



# **Science Standards of Learning** ***Curriculum Framework***

Commonwealth of Virginia  
Department of Education  
Richmond, Virginia

## **Grade Two**

**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 2 Science  
Pacing Guide *At a Glance***

Quarter	Month	Topic	Related SOL	Suggested number of *Lessons	Target Date for Completion
1 <sup>st</sup>	September	Scientific Investigation	2.1†	10	October 31, 2008
	October	Habitats	2.5, 2.8‡, 2.1	10	
2 <sup>nd</sup>	November	Effects of Seasonal Change	2.7, 2.1	8	January 22, 2009
	December January	Solids, Liquids and Gases	2.3, 2.1	10	
3 <sup>rd</sup>	February	Magnets	2.2, 2.1	10	April 3, 2009
	March	Weather	2.6, 2.1	8	
4 <sup>th</sup>	April	Life Cycles Earth Day April 22	2.4, 2.1	10	June 19, 2009
	May	Plants and Plant Products	2.7b, 2.8‡, 2.1	8	

\*A lesson is approximately 30 minutes

†Scientific Investigation, Reasoning, and Logic (Science SOL 2.1) 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.

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## 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 judged 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 2<sup>nd</sup> Grade Science Virginia Standards of Learning.

**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.

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 MEANINGFUL WATERSHED EDUCATIONAL EXPERIENCES**

[http://www.chesapeakebay.net/pubs/doc-c2k\\_meaningful\\_bay\\_experience.pdf](http://www.chesapeakebay.net/pubs/doc-c2k_meaningful_bay_experience.pdf)

The link is 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.

**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 3<sup>rd</sup> grade SOL assessment measure these skills.

**Standard 2.1**

The student will conduct investigations in which

- a) observation is differentiated from personal interpretation, and conclusions are drawn based on observations;
- b) observations are repeated to ensure accuracy;
- c) two or more attributes are used to classify items;
- d) conditions that influence a change are defined;
- e) length, volume, mass, and temperature measurements are made in metric (centimeters, meters, liters, degrees Celsius, grams, kilograms) and standard English units (inches, feet, yards, cups, pints, quarts, gallons, degrees Fahrenheit, ounces, pounds);
- f) pictures and bar graphs are constructed using numbered axes;
- g) unexpected or unusual quantitative data are recognized; and
- h) simple physical models are constructed.

**Understanding the Standard**

The skills defined in standard 2.1 are intended to define the "investigative" component of all of the other second grade standards. Standard 2.1 require students to continue developing a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed at the second grade. Standard 2.1 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 second 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 2.1

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• The more times an observation is repeated, the greater the chance of ensuring the accuracy of the observation.</li><li>• In order to communicate accurately, it is necessary to provide a clear description of exactly what is observed. There is a difference between what one can observe and what can be interpreted from an observation.</li><li>• It is easier to see how things are related if objects are classified according to their common characteristics.</li><li>• By constructing and studying simple models, it is sometimes easier to understand how real things work.</li><li>• Scientific investigations require standard measures, reliable tools, and organized collection and reporting of data. The way the data are displayed can make it easier to interpret important information.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• conduct simple experiments, make predictions, gather data from those experiments, repeat observations to improve accuracy, and draw conclusions.</li><li>• classify items using two or more attributes such as size, shape, color, texture, and weight.</li><li>• differentiate among simple observations and personal interpretations. This requires students to comprehend what an observation is and apply the term in novel situations related to 2nd grade SOL concepts.</li><li>• construct and interpret simple models (for example, weathering and erosion of land surfaces - 2.7).</li><li>• analyze sets of objects, numerical data, or pictures; and create basic categories to organize the data (descriptive or numerical).</li><li>• construct and interpret picture and bar graphs with numbered axes depicting the distribution of data.</li><li>• use centimeters, meters, liters, degrees Celsius, grams, kilograms in measurement.</li><li>• use inches, feet, yards, quarts, gallons, degrees Fahrenheit, ounces, pounds in measurement.</li><li>• judge which, if any, collected data in a small set appear to be unexpected or unusual.</li></ul>

