye Water Cycle Laser Discs Windows On Science, Primary Science, Volume 2- Earth's Weather Windows On Science, Earth Science, Volume 2 – Air and Water Windows On Science, Earth Science, Volume 2 – Earth's Weather (Not available in all schools.)	

Project Learning Tree (Activity 44) Water Wonders ***Aquatic Words*** ***Around and Around It Goes*** ***"A-Reservoiring" We Will Go*** ***Every Drop Counts*** ***Pollution Perils*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** ***A River Runs Through It*** ***Wasting Water*** ***Going for Water*** ***Journey of a Raindrop to the Chesapeake Bay*** ***Does It Soak Right In?*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Droplet and the Water Cycle (game) **http://kids.earth.nasa.gov/droplet.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Resources
This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way.

Standard 3.10

The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include

a) the interdependency of plants and animals;
b) human effects on the quality of air, water, and habitat;
c) the effects of fire, flood, disease, and erosion on organisms; and
d) conservation and resource renewal.

Meaningful Watershed Experience Opportunity

Understanding the Standard

This standard reinforces the concept that plants and animals are dependent upon each other for survival. Living things depend on other living thing to survive. Human and natural events can change habitats. Natural disasters such as fire, flood, disease, and erosion can kill organisms and can destroy their habitats. Methods of ensuring the survival of plant and animal species include specific conservation measures. These are resource renewal, habitat management procedures, and species monitoring practices. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.10

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Every living thing depends on every other living thing to survive. This is called interdependency. • Human actions, such as polluting, can affect the survival of plants and animals. • Humans can help protect the survival of species by conservation measures such as resource renewal, habitat management procedures, and species monitoring. • Natural events, such as fires, floods, diseases, and erosion, can also affect the survival of plant and animal species. • Conservation is the careful use and preservation of our natural resources. • Resource renewal is a conservation practice in which species are protected. An example would be protecting endangered plants by saving their seeds, growing the seeds indoors, and later putting the plants in their natural habitats.	In order to meet this standard, it is expected that students should be able to: • explain how living things in an area are dependent on each other. • compare and contrast human influences on the quality of air, water, and habitats. • analyze the effects of fire, flood, disease, erosion, earthquakes, and volcanic eruption on organisms and habitat. • describe how conservation practices can affect the survival of a species. • describe a conservation practice in the local community.

Standard 3.10

Resources	Teacher Notes
Text: Harcourt Science; Unit A, Chapter 2, Lesson 5 Unit C, Chapter 3, Lesson 3; Chapter 4, Lesson 3 AIMS: **"**"Food Chains", Critters AIMS: "People Need Plants", Primarily Plants AIMS: "Seeds Travel", Primarily Plants AIMS: "Bitter Litter", Overhead and Underfoot AIMS: "Pollution Solution", Overhead and Underfoot AIMS: "Mini Water Treatment Simulation", Water Precious Water AIMS: "Agent Erosion", Primarily Earth AIMS: "Quaking Earth", Primarily Earth AIMS: "Volcanoes", Primarily Earth AIMS: "Little Sprouts", Water Precious Water Cherry, Lynne. (2000). *Great Kapok Tree: A Tale of the Amazon Rain Forest*. ISBN: 0590980688. Seuss, Dr. (1971). *The Lorax*. ISBN: 0394823370. ***Riparian Buffers*** ***A River Runs Through It*** ***Who Killed SAV?*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml**	

A River Runs Through It ***Riparian Buffers*** ***Captain John Smith's Chesapeake Bay*** ***Succession & Forest Habitats*** ***Bay and Pond Food Webs*** ***Native vs. Non-native Species: Who Will Win?*** ***Journey of a Raindrop to the Chesapeake Bay*** ***Does It Soak Right In?*** ***Stream Creatures: Clues to Stream Health*** ***Grasses, Grasses Everywhere*** VA Department of Education **Lessons from the Bay**. Correlated to VA Science, Math, Language Arts, and Social Studies SOL. **http://www.pen.k12.va.us/VDOE/watershed/index.html** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

Resources
This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way.

Standard 3.11

The student will investigate and understand different sources of energy. Key concepts include

a) the sun's ability to produce light and heat energy;
b) sources of energy (sunlight, water, wind);
c) fossil fuels (coal, oil, natural gas) and wood; and
d) renewable and nonrenewable energy resources.

