

## 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)

**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>S:ESS1:2:2.1 Recognize that solid rocks, soils, and water in its liquid and solid states can be found on the Earth's surface.</p> <p>S:ESS1:2:2.3 Recognize that Earth materials have a variety of properties, including size, shape, color and texture.</p>	<ol style="list-style-type: none"> <li>1. What is the weather like today and how can we record it?</li> <li>2. How does the weather change over time?</li> <li>3. How does the weather change water outside?</li> <li>4. What does nature make that we can use?</li> <li>5. Why are these things useful to us?</li> <li>6. How are nature's materials the same and how are they different?</li> </ol>
<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>	<ol style="list-style-type: none"> <li>7. Why do plants need the sun?</li> <li>8. How and why do plants in our area adapt to seasonal changes?</li> </ol>
<b>ES3</b>	None at this level	None at this level
<b>ES4</b>	<p>S:ESS4:2:3.1 Differentiate between natural and manmade materials.</p>	<ol style="list-style-type: none"> <li>6. How and for what do we use plant materials?</li> </ol>



Grade: Kindergarten

## Earth Science

<b>Essential Vocabulary</b>	
<b><u>CONTENT</u></b> Weather Seasons Pattern Temperature Precipitation Light Energy Manmade -vs- natural materials Size Shape Color Texture	<b><u>INQUIRY</u></b> Describe Compare Observe Record Differentiate Predict Explain Categorize Sequence

## Earth Science

### Suggested Resources

#### Teacher Resources and Activities:

Harcourt Manual

Teaching Children About Science by Elaine Levenson\*

Weather Ideas and Activities by C.C. Stack\*

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 \*

Discovering Nature With Young Children by Ingrid Chalufour and Karen Worth,  
Redleaf Press, a division of Resources for Child Caring. 2004

Teaching Science as Inquiry by Arthur Carin

<http://www.harcourtschool.com>

<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)

#### Trade books:

The sticky bear™ book of Weather by Richard Hefter\*

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

Snow Crystals by W.A. Bently and W.J. Humphreys\*\*\*

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 \*\*\*

Rain and Dreams by Peter Spier\*\*\*

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

\*Available in our school library

\*\*Available at the Brattleboro Library

\*\*\*Available at the Keene Library

### Suggested Activities

Grade: Kindergarten

## Earth Science

Ongoing bar graph of daily weather – sunny, cloudy, rainy, snowy, etc.

Pie graphs of each month's weather.

Compare and contrast natural and manmade materials.

Timelines of the seasons through pictures of different plants and animals.

“Life cycle” of a snowman, puddle, sandcastle, etc.

Experiment growing plants with different light sources and different amounts of light.

Seasonal collages – inspired by books with collage illustrations such as Snowballs, Leaf Man, Planting a Rainbow by Lois Ehlert, It's Spring!, and others by Linda Glaser and The Snowy Day by Ezra Jack Keats. Use natural materials and found objects!

Lots and lots of nature walks, rain or shine, wind or snow. Go at the kid's pace and let them observe EVERYTHING. Ask lots of wondering questions.

Texture table of seasonal materials (snow, leaves, seeds, water, snow), sift-able and sort-able materials (sand, pebbles and rocks or a variety of dried beans and rice), property changing materials (icicles and snow, clay with water, oobleck).

## 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:LS1:2:1.1</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 plants are alive?</p> <p>How can we categorize different plants?</p> <p>How do plants in our area respond to seasonal changes?</p> <p>What is the life cycle of a plant?</p>
<b>LS2</b>	<p><b>S:LS2:2:1.1</b> Recognize that living things can be found almost anyplace in the world; and that specific types of environments are required to support the many different species of plant and animal life.</p> <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>What kinds of plants are in our school yard?</p> <p>What do plants need to survive?</p> <p>How and why do we use our five senses?</p>
<b>LS3</b>	<p><b>S:LS3:4:1.3</b> Using information (data or</p>	<p>How do plants in our area</p>

## LIFE SCIENCE

	scenario), explain how change in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).	respond to seasonal changes?  How do we respond to seasonal changes?
<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><b>S:LS4:2:3.1</b> Recognize similarities and individual differences among people, and that children closely resemble their parents.</p> <p><b>S:LS4:2:3.2</b> Identify the sense organs, including eyes, ears, nose, mouth, and skin; and describe how each can warn an individual about danger.</p>	What can we do to be healthy individuals every day?  How are we the same and how are we different?  How and why do we use our five senses?
<b>LS5</b>	<p><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.</p>	How do we use different plan products?

Grade: Kindergarten

## LIFE SCIENCE

<b>Essential Vocabulary</b>	
<b><u>CONTENT</u></b>	<b><u>INQUIRY</u></b>
Observable characteristics	Observe
Features	Describe
Survival	Differentiate
Life cycle	Categorize
Habitat	Identify
Basic needs	Classify
Adapt	Recognize
Energy	Predict
Information	Sequence
Evidence	Compare
Change	Explain
Response	
Nutrition	
Health	
Natural materials	
Products	

## LIFE SCIENCE

### Suggested Resources

**Teacher Resources and Activities:**

Teaching Children About Science by Elaine Levenson\*

Seeds and Weeds from Windows On Beginning Science by Joan Westley\*

Environmental Education Activity Guide by Project Learning Tree\*

The Science Book by Sara Stein\*

Show Your Thinking by Elizabeth McLean and Sylvia Pusser \*

Simple Nature Experiments with Everyday Materials by Anthony Fredericks\*

Understanding by Design by Grant Wiggins and Jay McTighe\*

Teaching Science as Inquiry by Arthur Carin

Chalufour, Ingrid and Karen Worth. Discovering Nature With Young Children.