## Standard 2.1

Resources	Teacher Notes
<p>Sorting by attributes <u>AIMS Glide Into Winter; <i>If the Shoe Fits</i></u></p> <p>Using sense of smell, Graphing Data <u>AIMS Glide Into Winter; <i>Do You Have A Snoot for Fruit?</i></u></p> <p>Identifying attributes, Graphing data, Measuring <u>AIMS January 1990 Newsletter ; <i>My Shoes</i></u></p> <p>Identifying Patterns, <u>AIMS Vol 12 Issue 10; <i>Scouting for Patterns</i></u></p> <p><b><i>Observe &amp; Classify</i></b> <b><i>Let's Find the Mass</i></b> <b><i>Are All Containers Created Equal?</i></b> <b><i>Feelin' Hot, Hot, Hot</i></b></p> <p>Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 2. <b><u><a href="http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml">http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml</a></u></b></p> <p>Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: <b><u><a href="http://www.intranet.lcps">http://www.intranet.lcps</a></u></b></p> <p>Standards of Learning Literature Correlation searchable database "Connections" can be found at: <b><u><a href="http://www.fcps.k12.va.us/cpsapps/connections/">http://www.fcps.k12.va.us/cpsapps/connections/</a></u></b></p>	

**Force, Motion, and Energy**

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

**Standard 2.2**

The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals. Key concepts include

- a) magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and
- b) important applications including the magnetic compass.

**Understanding the Standard**

This standard continues the focus on magnets. In K.3 students investigate and learn that magnets can be used to make some things move without being touched by either attracting them or repelling them. In 2.2, magnets are revisited and students investigate and understand that magnets can be artificial or natural and have certain characteristics. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.2

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• Magnets can attract objects made of iron or nickel.</li><li>• Magnets can be artificially made from special metals or can be naturally occurring. Naturally occurring magnets are composed of a mineral called magnetite (lodestone).</li><li>• When a magnetized metal, such as a compass needle, is allowed to swing freely, it displays the interesting property of aligning with the Earth's magnetic fields.</li><li>• Magnets have a north and a south pole.</li><li>• Unlike magnetic poles attract and like poles repel.</li><li>• Magnets have important applications and uses in everyday life.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• predict which materials will be attracted to magnets, test the predictions, and create a chart that shows the results. Classify materials as to whether they are attracted to magnets or not.</li><li>• compare natural magnets (lodestone or magnetite) and artificial magnets.</li><li>• identify the north and south magnetic poles of magnets.</li><li>• conduct an investigation to determine how the different poles of magnets react to the poles of other magnets.</li><li>• use magnetic compasses to determine directions of north and south poles.</li><li>• identify important applications of magnets in everyday life:<ul style="list-style-type: none"><li>• refrigerator magnets and chalkboard letters</li><li>• toys</li><li>• door latches</li><li>• paper clip holder.</li></ul></li><li>• create a new application for using a magnet.</li></ul>

## Standard 2.2

Resources	Teacher Notes
<p><u>Harcourt Science; F2 – F17</u></p> <p><u>AIMS Mostly Magnets</u> Classify objects according to whether they are magnetic or nonmagnetic. Lessons: <i>Stick to It</i>, <i>What will a Magnet Attract?</i></p> <p>Investigate the strength of magnets. Lessons: <i>Fish and Chips</i> <i>Holding Power</i></p> <p>Investigate the magnetic fields of magnets. Lesson: <i>Through It All</i></p> <p>Investigate the distance between the magnet and the object. Lesson: <i>How Close Can you Get?</i></p> <p>Investigate the poles of magnets and how they interact with each other. Lesson: <i>Floating Magnets</i></p> <p>Books: <u>What Magnets Can Do</u> by Allan Fowler</p> <p><u>The Science Book of Magnets</u> by Neil Ardley</p> <p><u>Janice VanCleave’s magnets: Mind-Boggling science experiments that you can turn into Science Fair Projects</u></p> <p><b><i>Which Way is North?</i></b> <b><i>Magnetic Barbershop</i></b> <b><i>Magnetic Fishing</i></b> <b><i>North and South Poles</i></b> Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 2. <b><u><a href="http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml">http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml</a></u></b></p>	<p>Correlations to VA Science SOL (AIMS and Children’s Literature) found on the LCPS intranet at: <b><u><a href="http://www.intranet.lcps">http://www.intranet.lcps</a></u></b></p> <p>Standards of Learning Literature Correlation searchable database “Connections” can be found at: <b><u><a href="http://www.fcps.k12.va.us/cpsapps/connections/">http://www.fcps.k12.va.us/cpsapps/connections/</a></u></b></p>

**Matter**

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

**Standard 2.3**

The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include

- a) mass and volume; and
- b) processes involved with changes in matter from one state to another (condensation, evaporation, melting, and freezing).