Understanding the Standard

This standard focuses on the Earth's major types of energy sources. The sun produces light and heat energy. Natural forms of energy include sunlight, water, and wind. Important fossil fuels are coal, oil, or natural gas. They were formed over millions of years by decaying plants and animals buried in layers of rock. Sources of energy are classified either as renewable or nonrenewable. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.11

Overview	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The sun is the source of almost all energy on Earth. The sun is directly the source of light and heat energy. • Sunlight, water, and wind are sources of energy. The force of flowing water and moving air (wind) can also be used to generate electricity. • Wood comes from trees. It has many important uses including its use as a fuel. • Some energy sources are renewable. That means that they can be replaced. Some energy sources are nonrenewable. That means that once they are used up, they are gone and cannot be replaced. Coal, oil, and natural gas are nonrenewable resources. • Renewable energy sources can be replaced, but nonrenewable energy sources cannot be replaced. • Fossil fuels, such as coal, oil, and natural gas, are formed from decayed plants and animals. The formation of fossil fuels takes millions of years.	In order to meet this standard, it is expected that students should be able to: • explain that the sun is the major source of energy for the Earth. • analyze the advantages and disadvantages of using different naturally occurring energy sources. • identify sources of energy and their uses. • describe how solar energy, wind, and moving water can be used to produce electricity. • describe how fossil fuels are used as an energy source. • design a basic investigation to determine the effects of sunlight on warming various objects and materials, including water. • compare and contrast renewable and nonrenewable energy sources.

Standard 3.11

Resources	Teacher Notes
Text: Harcourt Science; Unit C, Chapter 4 Unit F, Chapter 1, Lessons 1, 3 AIMS: "Heat Energy and Color", Primarily Physics AIMS: "Light Sources", Primarily Physics AIMS: "Sunny-Side Up", Overhead and Underfoot AIMS: "It's In the Wind", Overhead and Underfoot AIMS: "Which Way", Primarily Earth AIMS: "Puff Mobiles", Popping with Power and Vol 5, No7 (1996) AIMS: "Wind Rollers", Popping with Power and Vol 5, No7 (1996) Cole, Joanna. (1987). *The Magic School Bus Inside the Earth*. ISBN: 0590407597. Russell, William. (1994). *Oil, Coal and Gas*. Information on fossil fuels. ISBN: 086593357x. Video Magic School Bus Gets Energized Project Learning Tree (Activity 39 Energy Sleuths) Laser Discs Windows On Science, Primary Science, Volume 2, Volume 3 (Not available in all schools.)	

Is It Hotter? ***Fossil Fuels*** ***Naturally Occurring Sources of Energy*** Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 3. **http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml** Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: **http://www.intranet.lcps** Standards of Learning Literature Correlation searchable database "Connections":http://www.fcps.k12.va.us/cpsapps/connections/	

3rd grade Science - Focal Points

Scientific Investigation – 3.1

- Predictions and observations
- Develop hypothesis
- Measurement - volume, mass, length, temperature and time (approximate and exact; metric & standard)
- Data are gathered, charted and graphed (line plot, picot & bar)
- Inferences
- Conclusions
- Natural events sequenced chronologically

Simple Machines – 3.2

- Types of simple machines – lever, screw, pulley, wheel and axle, inclined plane, and wedge
- How simple machines function
- Compound machines – scissors, wheelbarrow, and bicycle
- Examples of simple and compound machines

Physical Properties of Matter – 3.3

- Objects are made of 1 or more materials
- Materials are made of parts too small to be seen (atoms)
- Physical properties remain the same as materials are reduced in size
- Physical properties are color, shape, texture & size

Animal Adaptations – 3.4

- Behavior adaptations – hibernation, migration
- Instincts versus learned behaviors
- Physical adaptations – camouflage, mimicry
- Meeting basic needs – gather food, rear young, defend self & find shelter

Food Chains – 3.5

- Producer, consumer, decomposer
- Herbivore, carnivore, omnivore
- Predator, prey
- Interactions in the food chain
- Implications if part of chain is missing

Environments, Populations & Communities – 3.6

- Water environments (pond, marsh, swamp, stream, river, ocean)
- Dry land environments (desert, grassland, rain forest, forest)
- Population
- Community

Soil– 3.7

- Formation of soil (topsoil, subsoil & bedrock)
- Components of soil (rock, clay, silt, sand & humus)
- Soil (provides support & nutrients)
- Conservation
- Types of Soil best for plant growth

