

INTRODUCTION

The Hinsdale School District PreK-12 science curriculum is a coordinated program built around science education and the expectations of the New Hampshire Curriculum Frameworks. It proceeds sequentially; introducing, expanding, and further exploring content at appropriate grade levels with increasing degrees of depth and complexity. The Common Core State Standards for English Language Arts include standards pertaining to all content areas.

Teachers are responsible for incorporating the Common Core State Standards into their science instruction.

IMPORTANT NOTE TO ALL TEACHERS

It is important for teachers to follow the curriculum for each grade level or class as described in this guide; the integrity of the PreK-12 sequence has been carefully considered in its creation. Grade levels and individual classes have some degree of flexibility in designing the sequence of topics through the year, but *addressing the provided scope is required*. At the elementary level, the topics for each grade level have been carefully planned so as to address necessary content without redundancy or omission to meet the expectations of the NH frameworks and high stakes testing. At the middle school and high school levels the curricula are also constructed to fully meet the expectations of the NH frameworks and high stakes testing. The guiding questions in each section make clear the topics of inquiry (scope) for each grade. These topics change and build on each other through the grades (sequence), making it imperative that each teacher use the guiding questions to plan instruction.

SCIENCE INQUIRY

Science Inquiry!

Actual doing!

Capture student interest and motivate continued learning!

Inquiry involves QUESTIONING. Inquiry requires being able to identify assumptions, to use critical and logical thinking, and the ability to consider alternative explanations. Inquiry might be highly structured where known outcomes are clear, or students may be free to explore with unanticipated results!

Students engaged in Inquiry:

- make observations
- pose questions
- propose answers
- examine what they may already know
- review already researched information
- explain / communicate results
- use tools to
 - gather
 - analyze
 - interpret data

Students use journals to record observations, thoughts, ideas, and models, create diagrams, and represent data and observations with plots and tables. Students present their work to others with models, graphs, reports, posters, etc.

Asking students questions to guide continued exploration provides opportunities for discussion, further reflection, and student decision-making.

Appropriate activities are safe, developmentally appropriate, and directly related to the curriculum. Sufficient tools and materials must be available and science inquiry vocabulary (provided in guide) used.

Essential Understandings

The Science Curriculum for Hinsdale Elementary, Middle and High School is built around the standards listed in the New Hampshire Curriculum Framework. Science is divided into three content domains (Earth Space Science, Life Science, and Physical Science) and one Science Process Skills domain. The three content domains should encompass the Scientific Process Skills of Inquiry and Critical Thinking Skills. The following list of Essential Understandings or Enduring Knowledge Statements are used across all grade levels.

**Essential Understandings
Earth Space Science**

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	1. Atmosphere, Climate, and Weather
	2. Composition and Features
	3. Fossils
	4. Observation Of The Earth From Space
	5. Processes and Rates Of Change
	6. Rock Cycle
	7. Water
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	1. Earth, Sun And Moon
	2. Energy
	3. Solar System
	4. View From Earth
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	1. Size And Scale
	2. Stars And Galaxies
	3. Universe
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Local And Global Environmental Issues
	4. Career and Technical Education

Essential Understandings Life Science

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).	1. Classification
	2. Living Things And Organization
	3. Reproduction
LS2– Energy flows and matter recycles through an ecosystem.	1. Environment
	2. Flow Of Energy
	3. Recycling Of Materials
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).	1. Change
	2. Evolution
	3. Natural Selection
LS4– Humans are similar to other species in many ways, and yet are unique among Earth’s life forms.	1. Behavior
	2. Disease
	3. Human Identity
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Social Issues (Local And Global) Medical Technology and Biotechnology
	4. Career Technical Education Connections

(NH Department of Education- NH Curriculum Framework 2006)

**Essential Understandings
Physical Science**

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).	1. Composition
	2. Properties
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.	1. Change
	2. Conservation
	3. Energy
PS3– The motion of an object is affected by force.	1. Forces
	2. Motion
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Social Issues (Local and Global) Energy, Power, and Transportation Manufacturing
	4. Career Technical Education Connections

(NH Department of Education- NH Curriculum Framework 2006)