**Understanding the Standard**

This standard continues to focus on matter. In 2.3 students build upon the knowledge introduced in K.4 and 1.3. In K.4 physical properties of matter are investigated and the properties of water are observed and tested. In 1.3 students investigate how common materials interact with water. In 2.3 students investigate, by conducting simple experiments, the properties of solids, liquids, and gases. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.3

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• All common substances are made of matter.</li><li>• Matter is anything that has mass and takes up space.</li><li>• Mass is a measure of the amount of matter.</li><li>• Volume is the measure of the amount of space occupied by matter.</li><li>• Matter most commonly occurs in three states: solids, liquids, and gases.</li><li>• Matter can change from one state to another.</li><li>• When matter changes from one state to another, these changes are referred to as physical changes.</li><li>• Changes from solid to liquid to gas require heat energy.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• classify materials as to whether they are liquids, solids, or gases.</li><li>• measure the mass of solids and the volume of liquids in metric and standard English units.</li><li>• design an investigation to determine basic factors that affect the evaporation of water.</li><li>• examine and describe the transformation of matter from one state to another.</li><li>• Solid water (ice) to liquid (water) to gas (steam)</li><li>• conduct an investigation to observe the condensation of water.</li><li>• describe and identify example of condensation, evaporation, melting, freezing of water.</li><li>• identify the uses of water in the home and at school.</li></ul>

### Standard 2.3

Resources	Teacher Notes
<p><u>Harcourt Science</u>; E4 – E55</p> <p>AIMS <u>A World of Matter</u></p> <p>Investigating and classifying solids, liquids and gases. Lesson: <i>Matter, Matter, Everywhere</i></p> <p>Investigating Properties of Matter Lesson: <i>What is in the Bag?</i></p> <p>Finding the mass of objects Lesson: <i>Matter Has Mass</i></p> <p>Investigating properties of liquids Lesson: <i>Liquid Properties of Matter</i></p> <p>Investigating the properties of solids and liquids Lesson: <i>Coin Observations</i></p> <p>Observing the changes in matter Lessons: <i>Solid to Liquid to Gas</i> <i>Popcorn</i> <i>Whatizit?</i> <i>A String of Crystals</i></p> <p><u>AIMS Water Precious Water</u> <b>Demonstrate the process of evaporation and condensation.</b> Lesson: <i>The Mini Water Cycle</i></p>	

Demonstration of water changing forms: water cycle  
Lesson: Moving Water

Construct a visual aid which depicts water cycle.  
Lesson: *Moving Raindrops in the Water Cycle*.

#### Project Learning Tree

Simulate the paths that water takes in the water cycle.  
Lesson: *Water Wonders*

#### **Books:**

Water Dance by Thomas Locker

The Magic School Bus: Wet All Over: A book about the Water Cycle.

The Water Hole by Graeme Base

#### ***Water Cycle***

***Mix It Up: It's Refreshing***

***Disappearing Water***

Investigations from the VA Department of Education Science  
Enhanced Scope and Sequence – Grade 2.

**<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.leps>**

Standards of Learning Literature Correlation searchable database  
"Connections" can be found at:

**<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 2.4**

The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include

- a) some animals (frogs and butterflies) undergo distinct stages during their lives while others generally resemble their parents; and
- b) flowering plants undergo many changes from the formation of the flower to the development of the fruit.

