

PENINSULA SCHOOL DISTRICT
Science Curriculum
Sixth Grade



Process / Investigation Terms

particle	atmosphere	atmosphere (hydrosphere)	watershed
particles	atom	erosion	compare
reflect / reflection	body of water	sphere	water table
pH	cleavage of minerals	compound	rock cycle
element	CO ₂	deposition	controlled variable
conduction	convection	landslide	dew point
soluble / insoluble	frequency	proton	destructive
vein	igneous	magma	wind direction
acid / acidity	luster of minerals	mixture	metamorphic
electron	neutron	weathering	
density	organic	core	pressure
state (phase) of matter	pattern	mantle	particle
chemical	property	crust	environment
wavelength	reaction	landform (landform profile)	air pressure
ground water	resource	topographic	nitrogen
metamorphic	sedimentary	oceanic (crustal plates)	wind speed
heat (thermal) energy	transfer	convection currents	conduction
property	transfer	solution	constructive

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1. Systems: The student knows and applies scientific concepts and principles to understand the properties, structures, and changes in physical, earth/space, and living systems. (Essential Academic Learning Requirement)

Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
1.1 Properties: Understand how properties are used to identify, describe, and categorize substances, materials, and objects and how characteristics are used to categorize living things			
1.1.1	<p>Understand how to use physical and chemical properties to sort and identify substances W</p> <ul style="list-style-type: none"> Identify, categorize, describe, and sort substances using physical and/or chemical properties (i.e., boiling point, density, freezing point, mass, acidity [pH], solubility, magnetism) <p>soluble pH density insoluble acid state (phase) of matter property acidity density</p>	Chemical Building blocks chpt-1,2	http://particleadventure.org/particleadventure/frameless/sitemap.html
1.1.2	*		
1.1.3	<p>Understand sound waves, water waves, and light waves using wave properties, including amplitude, wavelength, and speed. Understand wave behaviors, including reflection, refraction, transmission, and absorption W</p> <ul style="list-style-type: none"> Describe how sound waves and/or water waves affect the motion of the particles in the substance through which the wave is traveling (e.g., air molecules vibrate back and forth as sound waves move through air) Describe the behavior of sound and water waves as the waves are reflected and/or absorbed by a substance Describe how the observed properties of light, sound, and water are related to amplitude, frequency, wavelength, and speed of waves (e.g., color and brightness of light, pitch and volume of sound, height of water waves, light waves are faster than sound waves) Describe the behavior of light waves when light interacts with transparent, translucent, and opaque substances (e.g., blue objects appear blue in color because the object reflects mostly blue light and absorbs the other colors of light, transparent objects transmit most light through them, lenses refract light) Describe the changes in speed and direction as a wave goes from one substance into another <p>wavelength property frequency particle reflect / reflection transform</p>	Sound and Light And Inside Earth - Earthquakes chpt. 2	http://www.cln.org/themes/sound.html

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1.1 Properties: Understand how properties are used to identify, describe, and categorize substances, materials, and objects and how characteristics are used to categorize living things, <i>continued</i>			
1.1.4	*	Chemical Building Blocks	
1.1.5	<p>Understand how to classify rocks, soils, air, and water into groups based on their chemical and physical properties W</p> <ul style="list-style-type: none"> • Describe properties of minerals and rocks that give evidence of how they were formed (e.g., crystal size and arrangement, texture, luster, cleavage, hardness, layering, reaction to acid) • Describe properties of soils that give evidence of how the soils were formed (e.g., chemical composition such as acidic, types of particles, particle size, organic materials, layering) • Describe how earth's water (i.e., oceans, fresh waters, glaciers, ground water) can have different properties (e.g., salinity, density) • Describe how the atmosphere has different properties at different elevations <p>cleavage of minerals ground water luster of minerals resource acid property vein particle reaction igneous organic atmosphere metamorphic pattern body of sedimentary water</p>	<p>Inside Earth Minerals Chpt 4 and Rocks Chpt. 5</p> <p>Crystals see also Chemical Building Blocks</p> <p>Earth's Changing surface Weathering and Soil Formation chpt. 2</p> <p>Earth's Changing Surface Erosion and Deposition chpt. 3</p>	<p>http://cte.jhu.edu/techacademy/fellows/brannon/webquest/kmbindex.html</p>
1.1.6	*		

