

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- Earth Science	Guiding Questions
ES1	<p>S:ESS1:6:1.1 Describe and make predictions about local and regional weather conditions using observation and data collection methods.</p> <p>S:ESS1:6:1.2 Identify weather patterns by tracking weather related events, such as hurricanes.</p> <p>S:ESS1:6:2.2 Describe and define the different landforms on the Earth’s surface, such as coastlines, rivers, mountains, deltas, canyons, etc.</p> <p>S:ESS1:6:2.3 Identify and distinguish between various landforms using a map and/or digital images.</p> <p>S:ESS1:6:3.2 Identify connections between fossil evidence and geological events, such as changes in atmospheric composition, movement of tectonic plates, and asteroid/comet impact; and develop a means of sequencing this evidence.</p> <p>S:ESS1:6:4.2 Explain that satellites can be used to view and track storms and Earth events, such as hurricanes and wild fires.</p> <p>S:ESS1:6:5.1 Recognize that things change in a steady, repetitive, or irregular ways, or sometimes in more than one way at the same time.</p>	<p>How do meteorologists predict the weather?</p> <p>What are landforms and how are they different from each other?</p> <p>How do scientists determine when something happened?</p> <p>What information can scientists gather from satellites that view the earth?</p> <p>Has the earth always looked like it does now?</p>

Earth Science

<p>ES1</p>	<p>S:ESS1:6:5.2 Explain how some changes to the Earth’s surface happen abruptly, as a result of landslides, earthquakes and volcanic eruptions; while other changes happen very slowly as a result of weathering, erosions and deposition of sediment caused by waves, wind, water and ice.</p> <p>S:ESS1:6:6.1 Explain how soil is formed from combinations of weathered rock and decomposed plant and animal remains, and that it contains living organisms.</p> <p>S:ESS1:6:6.2 Identify the components of soil and other factors, such as bacteria, fungi and worms, which influence its texture, fertility, and resistance to erosion.</p> <p>S:ESS1:6:6.3 Describe the properties of soil, such as color, texture, capacity to retain water, and its ability to support plant life.</p> <p>S:ESS1:6:7.2 Explain that water quality has a direct effect on Earth’s life forms.</p>	<p>What is dirt?</p> <p>Is all dirt the same?</p> <p>How important is clean water?</p>
<p>ES2</p>	<p>None at this level</p>	<p>None at this level</p>
<p>ES3</p>	<p>None at this level</p>	<p>None at this level</p>
<p>ES4</p>	<p>S:ESS4:6:3.3 Provide examples of how to reduce waste through conservation, recycling, and reuse</p>	<p>How can we reduce waste?</p>

Earth Science

Essential Vocabulary	
<u>CONTENT</u>	<u>INQUIRY</u>
Weather	Describe
Hurricane	Predict
Landform	Observe
Digital image	Collect data
Fossil evidence	Define
Geological events	Distinguish
Atmospheric composition	Identify connections
Tectonic plates	Recognize
Satellite	Explain
Earthquake	Provide examples
Volcano	
Weathering	
Erosion	
Deposition	
Sediment	
Soil	
Decomposed	
Organisms	
Components	
Texture	
Properties	
Capacity	
Water quality	
Conservation	
Recycling	
Reuse	

Grade:5th

Earth Science

Suggested Resources/ Activities – Earth Science

<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)

Science Matters: <http://science-mattersblog.blogspot.com/>

Middle School Science: <http://www.middleschoolscience.com/>

Life Science

	Standards- Life Science	Guiding Questions
LS1	<p>S:LS1:6:1.2 Categorize organisms into kingdoms that are currently recognized, according to shared characteristics.</p> <p>S:LS1:6:2.1 Recognize that all living things are composed of cells, and explain that while many organisms are single celled, such as yeast, others, including humans, are multicellular.</p> <p>S:LS1:6:2.2 Explain that the way in which cells function is similar in all organisms.</p> <p>S:LS1:6:2.3 Recognize that cells use energy obtain from food, to conduct the functions necessary to sustain life, such as cell growth.</p> <p>S:LS1:6:2.6 Recognize that the human cells found in tissues and organs are similar to those found in other animals, but somewhat different from cells found in plants.</p>	<p>How are organisms organized into groups?</p> <p>What do all living things have in common?</p> <p>How do animal and plant cells differ?</p>
LS2	<p>S:LS2:6:1.1 Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, the composition of the soil, any disease, the threat of predators, and competition from other organisms.</p>	<p>Why do some places have more organisms than others?</p>

