

**Course Title:** Science – Grade 4  
**Board Approval Date:** 3/18/13  
**Credit / Hours:** N/A

**Course Description:**

This course focuses on mastery of the PA Academic Standards for Science and Technology and Ecology. As students progress through this course they will participate in a systematic study of Science content based on the fourth grade strand of PA standards.

Units will focus on Matter, Energy, Magnets and Electricity, Water Cycle, Watershed, Weather, and Plants and Animals.

**Learning Activities / Modes of Assessment:**

Large group instruction	Tests and Quizzes
Laboratory experiments	
Projects with rubrics	
Computer simulations	
Small group work	

**Instructional Resources:**

*HSP Pennsylvania Science* (Harcourt School Publisher 2009)  
*Discovery Streaming*  
*Brain Pop*  
Various websites  
Focus Curriculum: Focus on Pennsylvania Standards  
*Content related bookroom and Library resources*

## Course Pacing Guide

Course: **Science – Grade Four**

<b>Course Unit (Topic)</b>	<b>Length of Instruction (Days/Periods)</b>
1. Matter	11 days
2. Plants and Animals	20 days
3. Energy	20 days
4. Magnets and Electricity	15 days
5. Watershed	6 days
6. Weather	<u>16 days</u>
<b>DAYS TOTAL</b>	<b>88 Days</b>

Topic: 1. Matter  
 Subject(s): Science

Days: 11  
 Grade(s): 4th

Know:	Understand:	Do:
<p><b>3.2.4.A4. – Essential</b>            Recognize that combining two or more substances may make new materials with different properties.</p> <p><b>3.4.4.A1. – Essential</b>            Understand that tools, materials, and skills are used to make things and carry out tasks.</p> <p>3.4.4.C3. - Asking questions and making observations help a person understand how things work and can be repaired.            SI.K-4.3 - Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.            SI.K-4.6 - Scientists develop explanations based on their evidence and compare them with their current scientific knowledge.            SI.K-4.7 - Scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.            3.2.5.A1. - Water can be changed from one state to another by adding or taking away heat.</p>	<p>All things are made of matter. Matter can take on one of three states.</p>	<p><b>3.2.4.A1.a – Essential</b>            Identify and classify objects based on their observable and measurable physical properties.</p> <p><b>3.2.4.A1.b – Essential</b>            Compare and contrast solids, liquids, and gases based on their properties.</p> <p><b>3.2.4.A2. – Important</b>            Demonstrate that materials are composed of parts that are too small to be seen without magnification.</p> <p><b>3.2.4.A3. – Essential</b>            Demonstrate the conservation of mass during physical changes such as melting or freezing.</p> <p><b>3.2.4.A5. – Important</b>            MODELS Use models to demonstrate the physical change as water goes from liquid to ice and from liquid to vapor.</p> <p><b>3.4.4.C3. – Essential</b>            RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION/PROBLEM SOLVING AND TROUBLESHOOTING - Explain how asking questions and making observations help a person understand how things work and can be repaired.</p> <p><b>SI.K-4.2 – Essential</b>            Ask questions about objects, organisms, and events.</p> <p><b>SI.K-4.3 – Essential</b>            Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p><b>SI.K-4.4 – Essential</b>            Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p>

Topic: 1. Matter  
Subject(s): Science

Days: 11  
Grade(s): 4th

Know:	Understand:	Do:
		<div>SI.K-4.6 – Essential Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</div> <div>SI.K-4.7 – Essential Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</div>

Topic: 2. Plants and Animals  
 Subject(s):

Days: 20  
 Grade(s):

Know:	Understand:	Do:
<p><b>3.1.4.A3. – Essential</b>            LIFE CYCLES - Identify differences in the life cycles of plants and animals.</p> <p><b>3.1.4.A5. – Important</b>            Living things share common functions to help them survive in a specific environment.</p> <p><b>3.1.4.B2. – Compact</b>            Reproduction is necessary for the continuation of life.</p> <p><b>3.1.4.B5. – Important</b>            UNIFYING THEMES - PATTERNS Identify observable patterns in the physical characteristics of plants or groups of animals.</p> <p><b>3.1.4.C1.a – Essential</b>            NATURAL SELECTION - Identify different characteristics of plants and animals that help some populations survive and reproduce in greater numbers.</p> <p><b>3.1.4.C1.b – Essential</b>            Environmental changes can cause extinction in plants and animals.</p> <p><b>3.1.4.C2. – Essential</b>            ADAPTATION - Describe plant and animal adaptations that are important to survival.</p>	<p>All living things have needs that must be met for survival within their environment.</p>	<p><b>3.1.4.A1. – Essential</b>            Classify plants and animals according to the physical characteristics that they share.</p> <p><b>3.1.4.A2. – Essential</b>            Describe the different resources that plants and animals need to live.</p> <p><b>3.1.4.A8. – Compact</b>            MODELS Construct and interpret models and diagrams of various animal and plant life cycles.</p> <p><b>SI.K-4.2 – Essential</b>            Ask questions about objects, organisms, and events.</p> <p><b>SI.K-4.3 – Essential</b>            Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p><b>SI.K-4.4 – Essential</b>            Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p> <p><b>SI.K-4.5 – Essential</b>            Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.</p> <p><b>SI.K-4.6 – Essential</b>            Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p><b>SI.K-4.7 – Essential</b>            Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p>