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources												
1.2 Structures: Understand how components, structures, organizations, and interconnections describe systems															
1.2.1	Analyze how the parts of a system interconnect and influence each other W <ul style="list-style-type: none"> • Explain how the parts of a system interconnect and influence each other 	Inside Earth Earth's Changing Surface Climate and Weather (originally adopted for 8th grade)													
1.2.2	Understand how various factors affect energy transfers and that energy can be transformed from one form of energy to another W <ul style="list-style-type: none"> • Describe and determine the factors that affect heat energy transfer (e.g., properties of substances/materials [conductors, insulators], distance, direction, position) • Describe how waves transfer energy (e.g., light waves transfer energy from sun to earth; air transfers an object's vibrations from one place to another as sound) heat (thermal energy) convection transfer, conduction	Sound and Light	http://www.cln.org/themes/sound.html												
1.2.3	Understand that all matter is made of particles called atoms and that atoms may combine to form molecules and that atoms and molecules can form mixtures W <ul style="list-style-type: none"> • Describe that matter is made of particles called atoms and molecules • Describe that elements are made of one kind of atom <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">particles</td> <td style="width: 33%;">compound</td> <td style="width: 33%;">proton</td> </tr> <tr> <td>atom</td> <td>mixture</td> <td>solution</td> </tr> <tr> <td>element</td> <td>electron</td> <td></td> </tr> <tr> <td>CO₂</td> <td>neutron</td> <td></td> </tr> </table>	particles	compound	proton	atom	mixture	solution	element	electron		CO ₂	neutron		Chemical Building Blocks	
particles	compound	proton													
atom	mixture	solution													
element	electron														
CO ₂	neutron														

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Benchmark 1 Seventh Grade	A Peninsula Seventh Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy			
1.3.1	*		
1.3.2	*		
1.3.3	*		

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Benchmark 1 Seventh Grade	A Peninsula Seventh Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy, <i>continued</i>			
1.3.4	<p>Understand the processes that continually change the surface of the earth W</p> <ul style="list-style-type: none"> • Describe the processes by which soils are formed (e.g., erosion and deposition in river systems) • Describe how thermal energy flow (heat) and movement (convection currents) beneath earth's crust cause earthquakes and volcanoes • Describe how constructive processes change landforms (e.g., crustal deformation, volcanic eruption, deposition of sediment) • Describe how destructive processes change landforms (e.g., rivers erode landforms) • Describe the processes involved in the rock cycle (e.g., magma cools into igneous rocks; rocks are eroded and deposited as sediments; sediments solidify into sedimentary rocks; rocks can be changed by heat and pressure to form metamorphic rocks) <p>heat (thermal energy) deposition convection currents weathering landform sedimentary destructive landslide pressure constructive rock cycle heat crust metamorphic particle mantle igneous erosion</p>	Earth's Changing Surface	http://www.watersheds.org/earth/karst.htm http://www.chariho.k12.ri.us/curriculum/MISmart/ocean/sandhome.htm
1.3.5	<p>Understand how fossils and other evidence are used to document life and environmental changes over time W</p> <ul style="list-style-type: none"> • Describe how fossils are formed • Describe different kinds of evidence that are used to document past conditions on earth (e.g., glacial markings, ash layers, tree rings, rock layers) <p>evolution extinct sedimentary rock</p>	Earth's Changing Surface	http://www.enchantedlearning.com/subjects/dinosaurs/