Life Science

<p>LS2</p>	<p>S:LS2:6:2.1 Describe how energy is transferred in an ecosystem through food webs; and explain the roles and relationships between producers, consumers and decomposers.</p> <p>S:LS2:6:2.3 Describe the process of photosynthesis and explain that plants can use the food they make immediately or store it for later use.</p> <p>S:LS2:6:3.1 Define a population as all individuals of a species that exist together at a given place and time; and explain that all populations living together in a community, along with the physical factors with which they interact, compose an ecosystem.</p> <p>S:LS2:6:3.1 2 Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.</p>	<p>Where and how do living things get the energy they need to live?</p> <p>What are populations, communities, and ecosystems?</p> <p>Why do changes in environment matter to organisms?</p>
<p>LS3</p>	<p>S:LS3:6:1.1 Provide examples of how all organisms, including humans, impact their environment; and explain how some changes can be detrimental to other organisms.</p> <p>S:LS3:6:3.1 Recognize that there are genetic variations among individuals in groups of organisms and provide examples of how these variations affect the survival of an organism.</p>	<p>Do different types of organism make a difference in an environment?</p> <p>Are all of one kind of organism exactly the same?</p>

Grade: 5th

Life Science

LS4	<p>S:LS4:6:2.1 Explain that the human body has ways to defend itself against disease-causing organisms and describe how defenders, including tears, saliva, the skin, some blood cells and stomach secretions support the defense process.</p> <p>S:LS4:6:3.1 Recognize that the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, environmental conditions, and personal health behaviors.</p>	How do our bodies help us stay healthy and how can we help ourselves live longer?
LS5	None at this level	None at this level

Life Science

Essential Vocabulary

<u>CONTENT</u>	<u>INQUIRY</u>
Organisms	Categorize
Kingdoms	Recognize
Characteristics	Identify
Cells	Describe
Multicellular	Define
Energy	Explain
Functions	
Life	
Cell growth	
Tissues & organs	
Ecosystem	
Predators	
Competition	
Ecosystem	
Food web	
Producer	
Consumer	
Decomposer	
Photosynthesis	
Population	
Community	
Environmental conditions	
Species	
Environment	
Genetic variation	
Survival	
Disease	
Defense process	
Sanitation	
Diet	
Medical care	
Gender	
Genes	
Behavior	

Grade: 5th

Life Science

Suggested Resources/ Activities – Life Science

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

(Science NECAP- Released items)

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Physical Science

	Standards- Physical Science	Guiding Questions
PS1	<p>S:PS1:6:2.2 Identify substances by their physical and chemical properties, such as magnetism, conductivity, density, solubility, boiling and melting points.</p> <p>S:PS1:6:2.3 Differentiate between weight and mass.</p> <p>S:PS2:6:2.1 Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change.</p>	<p>What are properties of substances?</p> <p>Are weight and mass the same?</p>
PS2	<p>S:PS2:6:3.3 Recognize that energy, in the form of heat, is usually a by-product when one form of energy is changed to another, such as when machines convert stored energy to motion.</p> <p>S:PS2:6:3.5 Explain how electrical circuits can be used to transfer energy in order to produce heat, light, sound, and chemical changes.</p>	<p>Why do motors get hot?</p> <p>How does electricity work?</p>
PS3	<p>S:PS3:6:1.1 Recognize that just as electric currents can produce magnetic forces, magnets can cause electric currents.</p>	<p>How is electricity made?</p>
PS4	<p>S:PS4:6:3.1 Explain how a battery changes chemical energy into electrical energy.</p>	<p>What is a battery?</p>

Grade: 5th

Physical Science

PS4	<p>S:PS4:6:3.2 Demonstrate how to produce a magnetic force with an electric current, such as an electromagnet, and how to produce an electric current with a magnet, such as a generator.</p> <p>***S:PS4:6:3.3 Provide an example to show that manufacturing processes involve changing natural materials into finished products through a series of processes that involve physical and/or chemical changes.</p>	<p>How are magnetism and electricity related?</p> <p>How do natural materials become consumer products?</p>
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Physical Science

Essential Vocabulary	
<u>CONTENT</u>	<u>INQUIRY</u>
Physical property	Identify
Chemical property	Differentiate
Magnetism	Describe
Conductivity	Explain
Density	Recognize
Solubility	Demonstrate
Boiling point	Provide examples
Melting point	
Weight	
Mass	
Closed system	
Energy	
By-product	
Machine	
Motion	
Electrical circuits	
Transfer energy	
Heat, light, & sound	
Chemical change	
Magnetic force	
Electric current	
Battery	
Chemical energy	
Electrical energy	
Electromagnet	
Generator	

Grade: 5th

Physical Science

Suggested Resources/ Activities – Physical Science

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