**Understanding the Standard**

In 2.4 students investigate and understand that plants and animals undergo change throughout their lives. This concept builds upon K.6, in which students learn about the basic needs and life processes of animals and 1.4, in which they learn that plants have life needs and functional parts and can be classified according to certain characteristics. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.4

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• Throughout their lives, plants and animals undergo a series of orderly and identifiable changes.</li><li>• Changes in living things over time occur in cycles and differ among the various plants and animals.</li><li>• Some animals, such as frogs and butterflies, go through distinct stages as they mature to adults. Other animals, such as deer, resemble their parents from birth to maturity and do not have distinct stages.</li><li>• An important part of the life cycle of a flowering plant is the formation of the flower to the development of the fruit.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• describe changes in the life cycle of a frog and a butterfly.</li><li>• identify and describe changes in a plant from flower (blossom) to fruit.</li><li>• compare and contrast life cycles of a frog and a butterfly.</li><li>• construct and interpret models/diagrams of animal and plant life cycles.</li></ul>

## Standard 2.4

Resources	Teacher Notes
<p>Harcourt Science; A4-7 Living Things; A31-39 Life Cycles; A8-13 Plants</p> <p>Books:</p> <p><u>A Monarch Butterfly's Life</u> by John Himmelman</p> <p><u>An Extraordinary life: The Story of a Monarch Butterfly</u> by Laurence Pringle</p> <p><u>Gotta Go! Gotta Go!</u> By Sam Swope</p> <p><u>AIMS Primarily Plants</u></p> <p>Investigate a seed. Sort and classify seeds. Lesson: <i>Inside a Seed</i> <i>Seed Sort</i> <i>The Seed Within</i></p> <p>Observe, compare, and collect data on the growth of a seed. Lesson: <i>A Seed Grows</i> <i>It's in the Bag</i></p> <p>Investigate ways seeds travel. Lesson: <i>Seeds Travel</i></p> <p>Plan experiments to determine the best soil for plant growth. Lesson: <i>Which Soil Works Best?</i></p> <p>Plan experiments to determine if plants are affected by the temperature. Lesson: <i>What Temperature is Best?</i></p> <p>Plan experiments to determine how light affects plants. Lessons: <i>How Plants Grow</i> <i>Sunlight and Shades of Green</i></p>	

Investigate ways people use plants.

Lesson: *People need Plants*

Investigate why stems are necessary for plants.

Lesson: *Stem Study*

Investigate the functions of the root.

Lesson: *Root Study*

Investigate the parts of a flower.

Lesson: Flowers

**More Books:**

How Do Apples Grow? By Betsy Maestro

Seeds to Plants by Jeffrey Bates

Plants by David Burnie

From Seed to Plant by Gail Gibbons

The Reason for a Flower by Ruth Heller

All About Seeds by Susan Kuchalla

The Plant That Kept on Growing by Barbara Brenner

The Tiny Seed by Eric Carle

The Magic School Bus Goes to Seed

***Looking at Life Cycles***

Investigation from the VA Department of Education Science  
Enhanced Scope and Sequence – Grade 2.

**<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:

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**Living Systems**

This strand builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell

**Standard 2.5**

The student will investigate and understand that living things are part of a system. Key concepts include

- a) living organisms are interdependent with their living and nonliving surroundings; and
- b) habitats change over time due to many influences.

**Understanding the Standard**

In K.6 students are introduced to the concept of living and non-living. Students are introduced to living systems in 2.5 and investigate and understand that living things interact with other living things and their surroundings. The formal word “system” is introduced in this standard. The expectation is that students understand the concept in terms of the interactions between living and non-living things. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.5

<b>Overview</b>	<b>Essential Knowledge, Skills, and Processes</b>
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• Living things are dependent on other living things and their non-living surroundings for survival.</li><li>• All of the interactions between and among living things and their non-living surroundings are referred to as a system.</li><li>• Shelter may be living (coral, tree) or non-living (caves, houses).</li><li>• The habitats of living things, such as forests, grasslands, rivers and streams, change due to many influences. Habitats change from season to season.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• classify objects as to whether they are living or non-living.</li><li>• describe the non-living components of an organism’s surroundings, including water, space, and shelter. (Shelter may be living or non-living.)</li><li>• construct and interpret simple models of different kinds of habitats, including a forest and a stream.</li><li>• predict and describe seasonal changes in habitat and their effects on plants and animals. For example, how trees change through the seasons, and how animals respond to changes in the seasons?</li><li>• describe how animals are dependent on their surroundings. For example, how are squirrels and other animals affected by the loss of forest habitat?</li></ul>