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1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy, <i>continued</i>			
1.3.6	<p>Analyze the relationship between weather and climate and how ocean currents and global atmospheric circulation affect weather and climate</p> <p>W</p> <ul style="list-style-type: none"> • Compare weather and climate • Explain the effect of the water cycle on weather (e.g., cloud formation, storms) • Explain how ocean currents influence the atmosphere in terms of weather and climate • Explain the causes of atmospheric circulation and oceanic currents (e.g., prevailing winds are the result of hot tropical regions, cold polar regions, and earth's spin) <p>atmosphere body of water wind speed air pressure ground water watershed wind direction nitrogen water table conduction convection dew point pressure</p> <p>* Continues to be taught in 8th grade until the 2007-2008 school year at which time it will be part of the 6th grade curriculum</p>	Weather and Climate (originally adopted for 8th grade use)	http://www.agiweb.org/earthcomm/fluidspheres/cryosphere.html http://www.phschool.com/science/planetdiary/archive05/drou1052105.html
1.3.7	*		
1.3.8	*		
1.3.9	*		
1.3.10	*		

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2. Inquiry: The student knows and applies the skills, processes, and nature of scientific inquiry.
(Essential Academic Learning Requirement)

Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
2.1 Investigating systems: Develop the knowledge and skills necessary to do scientific inquiry			
2.1.1	Understand how to generate a question that can be answered through scientific investigation W <ul style="list-style-type: none"> • Generate multiple questions based on observations • Generate a question that can be investigated scientifically • Generate a new question that can be investigated with the same materials and/or data as a given investigation 	Process Skills Booklet PH Choices from each book's Skills Lab and Real-World Lab sections	
2.1.2	Understand how to plan and conduct scientific investigations W <ul style="list-style-type: none"> • Make predictions (hypothesize) and give reasons • Generate a logical plan for, and conduct, a scientific controlled investigation with the following attributes: <ul style="list-style-type: none"> √ Prediction (hypothesis) √ Appropriate materials, tools, and available computer technology √ Controlled variables (kept the same) √ One manipulated (changed) variable √ Responding (dependent) variable √ Gather, record, and organize data using appropriate units, charts, and/or graphs √ Multiple trials • Generate a logical plan for a simple field investigation with the following attributes: <ul style="list-style-type: none"> √ Identify multiple variables √ Select observable or measurable variables related to the investigative question • Identify and explain safety requirements that would be needed in the investigation 	Process Skills Booklet PH	

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
2.1 Investigating systems: Develop the knowledge and skills necessary to do scientific inquiry, <i>continued</i>			
2.1.3	Apply understanding of how to construct a scientific explanation using evidence and inferential logic W <ul style="list-style-type: none"> • Generate a scientific conclusion including supporting data from an investigation using inferential logic (e.g., chewing gum loses more mass than bubble gum after being chewed for 5 minutes; chewing gum lost 2.00 grams while bubble gum only lost 1.47 grams) • Describe a reason for a given conclusion using evidence from an investigation • Generate a scientific explanation of an observed phenomenon using given data • Predict what logically might occur if an investigation lasted longer or changed • Describe the difference between evidence (data) and conclusions 	Process Skills booklet PH	
2.1.4	Analyze how models are used to investigate objects, systems, and processes W <ul style="list-style-type: none"> • Compare models or computer simulations of phenomena • Explain how models or computer simulations are used to investigate and predict the behavior of objects, events, systems, or processes • Create a model or computer simulation to investigate and predict the behavior of objects, events, systems, or processes (e.g., phases of the moon using a solar system model) • Explain the advantages and limitations of investigating with a model 	Process Skills Booklet PH Inside Earth	