Essential Understandings Science Process Skills

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
SPS1– Scientific Inquiry and Critical Thinking Skills	1. Making observations and asking questions
	2. Designing scientific investigations
	3. Conducting scientific investigations
	4. Representing and Understanding results of Investigations
	5. Evaluating Scientific Investigations
	NECAP Science Assessment Targets for Inquiry (INQ) <i>May subject of performance component</i>
SPS2– Unifying Concepts of Science (including NECAP Science Assessment Targets by Big Idea)	1. Nature of Science (NOS)
	2. Systems and Energy (SAE)
	3. Models and Scale (MAS)
	4. Patterns of Change (POC)
	5. Form and Function (FAF)
SPS3– Personal, Social, and Technological Perspectives	1. Collaboration in Scientific Endeavors
	2. Environment, Natural Resources, and Conservation
	3. Science, Technology, and Design
SPS4– Science Skills for Information, Communication and Media Literacy	1. Information and Media Literacy
	2. Communication Skills
	3. Critical Thinking and Systems Thinking
	4. Problem Identification, Formulation, and Solution
	5. Creativity and Intellectual Curiosity
	6. Interpersonal and Collaborative Skills
	7. Self Direction
	8. Accountability and Adaptability
	9. Social Responsibility

(NH Department of Education- NH Curriculum Framework 2006)

Earth Science

	Standards	Guiding Questions
ES1	<p>**S:ESS1:4:1.3 Based on data collected from daily weather observations, describe weather changes or weather patterns. [ESS1(K-4)POC-5]</p> <p>**S:ESS1:4:1.4 Explain how the use of scientific tools helps to extend senses and gather data about weather (i.e., weather/wind vane– direction; wind sock– wind intensity; anemometer– speed; thermometer– temperature; meter sticks/rulers– snow depth; rain gauges– rain amount in inches). [ESS1(K-4)NOS-3]</p> <p>S:ESS1:4:2.2 Describe rock as being composed of different combinations of minerals.</p> <p>**S:ESS1:4:2.3 Given information about Earth materials, explain how their characteristics lend themselves to specific uses. [ESS1(K-4)FAF-6]</p> <p>**S:ESS1:4:2.4 Given certain Earth materials (soils, rocks, or minerals) use physical properties to sort, classify, and/or describe them. [ESS1(K-4)INQ-1]</p> <p>S:ESS1:4:5.1 Identify and describe processes that affect the features of the Earth’s surface, including weathering, erosion, deposition of sediment.</p>	<p>What weather changes or patterns can be observed when looking at the data? (Bar graph, line plot)</p> <p>What scientific tools are used by scientists to gather data about the weather?</p> <p>How do scientists use the scientific tools to gather data about the weather?</p> <p>What makes a rock?</p> <p>Describe how natural resources can be used to create products. (Car parts, tables, counter tables)</p> <p>What physical properties would be used to sort, classify and describe Earth materials?</p> <p>-Compare and contrast the physical properties of Earth materials.</p>

Earth Science

<p>**S:ESS1:4:5.2 Explain how wind, water, or ice shape and reshape the Earth's surface. [ESS1(K-4)INQ+SAE-4]</p> <p>S:ESS1:4:6.2 Distinguish between the three categories of rocks (metamorphic, igneous and sedimentary) and describe the processes that create them.</p> <p>S:ESS1:4:6.3 Identify minerals by their physical properties, such as color, texture and cleavage, and describe simple tests used in the identification process.</p> <p>**S:ESS1:4:6.4 Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves). [ESS1(K-4)INQ-2]</p> <p>S:ESS1:4:7.1 Recognize and describe the Earth's surface as mostly covered by water.</p> <p>S:ESS1:4:7.2 Explain that most of Earth's water is salt water, which is found in the oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers.</p>	<p>How does the interaction between wind, water and ice effect the Earth's surface? (Cause / Effect)</p> <p>Classify the properties of the three categories of rocks.</p> <p>What is the Earth's process to create a rock?</p> <p>Identify and describe the physical properties of different Earth minerals.</p> <p>How does the interaction between water and earth materials affect the Earth's surface?</p> <p>What can be done to protect the Earth's surface?</p> <p>What percent of the Earth is covered in water?</p> <p>What percent of the Earth is covered in salt water, fresh water, and brackish water?</p> <p>Where would you find salt water, fresh water, and brackish water?</p>
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Grade: 4

Earth Science

ES2	None at this level	None at this level
ES3	None at this level	None at this level
ES4	None at this level	None at this level

Grade: 4

Earth Science

Essential Vocabulary

<u>CONTENT</u>	<u>INQUIRY</u>
Weather	Identification process
Weather changes / patterns	Experiment
Weather/wind vane	Observation
Wind sock	Inference
Anemometer	Hypotheses
Thermometer	Question
Meter sticks/rulers	Conclusion
Rain gauges	Compare
Rock	Sort
Mineral	Classify
Soil	Predict
Three categories of rocks (metamorphic, igneous and sedimentary)	Measure
Earth's surface	Unit
Weathering	Data
Erosion	Evidence
Deposition of sediment	Demonstrate
Succession	
Wind / Water / Ice	

Grade: 4

Earth Science

Suggested Resources/ Activities

Weather Data Collection (temperature, precipitation, wind direction)

<http://www.weather.com/>

<http://www.sciencekids.co.nz/weather.html> (Weather Website)