## Standard 2.5

Resources	Teacher Notes
<p><u>Harcourt Science</u>; B2-B19, B29-37, B38-B64, B26-27</p> <p>Identify plants and animals by how they move and look and where they live. <u>Project Learning Tree</u> Activity 10 - <i>Charting Diversity</i></p> <p>Identify plant and animal life in a given area. <u>Project Learning Tree</u> Activity 46, 47 <i>School Yard Safari</i> <i>Are Vacant Lots Vacant?</i></p> <p>Identify organisms that live on fallen logs. To identify decomposers. <u>Project Learning Tree</u> Activity 23, 24 <i>The Fallen Log</i> <i>Nature's Recyclers</i></p> <p>Identify plants and animals that live around trees. <u>Project Learning Tree</u> Activity 22 Trees as Habitats</p> <p><b><i>There's No Place Like Home</i></b> Investigation from the VA Department of Education Science Enhanced Scope and Sequence – Grade 2. <b><u><a href="http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml">http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml</a></u></b></p> <p>Correlations to VA Science SOL (AIMS and Children's Literature) found on the LCPS intranet at: <b><u><a href="http://www.intranet.lcps">http://www.intranet.lcps</a></u></b></p> <p>Standards of Learning Literature Correlation searchable database "Connections" can be found at: <b><u><a href="http://www.fcps.k12.va.us/cpsapps/connections/">http://www.fcps.k12.va.us/cpsapps/connections/</a></u></b></p>	

**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 2.6**

The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include

- a) temperature, wind, precipitation, drought, flood, and storms; and
- b) the uses and importance of measuring and recording weather data.

**Understanding the Standard**

In K.8 students conducted weather observations and in 1.6 and 1.7 students were introduced to the concept that the sun is the source of heat and light for the Earth and how heat, light, and precipitation affect people and other living things. In 2.6 second grade students will investigate and understand types of weather and weather patterns and measure and record weather data. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.6

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• The Earth’s weather changes continuously, from day to day.</li><li>• Changes in the weather are characterized by daily differences in wind, temperature, and precipitation. Precipitation occurs when water, previously evaporated, condenses out of the air and changes state from a gas to a liquid (rain), or to a solid (snow and sleet).</li><li>• Extremes in the weather, such as too little or too much precipitation, can result in droughts or floods.</li><li>• Storms have powerful winds, which may be accompanied by rain, snow, or other kinds of precipitation.</li><li>• Weather data is collected and recorded using instruments. This information is very useful for predicting weather and determining weather patterns.</li><li>• Weather influences human activity.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• observe and describe types of precipitation including rain, snow, and ice (sleet and hail).</li><li>• observe and describe precipitation in terms of evaporation and condensation of water.</li><li>• observe and record daily weather conditions, such as sunny, cloudy, windy, rainy, or snowy.</li><li>• describe weather in terms of temperature, wind, and precipitation.</li><li>• measure and record weather data using weather instruments including a thermometer, rain gauge, and weather vane (standard English and metric measures).</li><li>• record and interpret daily temperature using a graph with numbered axes.</li><li>• observe and describe seasonal weather patterns and local variations.</li></ul>

**Standard 2.6 (continued)**

<b>Overview</b>	<b>Essential Knowledge, Skills, and Processes</b>
	<ul style="list-style-type: none"><li>• identify common types of storms. (Examples include hurricanes, tornadoes, blizzards, and thunderstorms.)</li><li>• compare and contrast droughts and floods.</li><li>• evaluate the influence of daily weather conditions on personal activities and dress.</li></ul>

## Standard 2.6

Resources	Teacher Notes
<p><u>Harcourt Science</u>; D18-23, D34-62, C15</p> <p><u>AIMS Primarily Earth</u> Making observations about air. Lesson: <i>A Closer Look at Air</i></p> <p>Air takes up space. Lesson: <i>Air is There</i></p> <p>Making observations about the wind. Lesson: <i>The Wind Blows</i></p> <p>Making a wind vane. Lesson: <i>Which way?</i></p> <p>Observing clouds. Lesson: <i>Cloudy Weather</i></p> <p>Recording weather conditions over a period of time. Lesson: <i>Watching the Weather</i></p> <p>Using a thermometer to measure air temperature. Lesson: <i>Air Temperature</i></p> <p><b>Books:</b> <u>Little Cloud</u> by Eric Carle</p> <p><u>Hi Clouds</u> by Carol Greene</p> <p><u>It Looked Like Spilt Milt</u> by Charles G. Shaw</p>	

