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

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

(NH Department of Education- NH Curriculum Framework 2006)

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) *May subject of performance component*
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)

GRADE: 8

Physical Science

	Standards	Guiding Questions
PS1	**S:PS1:6:1.3** Recognize that over one hundred elements exist, and identify the periodic table as a tool for organizing the information about them. **S:PS1:8:1.7** Given graphic or written information, classify matter as atom/molecule or element/compound (Not the structure of an atom). **S:PS1:8:2.4** Investigate the relationships among mass, volume and density. **S:PS1:8:2.5** Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility) identify, compare, or classify different substances. **S:PS1:8:2.6** Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter.	How can everything be made of matter? How can the differences in matter's characteristics be used to identify substances? How does ice melt?
PS2	**S:PS2:6:1.1** Differentiate between a physical change, such as melting, and a chemical change, such as rusting. **S:PS2:8:1.5** Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).	Are all changes in matter the same? How is energy involved in everything that changes?

GRADE: 8

Physical Science

PS2	**S:PS2:6:2.1** Describe how mass remains constant in a closed system and provide examples relating to both physical and chemical change. **S:PS2:8:2.2** Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter) **S:PS2:6:3.2** Explain that sound vibrations move at different speeds, have different wavelengths; and establish wave-like disturbances that emanate from the source. **S:PS2:8:3.6** Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation).	How can it be that, in the big picture, the amount of mass doesn't change? What is sound? How do things heat up and cool down?
PS3	**S:PS3:6:2.1** Explain how balanced and unbalanced forces are related to an object's motion. **S:PS3:8:2.2** Use data to determine or predict the overall (net) effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects.	Why do some things move while others don't? What are the different kinds of forces?
PS4	None at this level	None at this level
	(No State standard) The Metric system and mass, volume, and length.	What is the metric system and how is it used?

GRADE: 8

Physical Science

Essential Vocabulary	
CONTENT	**INQUIRY**
Elements Periodic table Atom/Molecule Element/Compound Mass Volume Density Characteristic properties matter melting and boiling points solubility energy, molecular motion, temperature states of matter physical change chemical change system energy transformations chemical heat electrical gravitational light	Recognize Classify matter Investigate relationships Identify Compare Classify Represent or explain Differentiate Show Describe Provide examples Collect data Use data Infer Predict Explain Use data to draw conclusions Use data to determine or predict

GRADE: 8

Physical Science

sound **CONTENT CONT.** mechanical conservation of matter convection conduction radiation sound vibrations wavelengths balanced forces unbalanced forces friction magnetic	

GRADE: 8

Physical Science

Suggested Resources/ Activities
Selected chapter projects and activities from the textbook. 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) 2008 NECAP Practice Test Inquiry Task: “Rainy Morning.” 2010 NECAP released inquiry task: “Mass and Matter.” Science Matters: http://science-mattersblog.blogspot.com/ Middle School Science: http://www.middleschoolscience.com/