**New Haven Public Schools**
**New Teacher Day Elem Science**

**WHY TEACH SCIENCE?**

RICHARD THERRIEN  
K-12 SCIENCE SUPERVISOR

RICHARD THERRIEN  
K-12 SCIENCE SUPERVISOR
To Start... Try: Catch IT Task
MEASURE reaction time catching a ruler!

<table>
<thead>
<tr>
<th>Distance Ruler Dropped (in centimeters)</th>
<th>Reaction Time (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.05</td>
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<tr>
<td>2</td>
<td>.07</td>
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<td>3</td>
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<td>4</td>
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<td>0.23</td>
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<tr>
<td>30</td>
<td>0.25</td>
</tr>
</tbody>
</table>

☐ So, WHY TEACH SCIENCE?
OUR MOTTO FOR OUR KIDS:

Science is your key to the future.

NEW HAVEN CAPT RESULTS

2001 -------> 2007---->2008

- GOAL: 12% ----- 13.1 %--->15.6%
- PROFICIENT: 52.7%------> 51.6%-->50.6%
- Inquiry/Experimentation
- 6.5/12 (54%)----> 15.1/35-->15.4/35 (44%)
New Haven CMT Science Results

- Grade 8 GOAL: 25.2% (ahead of 7 towns)
- Grade 8 PROFICIENT: 45.4% (ahead of 7 towns)
- Grade 8: 50% content, 47% inquiry

- Grade 5 Goal: 21.3% (ahead of 5 towns)
- Grade 5 Proficient: 53.8% (ahead of 5 towns)
- Grade 5: 48% content, 54% inquiry

INQUIRY SKILLS 47% of NEW CAPT!, 50% of 8th Grade CMT

- This is what industry and college looks for.
- This is what we need to teach
- This is what our students need to improve their life!

- YOU can make the difference!
SCIENCE EDUCATION GOALS
Supported By The New State Framework

AN INVITATION FOR STUDENTS AND TEACHERS TO EXPLORE SCIENCE AND ITS ROLE IN SOCIETY

☐ Science literacy for ALL; solid foundation & motivation for advanced study for MORE!
☐ Science learning in a context of real world issues and technologies
☐ Science learning that is interesting & relevant to students
☐ Science learning that is an active and thoughtful exploration of questions and problems

☐ CT State Dept of Ed Science:

CONNECTIONS THAT SUPPORT LEARNING

STANDARDS:
What Students Should Know

DISTRICT:
Professional Growth Plan & PD

State: CCT & BEST

INSTRUCTION

Curriculum

District Scope & Sequence

State Framework

District Summative & Classroom Formative Assessments

State Summative CMT & CAPT

ASSESSMENT
### How Are Framework Learning Goals Organized?

**PreK-2:**
- Development of wonder about the natural world and the ability to apply basic process skills

**Grades 3-5:**
- Development of basic descriptions of natural phenomena and the ability to perform simple explorations

**Grades 6-8:**
- Development of basic explanations for natural phenomena, and the ability to apply experimental procedures to acquire new knowledge

**Grades 9-10:**
- Development of interest in global issues and the ability to collect, analyze and use data to explore and explain related science concepts