Topic: 2. Plants and Animals  
 Subject(s):

Days: 20  
 Grade(s):

Know:	Understand:	Do:
<p><b>SI.K-4.1 – Essential</b> Distinguish between scientific fact and opinion.</p> <p><b>3.1.3.C1.a – Unranked</b> NATURAL SELECTION - Recognize that plants survive through adaptations, such as stem growth towards light and root growth downward in response to gravity.</p> <p><b>3.1.3.C1.b – Unranked</b> NATURAL SELECTION - Recognize that many plants and animals can survive harsh environments because of seasonal behaviors (e.g. hibernation, migration, trees shedding leaves).</p> <p><b>3.1.4.B1. – Essential</b> HEREDITY - Describe features that are observable in both parents and their offspring.</p> <p><b>4.1.4.A.a – Important</b> Explain how living things are dependent upon other living and nonliving things for survival.</p> <p><b>4.1.4.A.b – Compact</b> Explain what happens to an organism when its food supply, access to water, shelter or space (niche / habitat) is changed.</p>		<p>3.1.4.A3. - Identify differences in the life cycles of plants and animals.</p> <p>3.1.4.B5. - PATTERNS Identify observable patterns in the physical characteristics of plants or groups of animals.</p> <p>3.1.4.C1.a - Identify different characteristics of plants and animals that help some populations survive and reproduce in greater numbers.</p> <p>3.1.4.C2. - Describe plant and animal adaptations that are important to survival.</p> <p>3.1.4.B1. - Describe features that are observable in both parents and their offspring.</p> <p>4.1.4.B.a - Identify how matter cycles through an ecosystem.</p>

Topic: 2. Plants and Animals  
 Subject(s):

Days: 20  
 Grade(s):

Know:	Understand:	Do:
<p><b>4.1.4.C. – Important</b>          Explain how most life on earth gets its energy from the sun.</p> <p><b>4.1.4.B.a – Compact</b>          Identify how matter cycles through an ecosystem.</p> <p>life cycle of animals          life cycles of plants          reproduction (very basic)</p> <p>characterisitics for survival- camouflauge, mimicry, adaptations, decptive coloration and counter shading</p> <p>extinction - over population, loss of habitat, pollution</p> <p>common functions to meet basic needs - food, water, air, and shelter</p> <p>SI.K-4.3 - Scientific investigations involve asking and answering questions and comparing the answer with what is already known.          SI.K-4.6 - Scientists develop explanations based on their evidence and compare them with their current scientific knowledge.          SI.K-4.7 - Scientists make their results public, describe their investigations so they</p>		

Topic: 2. Plants and Animals  
Subject(s):

Days: 20  
Grade(s):

Know:	Understand:	Do:
can be reproduced, and review and ask questions about the work of other scientists.		



Topic: 3. Energy

Subject(s):

Days: 20

Grade(s):

Know:	Understand:	Do:
<p><b>3.2.4.B1. – Compact</b> FORCE &amp; MOTION OF PARTICLES AND RIGID BODIES - Explain how an object's change in motion can be observed and measured.</p> <p><b>3.2.4.B2. – Important</b> ENERGY STORAGE AND TRANSFORMATIONS: CONSERVATION LAWS - Identify types of energy and their ability to be stored and changed from one form to another.</p> <p><b>3.2.4.B3. – Important</b> Objects that emit light often emit heat.</p> <p><b>SI.K-4.1 – Essential</b> Distinguish between scientific fact and opinion.</p> <p><b>4.1.3.C. – Unranked</b> Identify sources of energy.</p> <p><b>4.1.4.C. – Important</b> Explain how most life on earth gets its energy from the sun.</p> <p><b>3.4.4.E3. – Important</b> ENERGY AND POWER TECHNOLOGIES - Identify types of energy and the importance of energy conservation.</p>	<p>Energy exists and is used in many forms.</p>	<p><b>3.2.4.B5.a – Important</b> Demonstrate how vibrating objects make sound and sound can make things vibrate.</p> <p><b>3.2.4.B5.b – Important</b> Demonstrate how light can be reflected, refracted, or absorbed by an object.</p> <p><b>3.2.4.B6. – Essential</b> UNIFYING THEMES - ENERGY Give examples of how energy can be transformed from one form to another.</p> <p><b>SI.K-4.2 – Essential</b> Ask questions about objects, organisms, and events.</p> <p><b>SI.K-4.3 – Essential</b> Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p><b>SI.K-4.4 – Essential</b> Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p> <p><b>SI.K-4.5 – Essential</b> Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.</p> <p><b>SI.K-4.6 – Essential</b> Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p><b>SI.K-4.7 – Essential</b> Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p> <p>through an experiment demonstrate how vibrating objects create sound</p>

