

## 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**

<b>Strand (Enduring Knowledge Statements)</b>	<b>Stem (rows) in GSEs</b>
<b>ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.</b>	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
<b>ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.</b>	1. Earth, Sun And Moon
	2. Energy
	3. Solar System
	4. View From Earth
<b>ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.</b>	1. Size And Scale
	2. Stars And Galaxies
	3. Universe
<b>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.</b>	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
<b>LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).</b>	1. Classification
	2. Living Things And Organization
	3. Reproduction
<b>LS2– Energy flows and matter recycles through an ecosystem.</b>	1. Environment
	2. Flow Of Energy
	3. Recycling Of Materials
<b>LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).</b>	1. Change
	2. Evolution
	3. Natural Selection
<b>LS4– Humans are similar to other species in many ways, and yet are unique among Earth’s life forms.</b>	1. Behavior
	2. Disease
	3. Human Identity
<b>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.</b>	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**

<b>Strand (Enduring Knowledge Statements)</b>	<b>Stem (rows) in GSEs</b>
<b>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).</b>	1. Composition
	2. Properties
<b>PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.</b>	1. Change
	2. Conservation
	3. Energy
<b>PS3– The motion of an object is affected by force.</b>	1. Forces
	2. Motion
<b>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.</b>	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
<b>SPS1– Scientific Inquiry and Critical Thinking Skills</b>	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>
<b>SPS2– Unifying Concepts of Science (including NECAP Science Assessment Targets by Big Idea)</b>	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)
<b>SPS3– Personal, Social, and Technological Perspectives</b>	1. Collaboration in Scientific Endeavors
	2. Environment, Natural Resources, and Conservation
	3. Science, Technology, and Design
<b>SPS4– Science Skills for Information, Communication and Media Literacy</b>	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: 1

## Earth Science

	<b>Standards</b>	<b>Guiding Questions</b>
<b>ES1</b>	<p>S:ESS1:2:1.1 Recognize that weather conditions change frequently, and that weather patterns change over the seasons.</p> <p>S:ESS1:2:1.2 Describe and compare weather using observations and measurements of local weather conditions.</p>	<p>How can we measure and record the temperature?</p> <p>What can we observe from temperature readings over time?</p> <p>Is there a predictable pattern?</p>
<b>ES2</b>	<p>S:ESS2:2:2.1 Recognize that the light and heat the Sun provides to the Earth is necessary for life.</p>	<p>Why do we and other animals need the sun?</p> <p>How do we and other animals in our area adapt to seasonal changes?</p>
<b>ES3</b>	<p>None at this level</p>	<p>None at this level</p>
<b>ES4</b>	<p>S:ESS4:2:2.1 Recognize, and with assistance, safely demonstrate the use of tools to gather data and extend the senses, such as thermometers, hand lens and balances.</p> <p>S:ESS4:2:3.1 Differentiate between natural and manmade materials.</p>	<p>What tools can we use to measure and record the temperature?</p> <p>Where do our clothes come from?</p>



EARTH SCIENCE

<b>Essential Vocabulary</b>	
<p><b><u>CONTENT</u></b></p> <p>weather seasons pattern temperature thermometer energy heat and light natural vs manmade materials</p>	<p><b><u>INQUIRY</u></b></p> <p>recognize describe compare observe measure demonstrate differentiate record predict explain sequence</p>

## EARTH SCIENCE

### Suggested Resources

#### Teacher Resources and Activities:

Harcourt curriculum guide

Teaching Children About Science by Elaine Levenson\*

Sky Watchers, Student Booklet \*

The Science Book of Weather by Neil Ardley\*

Understanding by Design by Grant Wiggins and Jay McTighe \*

Show Your Thinking by Elizabeth McLean and Sylvia Pusser \*

Simple Nature Experiments with Everyday Materials by Anthony Fredericks\*

Simple Science Experiments with Everyday Materials by Muriel Mandell \*

Teaching Science as Inquiry by Arthur Carin

<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)

<http://www.harcourtschool.com>

Our library system: weather – 551.5 and 551.6, seasons – 578.43

#### Trade books:

Temperature and Energy by Kay Manolis \* (631.6 and 636.5)

Bently, W.A. and W.J. Humphreys., Snow Crystals. Dover Publications, Inc., New York, New York. 1962\*\*

Rookie Read-About® Science Series including From Seed to Plant, It Could Still Be A Flower, Scientists ask Questions (many available at the libraries below)

*Investigate the Seasons* series by Capstone Press\*\*

Seasons of the Year from the “Patterns in Nature” Series by Capstone Press\*\*

Rookie Read-About® Science Series including What’s the Weather Today?, Scientists ask Questions (many available at all three libraries below)

It’s Spring!, It’s Summer!, It’s Fall!, It’s Winter! all by Linda Glaser \*\*\*

Lois Ehlert has many beautiful seasonal books, available at all three libraries

Charlie Needs a Cloak by Tomie dePaula

Unraveling Fibers by Patricia Keeler

\*Available in our school library

\*\*Available at the Brattleboro Library

\*\*\*Available at the Keene Library

EARTH SCIENCE

**Suggested Activities**

Ongoing line graph of the temperature in the morning and at the end of the day.