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<table>
<thead>
<tr>
<th>Grade 9 Core Themes, Content Standards and Expected Performances pg 1 of 3</th>
<th>Content Standards</th>
<th>Expected Performances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand II: Chemical Structures and Properties</strong></td>
<td><strong>Properties of Matter – How does the structure of matter affect the properties and uses of materials?</strong></td>
<td><strong>D.1.</strong> Describe how the chemical structure of polymers affects their properties</td>
</tr>
<tr>
<td></td>
<td>9.5 – Due to its unique chemical structure, carbon forms many organic and inorganic compounds.</td>
<td><strong>D.9.</strong> Explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.</td>
</tr>
<tr>
<td></td>
<td>- Carbon atoms can bond to one another in chains, rings and branching networks to form a variety of structures, including fossil fuels, synthetic polymers and the large molecules of life.</td>
<td><strong>D.10.</strong> Describe chemical reactions that produce covalent bonds between carbon atoms.</td>
</tr>
<tr>
<td></td>
<td><strong>Science and Technology in Society – How do science and technology affect the quality of our lives?</strong></td>
<td><strong>D.14.</strong> Describe the effects of chemical reactions on the properties of organic and inorganic compounds.</td>
</tr>
<tr>
<td></td>
<td>9.6 - Chemical technologies present both risks and benefits in the health and well-being of humans, plants and animals.</td>
<td><strong>D.15.</strong> Explain the significance of chemical technology and its impact on the quality of human life.</td>
</tr>
<tr>
<td></td>
<td>- Materials produced from the cracking of petroleum are the starting points for the production of many synthetic compounds.</td>
<td><strong>D.16.</strong> Explain how simple chemical reactions can be used to create complex fuels.</td>
</tr>
<tr>
<td></td>
<td>- The products of chemical technologies include synthetic fibers, pharmaceuticals, plastics and foods.</td>
<td><strong>D.17.</strong> Explain the processes involved in the production of synthetic polymers.</td>
</tr>
<tr>
<td>Quarter One</td>
<td>Quarter Two</td>
<td>Quarter Three</td>
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<tr>
<td><strong>K</strong></td>
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<tr>
<td><strong>Weather</strong></td>
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<tr>
<td>1</td>
<td><strong>Compere/Measures</strong></td>
<td><strong>Math; Prop. SB/e</strong></td>
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<td></td>
<td><strong>Measures</strong></td>
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<td><strong>5, 6, 7</strong></td>
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<td>2</td>
<td><strong>Sub.</strong></td>
<td><strong>SB/e</strong></td>
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<td><strong>SB/e</strong></td>
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<tr>
<td>3</td>
<td><strong>Rocks</strong></td>
<td><strong>Materials Prop. SB/e</strong></td>
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<td><strong>SB/e; Prop.</strong></td>
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<td></td>
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<td><strong>SB/e; Prop.</strong></td>
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<tr>
<td>4</td>
<td></td>
<td><strong>Energy/Ecology</strong></td>
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<td>5</td>
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<td><strong>Light/Heat</strong></td>
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<td><strong>Light/Heat</strong></td>
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<td>6</td>
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<td><strong>Ecosystem; Prop. SB/e</strong></td>
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<td>7</td>
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<td><strong>Matter Prop. SB/e</strong></td>
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<td><strong>Chemical Prop. SB/e</strong></td>
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<td>8</td>
<td></td>
<td><strong>Forces Prop. SB/e</strong></td>
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<td><strong>Forces Prop. SB/e</strong></td>
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<td><strong>Forces Prop. SB/e</strong></td>
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<tr>
<td>9</td>
<td><strong>Heat/Phase Changes</strong></td>
<td><strong>Alloys; Polymers; SB/e</strong></td>
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<td><strong>Alloys; Polymers; SB/e</strong></td>
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<tr>
<td>10</td>
<td><strong>Biochemistry</strong></td>
<td><strong>Cells/Prop. SB/e</strong></td>
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<td><strong>Cells/Prop. SB/e</strong></td>
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<td><strong>Cells/Prop. SB/e</strong></td>
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<tr>
<td>11</td>
<td><strong>Chemical Properties</strong></td>
<td><strong>Atoms; Prop. SB/e</strong></td>
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<td><strong>Atoms; Prop. SB/e</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Atoms; Prop. SB/e</strong></td>
</tr>
<tr>
<td>12</td>
<td><strong>Phases</strong></td>
<td><strong>Forces</strong></td>
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<td><strong>Forces</strong></td>
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</tbody>
</table>

**Overall Pacing Guide**

4 Units Per Grade K-6 rotation, any order

* = CT Embedded Task, NPS District Unit Tasks and Quarterly Assessments Also Required Grades 7-12, New Haven City Wide Science Framework
STC Kits

- Science Resource Center:
- 2-3 kits per year, 6-8 weeks to complete kit, 10-16 lessons.
- National research based activities, sequence, integrates literacy, math, SS.
- Kit rotation may change... may SHARE with others!
- Cindy Vieira 946-2818