Topic: 3. Energy

Days: 20

Subject(s):

Grade(s):

Know:	Understand:	Do:
<p>types of energy - renewable ( solar, wind, hydroelectric) and nonrenewable (fossil fuels)</p> <p>kinetic versus potential</p> <p>light - reflect and refract</p> <p>3.2.4.B6. - Energy can be transformed from one form to another.</p> <p>SI.K-4.3 - Scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p>SI.K-4.6 - Scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p>SI.K-4.7 - Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p>		<p>through an inquiry demonstrate the means and methods of light travel</p> <p>using a flow chart display a variety of examples of energy that is transformed from one form to another ( solar to electric, water to electric )</p> <p>3.2.4.B2. - Identify types of energy and their ability to be stored and changed from one form to another.</p> <p>3.4.4.E3. - Identify types of energy and the importance of energy conservation.</p>

Topic: 4. Magnets and Electricity

Subject(s): Science

Days: 15

Grade(s): 4th

Know:	Understand:	Do:
<p><b>SI.K-4.1 – Essential</b> Distinguish between scientific fact and opinion.</p> <p><b>3.2.3.B4.b – Unranked</b> ELECTRICAL AND MAGNETIC ENERGY - Identify and classify objects and materials as magnetic or nonmagnetic.</p> <p><b>3.2.3.B4.a – Unranked</b> ELECTRICAL AND MAGNETIC ENERGY - Identify and classify objects and materials that are conductors or insulators of electricity.</p> <p>Vocab - pole, attract, repel</p> <p>3.2.4.B4.c - Magnets have poles that repel and attract each other.            SI.K-4.3 - Scientific investigations involve asking and answering questions and comparing the answer with what is already known.            SI.K-4.6 - Scientists develop explanations based on their evidence and compare them with their current scientific knowledge.            SI.K-4.7 - Scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p>	<p>Electricity is an important and useful form of energy.</p> <p>Magnets create force using attraction and repulsion.</p>	<p><b>3.2.4.B4.a – Essential</b> Design and construct a simple direct current circuit.</p> <p><b>3.2.4.B4.b – Essential</b> Compare and contrast series and parallel circuits.</p> <p><b>3.2.4.B4.c – Essential</b> ELECTRICAL AND MAGNETIC ENERGY - Demonstrate that magnets have poles that repel and attract each other.</p> <p><b>SI.K-4.2 – Essential</b> Ask questions about objects, organisms, and events.</p> <p><b>SI.K-4.3 – Essential</b> Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p><b>SI.K-4.4 – Essential</b> Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p> <p><b>SI.K-4.5 – Essential</b> Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.</p> <p><b>SI.K-4.6 – Essential</b> Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p><b>SI.K-4.7 – Essential</b> Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p>

Topic: 4. Magnets and Electricity

Subject(s): Science

Days: 15

Grade(s): 4th

Know:

Understand:

Do:

3.2.3.B4.b - Identify and classify objects and materials as magnetic or nonmagnetic.  
3.2.3.B4.a - Identify and classify objects and materials that are conductors or insulators of electricity.

Topic: 5. Watershed  
 Subject(s):

Days: 6  
 Grade(s):

Know:	Understand:	Do:
<p><b>4.2.4.A.a – Essential</b> Describe the physical characteristics of a watershed.</p> <p><b>4.2.4.A.b – Important</b> Identify and explain what determines the boundaries of a watershed.</p> <p><b>4.2.4.A.c – Essential</b> Identify water systems and their components as either lotic or lentic.</p> <p><b>4.2.3.A.a – Unranked</b> Define the term watershed.</p> <p><b>4.2.3.A.b – Unranked</b> Identify the watersheds in which you reside.</p> <p><b>4.1.4.A.a – Important</b> Explain how living things are dependent upon other living and nonliving things for survival.</p> <p>watershed - the area of land where all of the water that is under it or drains off of it goes into the same place</p> <p>Physical properties of a watershed -</p> <p>Boundaries of watersheds-natural high areas of land</p> <p>six watersheds -</p>	<p>Human impact on your local environment (watershed) has global effects.</p>	<p><b>4.2.6.A. – Essential</b> Identify the five major watersheds of Pennsylvania.</p> <p><b>SI.K-4.6 – Essential</b> Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p><b>SI.K-4.4 – Essential</b> Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p> <p><b>SI.K-4.3 – Essential</b> Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p>4.2.4.A.a - Describe the physical characteristics of a watershed.</p> <p>4.2.4.A.b - Identify and explain what determines the boundaries of a watershed.</p> <p>4.2.3.A.b - Identify the watersheds in which you reside.</p>