Experiment growing plants with different sources of light and consider how this affects the food chain.

Track the production of our clothes. Consider the materials; natural: cotton, wool, leather, silk, hemp and synthetic: nylon, polyester and other plastics. Consider the resources necessary to create and transport the final product.

Felt wool, try spinning and weaving, knit and crochet, mend garments. Test strength of different fibers before and after felting, spinning, weaving, knitting and crocheting.

## Life Science

	<b>Standards</b>	<b>Guiding Questions</b>
<b>LS1</b>	<p><b>S:LS1:2:1.1</b> Differentiate between living and nonliving things, and categorize objects in each group using the significant observable characteristics they share, such as color, shape and size.</p> <p><b>S:LS1:2:2.1</b> Recognize that plants and animals have features that help them survive in different environments.</p> <p><b>S:LS1:2:3.2</b> Recognize that living things have a life cycle, during which they are born, grow, and die.</p>	<p>How do we know that animals are alive?</p> <p>How can we categorize different animals and nonliving things?</p> <p>How do animals in our area adapt to seasonal changes?</p> <p>What is the life cycle of a butterfly? Frog? Bear?</p>
<b>LS2</b>	<p><b>S:LS2:2:1.2</b> Recognize that animals, including humans, interact with their surroundings using their senses and that different senses provide different kinds of information.</p> <p><b>S:LS2:2:2.1</b> Identify the resources plants and animals need for growth and energy, and describe how their habitat provides these basic needs.</p>	<p>How and why do we (and other animals) use our five senses?</p> <p>What do we (and other animals) need to stay alive?</p>
<b>LS3</b>	<p><b>S:LS3:4:1.3</b> Using information (data or scenario), explain how change in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).</p>	<p>How do local animals adapt to seasonal changes?</p>
<b>LS4</b>	<p><b>S:LS4:2:2.1</b> Recognize that proper nutrition, exercise and rest are all important factors in maintaining good health.</p>	<p>How can we be healthy individuals every day?</p> <p>Where does our food come from?</p>

Grade: 1

## Life Science

<b>LS5</b>	<b>S:LS5:2:1.1</b> Recognize that new products can be made out of natural materials, such as paper from trees and cloth from various plants and animals.	How do we use different animal products?
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## Life Science

### Essential Vocabulary

#### CONTENT

Observable characteristics  
Features  
Classification  
Survival  
Environment  
Life-cycle  
Food web  
Energy  
Interaction  
Five senses  
Information  
Resource  
Habitat  
Basic needs  
Change  
Response  
Survival  
Nutrition  
Health  
Evidence

#### INQUIRY

Differentiate  
Classify  
Categorize  
Observe  
Recognize  
Compare  
Explain  
Sequence  
Predict  
Describe  
Identify

Grade: 1

## Life Science

### Suggested Resources

#### Teacher Resources and Activities:

Simple Nature Experiments with Everyday Materials by Anthony Fredericks\*  
Chalufour, Ingrid and Karen Worth. Discovering Nature With Young Children.  
Redleaf Press, a division of Resources for Child Caring. 2004

Teaching Science as Inquiry by Arthur Carin

Understanding by Design by Grant Wiggins and Jay McTighe \*

Show Your Thinking by Elizabeth McLean and Sylvia Pusser \*

Harcourt Teachers Manual

<http://www.harcourtschool.com>

[www.learner.org/jnorth](http://www.learner.org/jnorth) - Journey North: A Global Study of Wildlife Migration  
and Seasonal Change

<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)

Nutritionist

Nurse

#### Trade books:

What Do You Do With a Tail Like This? By Jenkins, Steve and Robin Page\*

“I’m Alive!” Series by Mandy Suhr, pulished by Carolrhoda Books\*

Proteins are Powerful, Grains are Good and others by Jacqui Bailey \* (620.1)

How Nature Works by Davie Durnie \* (508)

Life in a Pond by Clare Olive \* (577.6)

What Lives in Streams and Rivers? by Gaarder-Junti \*(578.76)

What Lives in a Forest? by Gaarder-Junti \*(591.7)

Animals in the Wild by Sue Barraclough \* (590)

(Basically, check out the 590 section of the library!!)