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**PreK-Kindergarten**

### Core Themes, Content Standards and Expected Performances

<table>
<thead>
<tr>
<th>Content Standards</th>
<th>Expected Performances</th>
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</thead>
</table>
| Properties of Matter – How does the structure of something affect the properties and uses of materials? | **K**
| K.1 - Objects have properties that can be observed and used to describe similarities and differences.  
  - Some properties can be observed with the senses, and others can be discovered by using simple tools or tests. | • Use the senses and simple measuring tools, such as rulers and equal-arm balances, to observe common objects and sort them into groups based on size, weight, shape or color.
  - Sort objects - made of materials such as wood, paper and metal into groups based on properties such as flexibility, attraction to magnets, and whether they float or sink in water.
  - Count objects in a group and use mathematical terms to describe quantitative relationships such as: same as, more than, less than, equal, etc. |
| Science and technology in Society – How do science and technology affect the quality of our lives? | **K**
| K.4 - Some objects are natural, while others have been designed and made by people to improve the quality of life.  
  - If you select both natural and man-made materials to build shelters based on local climate conditions, properties of the materials and their availability in the environment. | • Describe the similarities and differences in the appearance and behaviors of plants, birds, fish, insects and mammals (including humans).
  - Describe characteristics that distinguish living from nonliving things.
  - Describe the similarities and differences in the appearance and behaviors of adults and their offspring.
  - Describe characteristics that distinguish living from nonliving things.
  - Describe the types of materials used by people to build houses, and the properties that make the materials useful.
  - Describe and record daily weather conditions.
  - Describe seasonal weather patterns to appropriate choices of clothing and activities.
### Grade 1

#### Core Themes, Content Standards and Expected Performances

<table>
<thead>
<tr>
<th>Content Standards</th>
<th>Expected Performances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forces and Motion – What makes objects move the way they do?</td>
<td>• D e scrie how the motion of objects can be changed by pulling and pushing.</td>
</tr>
<tr>
<td>1.1 - The sun appears to move across the sky in the same way every day, but its path changes gradually over the seasons.</td>
<td>• D e scrie the apparent movement of the sun across the sky and the changes in its position over time. CURRENT STC KIT: WEATHER</td>
</tr>
<tr>
<td>• An object’s position can be described by locating it relative to another object or the background.</td>
<td></td>
</tr>
<tr>
<td>• An object’s motion can be described by tracing and measuring its position over time.</td>
<td></td>
</tr>
<tr>
<td>Structure and Function – How are organisms structured to ensure efficiency and survival?</td>
<td>• D e scrie the different ways that animals, including humans, obtain water and food.</td>
</tr>
<tr>
<td>1.2 - Living things have different structures and behaviors that allow them to meet their basic needs.</td>
<td>• D e scrie the different structures plants have for obtaining water and sunlight.</td>
</tr>
<tr>
<td>• Animals need air, water and food to survive.</td>
<td>• D e scrie the structures that animals, including humans, use to move around.</td>
</tr>
<tr>
<td>• Plants need air, water and sunlight to survive.</td>
<td></td>
</tr>
<tr>
<td>Structure and Function – How are organisms structured to ensure efficiency and survival?</td>
<td>• D e scrie the changes in organisms, such as frogs and butterflies, as they undergo metamorphosis.</td>
</tr>
<tr>
<td>1.3 - Organisms change in form and behavior as part of their life cycles.</td>
<td>• D e scrie the life cycles of organisms that grow but do not metamorphose. OPTIONAL STC KIT: ORGANISMS</td>
</tr>
<tr>
<td>• Some organisms undergo metamorphosis during their life cycles; other organisms grow and change, but their basic form stays essentially the same.</td>
<td></td>
</tr>
<tr>
<td>Science and Technology in Society – How do science and technology affect the quality of our lives?</td>
<td>• Est imate, measure and compare the sizes and weights of different objects and organisms using standard and nonstandard measuring tools.</td>
</tr>
<tr>
<td>1.4 - The properties of materials and organisms can be described more accurately through the use of standard measuring units.</td>
<td>CURRENT STC KIT: COMPARING/MEASURING</td>
</tr>
<tr>
<td>• Various tools can be used to measure, describe and compare different objects and organisms.</td>
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</tbody>
</table>