Patterns & Cycles – 3.8

- Rotation – day and night
- Revolution – seasonal changes (effects of seasons on deciduous and coniferous forests)
- The cycle of moon phases follows a pattern.
- Gravitational force and effect on tides
- Animal & plant life cycles

Water Cycle – 3.9

- Energy from sun drives the water cycle
- Evaporation, condensation, precipitation
- Water is essential to living things
- Water conservation

Events & Influences Affect – 3.10
Species Survival

- Interdependency of plants and animals
- Human effects on quality of air, water, and habitat
- Natural effects- fire, flood, disease, erosion
- Conservation and resource renewal

Energy Sources – 3.11

- Sun produces energy, light & heat
- Energy sources: sun, water, wind
- Fossil fuels (including coal & natural gas) and wood
- Renewable and non-renewable resources
- Conservation

2nd grade Science - Focal Points

(The 3rd Grade Science SOL Test covers 1st, 2nd and 3rd grade standards. The 1st and 2nd grade focal points are listed here for reference.)

Scientific Investigation – 2.1

- Observation
- Prediction
- Experiment
- Measure length, volume, mass and temperature (metric and English units)
- Classify using 2 or more attributes
- Record data (graphs, charts)

Magnets – 2.2

- Poles (north, south)
- Attract/ repel
- Magnetic/ non-magnetic
- Natural/ man-made
- Compass
- Uses in everyday life
- Objects reaction to magnets

Solids, Liquids & Gases – 2.3

- Properties
- Mass/ volume
- Physical changes
- Melt
- Freeze
- Evaporate
- Condense (precipitation)
- Classify materials state

Life Cycles – 2.4

- Frog
- Butterfly
- Stages of life cycle
- Flowering plants
  Formation of flower
  Development of fruit

Habitats – 2.5

- Interdependency
- Habitats changes-seasonal and over time
- Habitat types: desert, ocean, pond, river, tundra, grassland, savannah, forest
- Shelters living or non-living
- Classification objects as living/non-living

Weather – 2.6

- Weather patterns
- Temperature
- Wind
- Precipitation
- Drought
- Flood
- Storms
- Weather data measured and recorded
- Evaporation/condensation of water
- Graphs and weather maps

Effects of Seasonal Change– 2.7

- Animal Effects (growth and behavior)
- Plant Effects (growth and development)
- Migration
- Hibernation
- Camouflage
- Adaptation
- Dormancy
- Seasonal clothing and activities
- Weathering and erosion of land surface

Plants and Plant Products – 2.8

- Plants produce oxygen and food
- Benefits of plants to people and nature
- Plant products
- Importance in preventing erosion
- Plants grow only in specific geographic areas and affects the development of the area

1st grade Science - Focal Points

(The 3rd Grade Science SOL Test covers 1st, 2nd and 3rd grade standards. The 1st and 2nd grade focal points are listed here for reference.)

Scientific Investigation – 1.1

- Make predictions
- Make observations using senses
- Inferences and conclusions
- Conduct simple experiments
- Classify/group objects
- Measurement (standard/nonstandard)
- Measurement (length, mass, volume)
- Graph data

Force, Motion & Energy – 1.2

- Push and pull
- Types of motion
- Vibration and sound
- Observing the motions of different objects

Matter – 1.3

- Some solids dissolve in water, and others do not
- Some liquids separate when mixed with water, and others do not
- Difference of hot and cold water

Plants – 1.4

- Parts: blossom, stem, leaf, seed, fruit
- Functions of root, stem, leaf, seed
- Plant needs: light, soil, water, food
- Characteristics:
  - edible vs. non-edible
  - flowering vs. non flowering
  - evergreen vs. deciduous

Animals – 1.5

- Animal needs:
  - air, food, water, place to live
- Physical characteristics:
  - body coverings, appendages, body shape, methods of movement
- Water homes vs. land homes
- Wild vs. tame

Earth and Sun – 1.6

- Night and day
- Rotation
- Sun is source of heat and light
- Energy

Seasonal Change – 1.7

- Seasons
- Precipitation forms
- Temperature changes
- Light changes
- Animals (behaviors, migration, hibernation, body covering, habitat)
- Plants (growth, budding, falling leaves, wilting)
- People (dress, work, recreation)

Natural Resources – 1.8

- Identify natural resources
- Air and water quality
- Reduce/ reuse/ recycle
- Conservation