Down Comes the Rain by Franklyn M. Branley

What do you see in a Cloud by Allan Fowler

It's Raining Cats and Dogs: All kinds of Weather by Franklyn M. Branley

Experiment with Weather by Miranda Bower

Weather Words and What They Mean by Gail Gibbons

***Backyard Weather***

***Weather Instruments***

***Collecting Weather Data***

Investigations from the VA Department of Education Science  
Enhanced Scope and Sequence – Grade 2.

**<http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml>**

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**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 2.7**

The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include

- a) effects on growth and behavior of living things (migration, hibernation, camouflage, adaptation, dormancy); and
- b) weathering and erosion of the land surface.

**Understanding the Standard**

Students have been introduced to the concepts of patterns, cycles and change in standards K.8 and K.9. These concepts include, in K.8, weather observations, shapes and forms of common natural objects (seeds, cones, and leaves), animal and plant growth, and home and school routine. K.9 introduces concepts that include natural and human-made things that change over time, either fast or slow, and that change can be measured. In 1.7 the first grade student investigates and understands the relationship between seasonal change and weather. Important concepts include how plants, animals, and people respond to changes in light, temperature, and precipitation. In 2.7 the student will investigate and understand that weather and seasons affect plants, animals, and their surroundings. The effects of weather and seasonal changes on weathering and erosion of the land surface are included in 2.7. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.7

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"><li>• Living things respond to weather and seasonal changes. This can be reflected in changes in growth and behavior.</li><li>• Adverse conditions of weather may slow the growth and development of plants and animals (<b>dormancy</b>), whereas optimal weather conditions may accelerate the growth and development of plants and animals.</li><li>• Many familiar trees produce new leaves in the spring and lose them in the fall due to seasonal changes in temperature and light.</li><li>• The outward coloration and coloration patterns of many animals are similar in appearance to the plants and places in which they live. This similarity to background is referred to as <b>camouflage</b> and enables animals to hide and avoid those that may eat or harm them.</li><li>• Some animals travel from one place to another and back again (migration) or go into a deep sleep (hibernation) due to seasonal changes.</li></ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"><li>• identify growth and behavioral responses of plants and animals to weather and seasonal changes. Examples of responses that are adaptive include migration, hibernation, and dormancy.</li><li>• identify animals that migrate, hibernate, or show other changes throughout the seasons or in the presence of adverse environmental conditions.</li><li>• evaluate the usefulness of camouflage in an animal's habitat (for example, coloration patterns in frogs).</li><li>• compare and contrast the responses of plants and animals to weather and seasonal changes.</li><li>• model the effects of weathering and erosion on the land surface.</li></ul>

**Standard 2.7 (continued)**

<b>Overview</b>	<b>Essential Knowledge, Skills, and Processes</b>
<ul style="list-style-type: none"><li>• Some animals migrate (geese, monarch butterflies). Some animals hibernate (bears, groundhogs). Some animals undergo physical changes from season to season (thickening of dog fur in the winter and shedding in the summer).</li><li>• Land surfaces are subject to the agents of weathering and erosion. Land surfaces that are not covered with or protected by plants are more likely to be subject to the loss of soil by wind and water.</li><li>• <b>Weathering</b> is the breaking down of rocks.</li><li>• <b>Erosion</b> is the process by which the products of weathering are moved from one place to another.</li></ul>	

## Standard 2.7

Resources	Teacher Notes
<p>Harcourt Science; B20-27, B54, C2-7, C8-13</p> <p><u>Hard-to-See Animals</u> by Allan Fowler This book about the characteristics of camouflage tells how different animals use their coloring to blend into their surroundings.</p> <p><i>What Changes When the Seasons Change?</i> <i>We Need Plants</i> Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 2. <a href="http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml">http://www.doe.virginia.gov/VDOE/EnhancedSandS/science.shtml</a></p> <p>Correlations to VA Science SOL (AIMS and Children’s Literature) found on the LCPS intranet at: <a href="http://www.intranet.lcps">http://www.intranet.lcps</a></p> <p>Standards of Learning Literature Correlation searchable database “Connections” can be found at: <a href="http://www.fcps.k12.va.us/epsapps/connections/">http://www.fcps.k12.va.us/epsapps/connections/</a></p>	