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### Grade 2

#### Core Themes, Content Standards and Expected Performances

<table>
<thead>
<tr>
<th>Content Standards</th>
<th>Expected Performances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties of Matter – How does the structure of matter affect the properties and uses of materials?</td>
<td>• D e scrie differences in the physical properties of solids and liquids. CURRENT STC KIT: BALANCING/WEIGHING</td>
</tr>
<tr>
<td>2.1 - Materials can be classified as solid, liquid or gas based on their observable properties.</td>
<td></td>
</tr>
<tr>
<td>• Solids tend to maintain their own shapes, while liquids tend to assume the shapes of their containers, and gases fill their containers fully.</td>
<td></td>
</tr>
<tr>
<td>Structure and Function – How are organisms structured to ensure efficiency and survival?</td>
<td></td>
</tr>
<tr>
<td>2.2 - Plants change their forms as part of their life cycles.</td>
<td>• D e scrie the life cycles of flowering plants as they grow from seeds, proceed through maturation and produce new seeds. CURRENT STC KIT: BUTTERFLIES</td>
</tr>
<tr>
<td>• The life cycles of flowering plants include seed germination, growth, flowering, pollination and seed dispersal.</td>
<td></td>
</tr>
<tr>
<td>The Changing Earth – How do materials cycle through the Earth’s systems?</td>
<td>• Sort different soils by properties, such as particle size, color and composition.</td>
</tr>
<tr>
<td>2.3 - Earth materials have varied physical properties which make them useful in different ways.</td>
<td>• R e ad about the properties of different soils to their capacity to retain water and support the growth of certain plants. OPTIONAL STC KIT: CHANGES</td>
</tr>
<tr>
<td>• Soils can be described by their color, texture and capacity to retain water.</td>
<td></td>
</tr>
<tr>
<td>• Soils support the growth of many kinds of plants, including those in our food supply.</td>
<td></td>
</tr>
<tr>
<td>Science and Technology in Society – How do science and technology affect the quality of our lives?</td>
<td></td>
</tr>
<tr>
<td>2.4 - Human beings, like all other living things, have special nutritional needs for survival.</td>
<td>• I dentify the sources of common foods and classify them by their basic food groups.</td>
</tr>
<tr>
<td>• The essential components of balanced nutrition can be obtained from plant and animal sources.</td>
<td>• D e scrie how people in different cultures use different food sources to meet their nutritional needs.</td>
</tr>
<tr>
<td>• People eat different foods in order to satisfy nutritional needs for carbohydrates, proteins and fats.</td>
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</tbody>
</table>
### Grade 3

**Core Themes, Content Standards and Expected Performances**

<table>
<thead>
<tr>
<th>Content Standards</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3.1 - Materials have properties that can be identified and described through the use of simple tests.</td>
<td>• Sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat, and attracting to magnets.</td>
</tr>
<tr>
<td>• Heating and cooling cause changes in some of the properties of materials.</td>
<td>• Describe the effect of heating on the melting, evaporation, condensation and freezing of water.</td>
</tr>
<tr>
<td><strong>CURRENT STC KIT: CHEMICAL TESTS</strong></td>
<td></td>
</tr>
<tr>
<td>Heredity and Evolution – What processes are responsible for life’s unity and diversity?</td>
<td>• Describe how different plants and animals are adapted to obtain air, water, food and protection in specific land habitats.</td>
</tr>
<tr>
<td>• Plants and animals have structures and behaviors that help them survive in different environments.</td>
<td>• Describe how different plants and animals are adapted to obtain air, water, food and protection in water habitats.</td>
</tr>
<tr>
<td><strong>CURRENT STC KIT: PLANT GROWTH</strong></td>
<td></td>
</tr>
<tr>
<td>The Changing Earth – How do materials cycle through the Earth’s systems?</td>
<td>• Describe the physical properties of rocks and relate them to their potential uses.</td>
</tr>
<tr>
<td>3.3 - Earth materials have different physical and chemical properties.</td>
<td>• Describe the properties of rocks to the possible environmental conditions during their formation.</td>
</tr>
<tr>
<td>• Rocks and minerals have properties that may be identified through observation and testing; these properties determine how earth materials are used.</td>
<td><strong>CURRENT STC KIT (IN CLASSROOMS): ROCKS/MINERALS</strong></td>
</tr>
<tr>
<td>Science and Technology in Society – How does science and technology affect the quality of our lives?</td>
<td>• Describe how earth materials can be conserved by reducing the quantity used, and by reusing and recycling materials rather than discarding them.</td>
</tr>
<tr>
<td>3.4 - Earth materials provide resources for all living things, but these resources are limited and should be conserved.</td>
<td><strong>REQUIRED CMT EMBEDDED TASK: SOGGY PAPER</strong></td>
</tr>
<tr>
<td>• Decisions made by individuals can impact the global supply of many resources.</td>
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</tbody>
</table>