Rookie Read-About® Science Series including Frogs & Toads & Tadpoles, Too,  
Hearing, Sound, etc. (many available at the libraries below)

“Animals in Their Habitats” Series published by Heinemann - Forest Animals,  
Pond Animals, Wetland Animals

“Creature Camouflage” Series published by Heinemann – Hiding in Wetlands,

Grade: 1

## Life Science

### Hiding in Forests

Bobbie Kalman's Leveled Readers, "My World" – How do Animals Change?, My Backyard Community, Animals Move Like This  
Hibernation from the "Patterns in Nature" Series by Capstone Press\*\*

\*Available in the school library

\*\*Available at the Brattleboro Library

\*\*\*Available at the Keene Library

### **Suggested Activities**

Focus on just a few animals ie: bears and frogs (hibernation), monarch (migration), and squirrels (stays active here). There are books available for each of these animals and young children relate to them well and can observe them (especially if you bring the pond muck and milkweed into your room).

Observe the life-cycles of butterflies and amphibians right in the room

Experiment with tools and products that mimic animal adaptations (straws = hummingbird beaks, spoons = spoonbill beaks, nut crackers = goldfinches beak or fuzzy sweater = bear fur, wet suit = frog skin and football pads = turtle shell

Use Thinking Maps to compare and contrast, describe and observe different animals



**Physical Science**

	<b>Standards</b>	<b>Guiding Questions</b>
<b>PS1</b>	<b>S:PS1:2:1.1</b> Recognize that objects are made up of many different types of materials, such as wood, metal, and paper.	What animal materials are used to make the objects around us?  What other natural materials are used to make the objects around us?
<b>PS2</b>	<b>S:PS2:2:3.1</b> Recognize that sound is produced by vibrating objects and that the pitch of the sound can be varied by changing the rate of vibration.	What is sound?  How is pitch changed?
<b>PS3</b>	<b>S:PS3:2:2.1</b> Describe the many different ways things can move, such as in a straight line, zigzag or circular motion, back and forth, and fast and slow.	What can we observe about how sound travels?
<b>PS4</b>	<b>S:PS4:2:1.1</b> Recognize that new objects can be made out of physical materials, such as cloth and paper.	How are animal and other natural materials used to make different fibers?

## Physical Science

### Essential Vocabulary

<u>CONTENT</u>	<u>INQUIRY</u>
Composition	Explain
Materials	Recognize
Properties	Identify
Characteristics	Observe
Observable	Predict
Change	Describe
Sound	Record
Pitch	Categorize
Vibration	Compare
Rate	Demonstrate
Energy	Explain
Motion	
Force	
Speed	
Data	

## Physical Science

### Suggested Resources

#### Teacher Resources and Activities:

Harcourt curriculum guide

Teaching Children About Science by Elaine Levenson\*

The Science Book by Sara Stein\*

Understanding by Design by Grant Wiggins and Jay McTighe \*

Show Your Thinking by Elizabeth McLean and Sylvia Pusser \*

Simple Nature Experiments with Everyday Materials by Anthony Fredericks\*

Simple Science Experiments with Everyday Materials by Muriel Mandell \*

More Than Magnets: Exploring the Wonders of Science in Preschool and Kindergarten by Sally Moomaw and Brenda Heironymus

Teaching Science as Inquiry by Arthur Carin

<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)

[http://www.naeyc.org/files/naeyc/Ramps\\_Pathways.pdf](http://www.naeyc.org/files/naeyc/Ramps_Pathways.pdf)

<http://www.harcourtschool.com>

Our library system: sound - 534

#### Trade books:

How Do We Use Materials? By Jacqui Bailey\* (620.1)

Machines by David Glover \* (631)

Sound by Jacqui Gailey \* (634)

Spilsbury, Richard and Louise, What is Sound?: Exploring Science with Hands-On Activities. Enslow Publishers. 2008\*\*

Rookie Read-About® Science Series including All About Sound, and Scientists Ask Questions (many available at the libraries below)

Bored, Nothing to Do, by Peter Spier\*\*\*

\*Available in our school library

\*\*Available at the Brattleboro Library

\*\*\*Available at the Keene Library

Grade:1

## Physical Science

### Suggested Activities

Make instruments (boxes with rubber bands, trumpets with hoses and water bottles, wash tub bases and wax paper harmonicas) and perform pieces with them.

Make can and string phones, experiment with distance, traveling through different mediums and change of direction.

Observe and experiment with waves through water and ropes.

Consider the natural products used to make our clothing – natural: cotton, wool, leather, silk, hemp.

Felt wool, spin and weave, knit and crochet.

Make different kinds of paper.