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
2.1 Investigating systems: Develop the knowledge and skills necessary to do scientific inquiry, <i>continued</i>			
2.1.5	Apply understanding of how to report investigations and explanations of objects, events, systems, and processes W <ul style="list-style-type: none"> • Report observations of scientific investigations without making inferences • Summarize an investigation by describing: <ul style="list-style-type: none"> √ Reasons for selecting the investigative plan √ Materials used in the investigation √ Observations, data, results √ Explanations and conclusions in written, mathematical, oral, and information technology presentation formats √ Ramifications of investigations √ Safety procedures used • Describe the difference between an objective summary of data and an inference made from data 	Process Skills booklet PH	

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
2.2 Nature of science: Understand the nature of scientific inquiry			
2.2.1	<p>Apply curiosity, honesty, skepticism, and openness when considering explanations and conducting investigations W</p> <ul style="list-style-type: none"> • Explain why an honest response to questionable results, conclusions, or explanations is important to the scientific enterprise • Describe a flaw in a claim or a conclusion (i.e., limited data, flawed procedure, or overgeneralization) • Describe how scientists accurately and honestly record, report, and share observations and measurements without bias • Explain why honest acknowledgement of the contributions of others and information sources are necessary 	<p>Earth's Changing Surface</p> <p>Trip Through Geologic Time Extinction Theories chpt.4</p> <p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	
2.2.2	<p>Understand that scientific theories explain facts using inferential logic W</p> <ul style="list-style-type: none"> • Describe how a principle or theory logically explains a given set of facts • Describe how new facts or evidence may result in the modification or rejection of a theory (e.g., caloric theory of heat, theory of acquired characteristics) 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	
2.2.3	<p>Analyze inconsistent results from scientific investigations to determine how the results can be explained W</p> <ul style="list-style-type: none"> • Compare two or more similar investigations and explain why different results were produced (e.g., insufficient data could be interpreted as inconsistent results) • Explain whether sufficient information has been obtained to make a conclusion • Explain why the results from a single investigation or demonstration are not sufficient to describe a phenomenon 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
2.2 Nature of science: Understand the nature of scientific inquiry, <i>continued</i>			
2.2.4	<p>Understand how to make the results of scientific investigations reliable and how to make the methods of investigation valid W</p> <ul style="list-style-type: none"> • Describe how the method of an investigation ensures reliable results (e.g., multiple trials ensure more reliable results) • Describe how to increase the reliability of the results of an investigation (e.g., repeating an investigation exactly the same way increases the reliability of the results) • Describe how the method of an investigation is valid (i.e., validity means that the investigation answered the investigative question with confidence; the manipulated variable caused the change in the responding or dependent variable) • Describe the purpose of the steps and materials of an investigation's procedure in terms of the validity of the investigation • Modify an investigation to improve the validity of the investigation and explain how the modifications improved the validity (e.g., more controlled variables, more accurate measuring techniques, greater sample size) 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	
2.2.5	<p>Understand that increased comprehension of systems leads to new inquiry W</p> <ul style="list-style-type: none"> • Describe how scientific inquiry results in new facts, evidence, unexpected findings, ideas, and explanations • Describe how results of scientific inquiry may change our understanding of the systems of the natural and constructed world • Describe how increased understanding of systems leads to new questions to be investigated • Describe how new ideas need repeated inquiries before acceptance • Describe how new investigative questions arise at the completion of scientific inquiry 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	

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3. Application: The student knows and applies science concepts and skills to develop solutions to human problems in societal contexts. (Essential Academic Learning Requirement)

Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
3.1 Designing solutions: Apply knowledge and skills of science and technology to design solutions to human problems or meet challenges			
3.1.1	<p>Analyze common problems or challenges in which scientific design can be or has been used to design solutions W</p> <ul style="list-style-type: none"> • Describe how science and technology could be used to solve all or part of a human problem and vice versa (e.g., understanding erosion can be used to solve some flooding problems) • Describe the scientific concept, principle, or process used in a solution to a human problem (e.g., understanding of the relationship between electricity and magnetism has been used to make electric motors and generators) • Explain how to scientifically gather information to develop a solution (e.g., collect data by measuring all the factors and establish which are the most important to solve the problem) • Describe an appropriate question that could lead to a possible solution to a problem 	Science and Society section "You Decide" activities in each book	