Redleaf Press, a division of Resources for Child Caring. 2004

Chalufour, Ingrid and Karen Worth. Discovering Nature With Young Children.

Redleaf Press, a division of Resources for Child Caring. 2004

Plants Storytelling kit available for checkout at Keene Library

Harcourt Guide

[www.harcourtschool.com](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.cfaitc.org/lessonplans/pdf/400.pdf> - *THE MYSTERIOUS PLANT CAPER: Gathering Clues to Solve the Mystery of What Plants Need to Grow*, written by Joanne Borovoy and Karen Holtman

<http://www.cfaitc.org/lessonplans/pdf/410.pdf> - *TREE TO TABLE*, written by Kelly King and Cynthia Livingston

<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)

**Trade books:**

The Five Senses series of books by María Rius\*

"I'm Alive!" Series by Mandy Suhr, published by Carolrhoda Books\*

Rookie Read-About® Science Series including Hearing,\* Touching,\* Tasting,\* Smelling,\* Knowing About Noses,\* Hearing Things,\* (and many others available in Keene and Brattleboro libraries)

You See with Your Eyes and You Touch with Your Fingers by Melvin and Gilda Berger\*

## LIFE SCIENCE

My Five Senses by Margaret Miller\*

Loving,\* Hats, Hats, Hats,\* Bread, Bread, Bread,\* Families, Play, Teamwork, and many others by Ann Morris (also available in Keene and Brattleboro)

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)

Autumn Leaves by Ken Robbins \*581.4

Leaves: The formation, characteristics, and uses of hundreds of leaves found in all parts of the world by Ghillean Tolmie Prance and Kjell Sandved\*\*

The Bizarre and Incredible World of Plants by Stuppy, Kessler and Harley\*\*

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)

The Carrot Seed by Ruth Krauss

Tops and Bottoms by Janet Stevens \*\*\*

Field Guides\*

\*Available in the school library

\*\*Available at the Brattleboro Library

\*\*\*Available at the Keene Library

### Suggested Activities

Focus on a few special plants in the area and cover them deeply. I recommend maple tree (deciduous, syrup), pine tree (evergreen conifer, lumber), lilac (shrub, showy flower, state flower), and corn (grass crop, food for us and livestock).

Seed investigations – sprout seeds to eat (radish, mung beans, radish, corn), sprout an avocado seed, identify what seeds we eat (nuts, beans, peas, corn, pumpkin and sunflowers, etc.), make seed collages, identify and categorize by method of travel

Press leaves and flowers and make art, categorize them, play variations of poker games using the characteristics of the leaves rather than suits and number's)

Journal the seasons of a tree from home or outside the classroom window.

Focus on local plant products – apples, pumpkins, corn, syrup, lumber. Visit a local farm or farmers market, sugar house, lumber yard.



KINDERGARTEN

LIFE SCIENCE

## Physical Science

	<b>Standards</b>	<b>Guiding Questions</b>
<b>PS1</b>	<p><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.</p> <p><b>S:PS1:2:2.1</b> Identify the observable properties of different objects, such as color, size, shape, weight and texture.</p>	<p>What can we observe about the objects around us?</p> <p>How can we categorize the objects around us?</p>
<b>PS2</b>	<p><b>S:PS2:2:1.1</b> Describe how the properties of certain materials can change when specific actions are applied to them, such as freezing, mixing, heating, cutting, dissolving and bending.</p>	<p>How can the weather change water?</p> <p>How can water change other materials?</p>
<b>PS3</b>	<p><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.</p> <p><b>S:PS3:4:2.1</b> Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls).</p>	<p>What can we observe about how water flows?</p> <p>How can we change the way water flows?</p> <p>What can we observe about how different objects move on ramps?</p> <p>How can we change the way objects move on ramps?</p>
<b>PS4</b>	None at this level	None at this level

## Physical Science

<b>Essential Vocabulary</b>	
<b><u>CONTENT</u></b>	<b><u>INQUIRY</u></b>
materials size, shape color texture characteristics observable change motion	explain identify observe recognize describe predict record categorize sort compare explain

## Physical Science

### Suggested Resources

#### Teacher Resources and Activities:

Teaching Children About Science by Elaine Levenson\*

Water and Ice from Windows on Beginning Science by Joan Westley\*

Constructions from Windows on Beginning Science by Joan Westley\*

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 \*

Exploring Water With Young Children and Building Structures with Young Children  
by Ingrid Chalufour and Karen Worth

Building Structures with Young Children by Ingrid Chalufour and Karen Worth

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

Harcourt Manual

<http://www.harcourtschool.com>

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

<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)

Our library system: water – 532

#### Trade books:

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

How Can Solids be Changed? By Jacqui Bailey\* (530.4)

A Drop of Water: A Book of Science and Wonder by Walter Wick \*

Rookie Read-About® Science Series including Will It Float or Sink?, 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

## Physical Science

### Suggested Activities

Water table exploration and experiments – sink and float, flow and dam, different sized funnels and clear plastic tubing, sieves, water plus property changing materials (flour, cornstarch, clay) –vs- non property changing materials (sand and/or river rocks, wood,)

Drops of water explorations – make and observe drops on different surfaces

Bubble exploration!

Lots and lots of sorting and classifying – objects, animals, food, each other.

Explore and investigate ramps with balls and cars, varying angles, surfaces and mass.

Provide structural challenges using limited materials – bridges and multi-story buildings, add challenge by requiring it to hold weight or allow objects to pass beneath them.

Playground investigations.

Ask lots of wondering questions.

Play and wonder and explore, play and wonder and investigate!