**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 2.8**

The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include

- a) important plant products (fiber, cotton, oil, spices, lumber, rubber, medicines, and paper);
- b) the availability of plant products affects the development of a geographic area; and
- c) plants provide homes and food for many animals and prevent soil from washing away.

**(Opportunity for a Meaningful Watershed Experience)**

**Understanding the Standard**

In K.10 students investigate and understand that materials can be used, recycled, and conserved, while in 1.8 students investigate and understand that natural resources, which are identified as plants, animals, water, air, land, minerals, forests, and soil, are limited. In 2.8 students will investigate and understand that plants produce oxygen and food and are a source of useful products and provide benefits in nature. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

## Standard 2.8

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none"> <li>• Plants provide many useful products and materials, which benefit human beings as well as other living things.</li> <li>• Plant products include such essentials as oxygen and food, as well as materials useful for clothing and shelter.</li> <li>• Plants may only grow well in certain geographic areas, thus enabling the production of plant products that allow humans to live in, as well as develop, those areas.</li> <li>• Plants provide homes and food for many animals.</li> <li>• Plants are also important agents in the prevention of soil erosion.</li> </ul>	<p>In order to meet this standard, it is expected that students should be able to:</p> <ul style="list-style-type: none"> <li>• comprehend that plants produce oxygen and food.</li> <li>• classify and identify the sources and uses of plant products such as fiber, cotton, oil, spices, lumber, rubber, medicines, and paper.</li> <li>• describe plant products grown in Virginia that are useful to people including wood, fruits, and vegetables. List and classify plant products.</li> <li>• compare and contrast different ways animals use plants as homes and shelters.</li> <li>• construct and interpret a chart illustrating the plant foods consumed by different animals.</li> <li>• construct and interpret a model that demonstrates how plants prevent soil erosion. <b>(Opportunity for a Meaningful Watershed Experience)</b></li> </ul>

## Standard 2.8

Resources	Teacher Notes
<p><u>Harcourt Science</u>; C3, 9-13; B28-33, 49</p> <p>AIMS Books <i>Cycle of Knowing and Growing; A Pressing Issue</i> <i>Primarily Earth; People Need Plants</i></p> <p><u>Project Learning Tree</u> To identify renewable and nonrenewable resources. Activity 14 <i>Renewable or Not</i></p> <p>To identify ways Humans use natural resources and how they affect the availability of renewable and nonrenewable resources. Activity 15 <i>A Few of My Favorite Things</i></p> <p>To learn about ways to reduce waste in a community. Activity 83 <i>Reduce, Reuse, Recycle</i></p> <p>To use a fictional story to discuss proper and improper uses of natural resources. Activity 89 <i>Trees for Many Reasons</i></p> <p>Analyze your own trash to see how you can reduce waste. Activity 37 <i>Talking Trash, Not</i></p> <p>Make recycled paper. Activity 51 <i>Making Your Own Paper</i></p> <p><b><i>We Need Plants!</i></b> <b><i>There's No Place Like Home</i></b> Investigations from the VA Department of Education Science Enhanced Scope and Sequence – Grade 2. <b><u><a href="http://www.doe.virginia.gov/VDOE/EnhancedSands/science.shtml">http://www.doe.virginia.gov/VDOE/EnhancedSands/science.shtml</a></u></b></p>	<p>Correlations to VA Science SOL (AIMS and Children’s Literature) found on the LCPS intranet at: <b><u><a href="http://www.intranet.lcps">http://www.intranet.lcps</a></u></b></p> <p>Standards of Learning Literature Correlation searchable database “Connections” can be found at: <b><u><a href="http://www.fcps.k12.va.us/cpsapps/connections/">http://www.fcps.k12.va.us/cpsapps/connections/</a></u></b></p>

## 2<sup>nd</sup> grade Science - Focal Points

### 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