<http://www.education.nh.gov/instruction/curriculum/science/index.htm>
(Science Curriculum Website)

<http://www.education.nh.gov/instruction/assessment/necap/released/index.htm>
(Science NECAP- Released items)

Harcourt Science: Earth Science- Earth's Surface

Life Science

	Standards	Guiding Questions
LS1	<p>**S:LS1:4:1.2 Sort/classify different living things using similar and different characteristics; and describe why organisms belong to each group or cite evidence about how they are alike or not alike. [LS1(K-4)INQ+POC-1]</p> <p>**S:LS1:4:2.3 Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire). [LS1(K-4)FAF-4]</p> <p>**S:LS1:4:2.4 Identify the basic needs of plants and animals in order to stay alive (i.e., water, air, food, space). [LS1(K-4)SAE-2]</p> <p>**S:LS1:4-3.4 Predict, sequence, or compare the life stages of organisms (plants and animals): e.g., put images of life stages of an organism in order, predict the next stage in sequence, and compare two organisms. [LS1(K-4)POC-3]</p>	<p>What are the basic needs for a plant or animal to survive?</p> <p>What are the life stages of a plant / animal?</p> <p>Depending on the plant / animal how would the life stages be the same /different? (Frog/ Bear)</p> <p>What physical characteristics are needed for a plant / animal to survive?</p>
LS2	<p>S:LS2:4:1.2 Describe the interaction of living organisms with nonliving things.</p> <p>S:LS2:4:2.1 Recognize that the transfer of energy through food is necessary for all living organisms and describe the organization of food webs.</p>	<p>How do living organisms and nonliving organisms interact?</p> <p>How do plants and animal receive energy? What are the different types of energy?</p> <p>What is a food web?</p>

Life Science

<p>LS2</p>	<p>**S:LS2:4:2.2 Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy. [LS2(K-4)SAE-5]</p> <p>S:LS2:4:3.1 Recognize that plants and animals interact with one another in various ways besides providing food, such as seed dispersal or pollination.</p> <p>**S:LS2:4:3.2 Describe ways plants and animals depend on each other (e.g., shelter, nesting, food). [LS2(K-4)SAE-6]</p>	<p>How do plants and animals interact and depend on each other?</p>
<p>LS3</p>	<p>**S:LS3:4:1.3 Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die). [LS3(K-4)SAE-7]</p> <p>S:LS3:4:3.1 Recognize that individuals of the same species differ in their characteristics; and explain that sometimes these differences give individuals an advantage in survival and reproduction.</p> <p>S:LS3:4:3.2 Recognize that for any particular environment, some kinds of animals and plants survive well, some less well, and some cannot survive at all.</p>	<p>Explain how plants / animals adapt to their environment to survive?</p> <p>Describe natural selection.</p>
<p>LS4</p>	<p>S:LS4:4:2.1 Explain how the amount of rest and the types of food, exercise and recreation humans choose can influence and affect their well-being.</p>	<p>What is the difference between genetic traits and learned traits?</p>

Life Science

<p>LS4</p>	<p>**S:LS4:4:3.1 Identify what the physical structures of humans do (e.g., sense organs—eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals. [LS4(K-4)FAF-8]</p> <p>**S:LS4:4:3.2 Distinguish between characteristics of humans that are inherited from parents (i.e., hair color, height, skin color, eye color) and others that are learned (e.g., riding a bike, singing a song, playing a game, reading). [LS4(K-4)POC-9]</p> <p>S:LS4:4:3.3 Recognize the nutritional value of different foods and distinguish between healthy and unhealthy food choices using data gathered from food labels and dietary guidelines, such as the food pyramid.</p>	<p>What are the differences between healthy and unhealthy foods?</p> <p>How does the physical structure of the human body keep a person safe?</p>
<p>LS5</p>	<p>S:LS5:4:2.1 Demonstrate the use of appropriate tools and simple equipment, such as thermometers, magnifiers and microscopes to gather data and extend the senses.</p>	<p>What tools are used in a doctor’s office?</p> <p>What tools are used to identify and classify organisms?</p>

Life Science

Essential Vocabulary	
<u>CONTENT</u>	<u>INQUIRY</u>
Characteristic	Identification process
Habitat	Experiment
Ecosystem	Observation
Population	Inference
Community	Hypotheses
Producer	Question
Consumer	Conclusion
Decomposer	Compare
Niche	Sort
Food Webs	Classify
Diversity	Predict
Adaptation	Measure
Natural Selection	Unit
Genetic Trait	Data
Learned Traits	Evidence
Food Pyramid	Demonstrate
Nutrition	