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3.1 Designing solutions: Apply knowledge and skills of science and technology to design solutions to human problems or meet challenges, <i>continued</i>			
3.1.2	<p>Apply the scientific design process to develop and implement solutions to problems or challenges W</p> <ul style="list-style-type: none"> • Propose, implement, and document a scientific design process used to solve a problem or challenge <ul style="list-style-type: none"> √ Define the problem √ Scientifically gather information and collect measurable data √ Explore ideas √ Make a plan √ List steps to do the plan √ Scientifically test solution √ Document the scientific design process • Explain possible solutions to the problem (e.g., use pulleys instead of levers to lift a heavy object) • Explain the reason(s) for the effectiveness of a solution to a problem or challenge 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	
3.1.3	<p>Analyze multiple solutions to a problem or challenge</p> <ul style="list-style-type: none"> • Describe the criteria to evaluate an acceptable solution to the problem or challenge • Describe the reason(s) for the effectiveness of a solution to a problem or challenge using scientific concepts and principles • Describe the consequences of the solution to the problem or challenge (e.g., using rocks on the edge of a stream to prevent erosion may destroy habitat) • Describe how to change a system to solve a problem or improve a solution to a problem • Compare the effectiveness of different solutions to a problem or challenge based on criteria, using scientific concepts and principles 	<p>Process Skills Booklet PH</p> <p>Choices from each book's Skills Lab and Real-World Lab sections</p>	

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Benchmark 1 Sixth Grade	A Peninsula Sixth Grade Student will: from the Grade Level Expectations (GLEs)	Instructional Materials and Resources	Assessment Strategies and Resources
3.2 Science, Technology, and Society: Analyze how science and technology are human endeavors, interrelated to each other, society, the workplace, and the environment			
3.2.1	<p>Analyze how science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history</p> <ul style="list-style-type: none"> • Explain how the contributions of diverse individuals have led to the development of science and technology • Explain how science and technology have affected individuals, cultures, and societies throughout human history 	All PH have interdisciplinary activities in Science and History and Science and Society Sections	
3.2.2	<p>Analyze scientific inquiry and scientific design and understand how science supports technological development and vice versa W</p> <ul style="list-style-type: none"> • Describe how scientific investigations and scientific research support technology (e.g., investigation into materials led to Gore-tex and Kevlar) • Describe how technology supports scientific investigations and research (e.g., microscopes led to the discovery of unicellular organisms) • Describe how a scientifically designed solution to a human problem can lead to new tools that generate further inquiry (e.g., microscopes, telescopes, and computers) • Compare the processes of scientific inquiry and scientific design in terms of activities, results, and/or influence on individuals and/or society 	Process Skills Booklet PH Choices from each book's Skills Lab and Real-World Lab sections	

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3.2 Science, Technology, and Society: Analyze how science and technology are human endeavors, interrelated to each other, society, the workplace, and the environment			
3.2.3	Analyze the use of science, mathematics, and technology within occupational/career areas of interest <ul style="list-style-type: none"> • Examine scientific, mathematical, and technological knowledge and skills used in an occupation/career • Research occupations/careers that require knowledge of science, mathematics, and technology 	Introduction section of each book and Interdisciplinary activities of each book	
3.2.4	Analyze how human societies' use of natural resources affects the quality of life and the health of ecosystems W <ul style="list-style-type: none"> • Discriminate between renewable and nonrenewable resources in an ecosystem • Explain the effects that the conservation of natural resources has on the quality of life and the health of ecosystems • Explain the effects of various human activities on the health of an ecosystem and/or the ability of organisms to survive in that ecosystem (e.g., consumption of natural resources; waste management; urban growth; land use decisions; pesticide, herbicide, or fertilizer use) 	Science and Society Sections of each book	