### Grade 4

**Core Themes, Content Standards and Expected Performances**

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</thead>
<tbody>
<tr>
<td>Forces and Motion – What makes objects move the way they do?</td>
<td>• Describe the effects of the strengths of pushes and pulls on the motion of objects.</td>
</tr>
<tr>
<td>4.1 - The position and motion of objects can be changed by pushing or pulling.</td>
<td>• Describe the effect of the mass of an object on its motion.</td>
</tr>
<tr>
<td>• The size of the change in an object’s motion is related to the strength of the push or pull.</td>
<td><strong>CURRENT STC KIT: MOTION AND DESIGN</strong></td>
</tr>
<tr>
<td>• The more massive an object is, the less effect a given force will have on its motion.</td>
<td></td>
</tr>
<tr>
<td>Matter and Energy in Ecosystems – How do matter and energy flow through ecosystems?</td>
<td>• Describe how animals, directly or indirectly, depend on plants to provide the food and energy they need in order to grow and survive.</td>
</tr>
<tr>
<td>4.2 - All organisms depend on the living and non-living features of the environment for survival.</td>
<td>• Describe how natural phenomena and some human activities may cause changes to habitats and their inhabitants.</td>
</tr>
<tr>
<td>• Plants and animals have structures and behaviors that help them survive and reproduce, and others die or move to new locations.</td>
<td><strong>CURRENT STC KIT: MOTION AND DESIGN</strong></td>
</tr>
<tr>
<td>Energy in the Earth’s Systems – How do external and internal sources of energy affect the Earth’s systems?</td>
<td>• Describe how the sun’s energy impacts the water cycle.</td>
</tr>
<tr>
<td>4.3 - Water has a major role in shaping the Earth’s surface.</td>
<td>• Describe the role of water in erosion and river formation.</td>
</tr>
<tr>
<td>• Water circulates through the Earth’s crust, oceans and atmosphere</td>
<td><strong>OPTIONAL STC KIT: LAND/WATER</strong></td>
</tr>
<tr>
<td>Energy Transfer and Transformations – What is the role of energy in our world?</td>
<td>• Describe how the energy in wires, batteries and bulbs transfer energy to light a light bulb.</td>
</tr>
<tr>
<td>4.4 - Electrical and magnetic energy can be transferred and transformed.</td>
<td>• Explain how simple electrical circuits can be adapted to determine which materials conduct electricity.</td>
</tr>
<tr>
<td>• Electricity in circuits can be transformed into light, heat, sound and magnetic effects.</td>
<td>• Describe the properties of magnets, and how they can be used to identify and separate mixtures of solid materials.</td>
</tr>
<tr>
<td>• Magnets can make objects move without direct contact between the object and the magnet.</td>
<td><strong>CURRENT STC KIT: CIRCUITS</strong></td>
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<tr>
<td><strong>REQUIRED CMT EMBEDDED TASK: GO WITH THE FLOW (Light Bulb)</strong></td>
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Grade 5

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<td><strong>Content Standards</strong></td>
</tr>
<tr>
<td>Energy Transfer and Transformations – What is the role of energy in our world?</td>
</tr>
<tr>
<td>5.1. Sound and light are forms of energy.</td>
</tr>
<tr>
<td>• Sound is a form of energy that is produced by the vibration of objects and is transmitted by the vibration of air and objects.</td>
</tr>
<tr>
<td>• Light is a form of energy that travels in a straight line and can be reflected by a mirror, refracted by a lens, or absorbed by objects.</td>
</tr>
<tr>
<td>Structure and Function – How are organisms structured to ensure efficiency and survival?</td>
</tr>
<tr>
<td>5.2 - Perceiving and responding to information about the environment is critical to the survival of organisms.</td>
</tr>
<tr>
<td>• The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.</td>
</tr>
</tbody>
</table>

REQUIRED CMT EMBEDDED TASK: CATCH IT

Earth in the Solar System – How does the position of Earth in the solar system affect conditions on our planet? | |
| 5.3 - Most objects in the solar system are in a regular and predictable motion. | • Explain the cause of day and night based on the rotation of Earth on its axis. |
| • The positions of the Earth and moon relative to the sun explain the cycles of day and night, and the monthly moon phases. | • D. e. scribe the monthly changes in the appearance of the moon, based on the moon’s orbit around the Earth. |

Science and Technology in Society – How do science and technology affect the quality of our lives? | |
| 5.4 - Humans have the capacity to build and use tools to advance the quality of their lives. | • C om p are and contrast the structures of the human eye with those of the camera. |
| • Advances in technology allow individuals to acquire new information about the world. | • D. e. scribe the uses of different instruments, such as eye glasses, magnifiers, periscopes and telescopes, to enhance our vision. |

CURRENT STC KIT: MICROWORLDS
CURRENT STC KIT: FOOD CHEMISTRY
(ELEM SCHOOL SCIENCE CMST IN MARCH)
ALL EMBEDDED TASKS COMPLETED