Life Science

Suggested Resources/ Activities

Inquiry Leaf Sort

Nutritionist

<http://www.kidsgeo.com/geography-for-kids/0164-ecosystems.php>

<http://www.wildlife.state.nh.us/Kids/kids.htm>

(Fish and wildlife service)

<http://www.education.nh.gov/instruction/curriculum/science/index.htm>

(Science Curriculum Website)

<http://www.education.nh.gov/instruction/assessment/necap/released/index.htm>

(Science NECAP- Released items)

Harcourt Science: Life Science- Looking at Ecosystems

Physical Science

	Standards	Guiding Questions
PS1	<p>**S:PS1:4:1.2 Use measures of weight (data) to demonstrate that the whole equals the sum of its parts. [PS1(K-4)SAE-3]</p> <p>**S:PS1:4:2.4 Make a prediction about what might happen to the state of common materials when heated or cooled; or categorize materials as solid, liquid, or gas. [PS1(K-4)POC-2]</p> <p>**S:PS1:4:2.5 Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility). [PS1(K-4)INQ-1]</p>	<p>What part of a fraction represents total number of equal groups?</p> <p>What part of a fraction represents parts under consideration?</p> <p>What will happen to a solid, liquid, or gas when heated / cooled?</p> <p>What are the properties of a solid / liquid / gas?</p> <p>How would you classify an object by its temperature, shape, weight, etc?</p>
PS2	<p>S:PS2:4:3.4 Differentiate between objects and materials that conduct electricity and those that are insulators of electricity.</p> <p>**S:PS2:4:3.6 Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together) predict the observable effects of energy (i.e., the bulb lights, a bell rings, hands warm up). A test item may ask, "What will happen when...?" [PS2(K-4)SAE-4]</p> <p>**S:PS2:4:3.7 Use observations of light in relation to other objects/substances to describe the properties of light (i.e., can be reflected, refracted, or absorbed). [PS2(K-4)SAE-5]</p>	<p>What are conductors / insulators of electricity?</p> <p>What are the similarities/difference between a series circuit and a parallel circuit?</p> <p>What must happen in order for a light bulb to turn on?</p> <p>What are the properties of light?</p>

Physical Science

PS2	<p>**S:PS2:4:3.8 Experiment, observe, or predict how heat might move from one object to another. [PS2(K-4) INQ+SAE-6]</p>	<p>How can heat move from one object to another?</p>
PS3	<p>S:PS3:4:1.1 Recognize that magnets attract certain kinds of other materials; and classify objects by those magnets will attract and those they will not.</p> <p>S:PS3:4:1.2 Recognize that magnets attract and repel each other.</p> <p>S:PS3:4:1.3 Explain that electrically charged material pulls on all other materials and can attract or repel other charged materials.</p> <p>S:PS3:4:1.4 Recognize that the Earth's gravitational force pulls any object toward it.</p> <p>**S:PS3:4:1.5 Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect). [PS3(K-4)INQ+SAE-8]</p>	<p>What materials are attracted to magnets?</p> <p>What materials are not attracted to magnets?</p> <p>When would two magnets attract towards each other?</p> <p>When would two magnets repel away from each other?</p> <p>How is a magnetic field and earth's gravitational force similar?</p>
PS4	<p>S:PS4:4:2.1 Demonstrate how to use tools, such as magnifiers, scales, balances, rulers, and thermometers to gather data and extend the senses.</p> <p>S:PS4:4:3.1 Give examples of transportation systems used in New Hampshire, such as buses, trains, cars, and bicycles; and describe the sources of energy they use.</p>	<p>What tools are used by scientists to conduct data based experiments?</p> <p>What types of transportation are used in N.H.?</p> <p>What energy sources are used in order for a bike, car, train, etc. to work?</p>

Physical Science

Essential Vocabulary	
<u>CONTENT</u>	<u>INQUIRY</u>
Physical property	Experiment
Solid	Observation
Liquid	Inference
Gas	Hypotheses
Electricity	Question
Static Electricity	Conclusion
Circuit	Compare
Parallel Circuit	Sort
Series Circuit	Classify
Conductor	Predict
Insulator	Measure
Electric current	Unit
Electric Cell	Data
Light / Energy	Evidence
Reflected	Demonstrate
Refracted	
Absorbed	
Magnet	
Poles	
Magnetic field	
Gravitational force	

Grade: 4

Physical Science

Suggested Resources/ Activities

Magnet Inquiry Task

http://www.chem4kids.com/files/matter_states.html

<http://www.kidskonnct.com/subject-index/15-science/90-magnets.html>

<http://www.education.nh.gov/instruction/curriculum/science/index.htm>

(Science Curriculum Website)

<http://www.education.nh.gov/instruction/assessment/necap/released/index.htm>

(Science NECAP- Released items)

Harcourt Science: Physical Science- Electricity and Magnetism