Topic: 5. Watershed  
Subject(s):

Days: 6  
Grade(s):

Know:	Understand:	Do:
<p>Susquehanna Basin, Ohio Basin, Delaware Basin, Erie Basin, Potomac Basin, and Genessee Basin</p> <p>lentic and lotic water systems</p> <p>pollution 4.2.6.A. - Identify the five major watersheds of Pennsylvania. SI.K-4.6 - Use data/ evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge. SI.K-4.3 - Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p>		

Topic: 6. Weather

Subject(s):

Days: 16

Grade(s):

Know:	Understand:	Do:
<p><b>3.3.4.A5.a – Essential</b> WEATHER AND CLIMATE - Describe basic weather elements.</p> <p><b>3.3.4.A5.b – Essential</b> WEATHER AND CLIMATE - Identify weather patterns over time.</p> <p><b>3.3.4.A6.c – Essential</b> UNIFYING THEMES - SCALE Explain how basic weather elements are measured.</p> <p><b>SI.K-4.1 – Essential</b> Distinguish between scientific fact and opinion.</p> <p><b>3.3.5.A5.a – Essential</b> WEATHER AND CLIMATE - Differentiate between weather and climate.</p> <p><b>3.4.4.A1. – Essential</b> Tools, materials, and skills are used to make things and carry out tasks.</p> <p><b>3.4.4.D2.a – Compact</b> USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Recognize and use everyday symbols (e.g. icons, simple electrical symbols measurement) to communicate key ideas.</p>	<p>Weather elements and tools are used to distinguish weather and climate of any given area.</p>	<p><b>SI.K-4.2 – Essential</b> Ask questions about objects, organisms, and events.</p> <p><b>SI.K-4.3 – Essential</b> Understand that all scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p><b>SI.K-4.4 – Essential</b> Plan and conduct a simple investigation and understand that different questions require different kinds of investigations.</p> <p><b>SI.K-4.5 – Essential</b> Use simple equipment (tools and other technologies) to gather data and understand that this allows scientists to collect more information than relying only on their senses to gather information.</p> <p><b>SI.K-4.6 – Essential</b> Use data/evidence to construct explanations and understand that scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p><b>SI.K-4.7 – Essential</b> Communicate procedures and explanations giving priority to evidence and understanding that scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other scientists.</p> <p>through an investigation of weather elements, write a weather prediction</p> <p>accurately interpret data on a weather map</p> <p>3.3.4.A5.a - Describe basic weather elements. 3.3.4.A5.b - Identify weather patterns over time. 3.3.4.A6.c - Explain how basic weather elements are measured. 3.3.5.A5.a - Differentiate between weather and climate. 3.4.4.D2.a - Recognize and use everyday symbols (e.g. icons, simple electrical symbols measurement) to communicate key ideas.</p>

Topic: 6. Weather

Days: 16

Subject(s):

Grade(s):

Know:	Understand:	Do:
<p><b>S4.D.1.3.2 – Essential</b> Explain how water goes through phase changes (i.e., evaporation, condensation, freezing, melting).</p> <p>atmosphere affects weather</p> <p>weather elements - clouds, severe storms, fronts, precipitation, air masses, humidity, temperature, pressure, wind</p> <p>climate</p> <p>weather tools - barometer, weather vane, anemometer, thermometer, rain gauge</p> <p>.</p> <p>SI.K-4.3 - Scientific investigations involve asking and answering questions and comparing the answer with what is already known.</p> <p>SI.K-4.6 - Scientists develop explanations based on their evidence and compare them with their current scientific knowledge.</p> <p>SI.K-4.7 - Scientists make their results public, describe their investigations so they can be reproduced, and review and ask questions about the work of other</p>		



Topic: 6. Weather

Days: 16

Subject(s):

Grade(s):

Know:	Understand:	Do:
<p>scientists.</p> <p>3.3.3.A4. - Forms of precipitation are linked to the weather in a particular place and time.</p> <p>3.3.3.A5. - Air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.</p>		