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Grade 6

<table>
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</tr>
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<td><strong>Content Standards</strong></td>
</tr>
<tr>
<td>Matter and Energy in Ecosystems – How do matter and energy flow through ecosystems?</td>
</tr>
<tr>
<td>6.2 An ecosystem is composed of all the populations that are living in a certain space and the physical factors with which they interact.</td>
</tr>
<tr>
<td>Populations in ecosystems are affected by biotic factors, such as other populations, and abiotic factors, such as soil and water supply.</td>
</tr>
<tr>
<td>Populations in ecosystems can be categorized as producers, consumers and decomposers of organic matter.</td>
</tr>
<tr>
<td>Energy in the Earth’s Systems – How do external and internal sources of energy affect the Earth’s systems?</td>
</tr>
<tr>
<td>6.3 - Variations in the amount of the sun’s energy hitting the Earth’s surface affect daily and seasonal weather patterns.</td>
</tr>
<tr>
<td>Local and regional weather are affected by the proximity of a large body of water.</td>
</tr>
<tr>
<td>Most precipitation that falls on Connecticut eventually reaches Long Island Sound.</td>
</tr>
<tr>
<td>Science and Technology in Society – How do science and technology affect the quality of our lives?</td>
</tr>
<tr>
<td>6.4 – Water moving across and through earth materials carries with it the products of human activities.</td>
</tr>
<tr>
<td>REQUIRED CMT EMBEDDED TASK: DIG IN</td>
</tr>
<tr>
<td>Energy Transfer and Transformations – What is the role of energy in our world?</td>
</tr>
<tr>
<td>7.1 - Energy provides the ability to do work and exist in many forms.</td>
</tr>
<tr>
<td>Work is the process of making objects move through the application of force.</td>
</tr>
<tr>
<td>Energy can be stored in many forms and can be transformed into the energy of motion.</td>
</tr>
</tbody>
</table>

CURRENT STC KIT: MAGNETS/MOTORS
CURRENT STC KIT: MEASURING TIME
Science Curriculum Overview: Format

- **Pacing Guide per grade PLUS**
- **Unit Goals, Power Standards**
- **CT Performance Expectations**
- **Essential Concepts/Skills**
- **CT Grade Level Expectations**
- **Misconceptions, Essential Vocabulary**

---

**Outline of Learning Activities** (downloadable)

- **Suggested, Essential, Required Activities**

---

**Significant Tasks**

---

**State Required Embedded Tasks**

---

**Reading for Information**

---

**Resources (Reading and more), Links**

---

**Significant Tasks**: A learning activity that addresses the essential power standard and concepts of this unit. Student and teacher materials are provided, along with assessment tools.

**Suggested, Essential, Required Activities**: The learning activities address essential concepts and skills of the unit. Student and teacher materials are provided, along with assessment tools.

---

**Outline of Learning Activities**: The learning activities are organized to support the unit goals and power standards. They are designed to meet the CT grade level expectations and provide opportunities for practice and assessment.

---

**State Required Embedded Tasks**: This section includes tasks that are aligned with the CT state performance expectations. These tasks are essential for meeting the CT grade level expectations and are required for student assessment.

---

**Reading for Information**: This section provides additional resources for students, such as links to more information, further reading, and other learning activities. It is designed to support the learning objectives of the unit.
Materials (K-8)

- Science Resource Center:
  - 2-3 Kits per year,
  - rotation to come next week
  - Some units from school budget
  - Sharing kits necessary

* Kit Rotation for K-4, 6 most 2 per year, some have a winter kit (see rotation)
  - Title I Schools received some 6-8 kits in June, others in Jan
  - Materials/text recommendations sent in May
  - Basic measuring tools should be in classrooms
Other Kits

- Title I schools: received some kit materials for grades 6, 7, 8. (NeoSci Kits)
- [http://nhps.net/curriculum/science/scimaterials.htm](http://nhps.net/curriculum/science/scimaterials.htm)
- These Neo Sci Kits should be available to all teachers by now. Not full units with lessons, but good materials.
- Same sets for non Title I Schools soon.
- Grade 4-6 teachers who participated in the UNH program all have class material kits for 4 units per grade.

Extra Materials

- Additional extra Materials. Mini Investigations, including assessments from CASAP (CT Academy Assessment) and NAEP (National Assessment of Education Progress), delivered to schools in November for use in units.
- Grade 2 NAEP Markers, CASAP Mystery Dots,
- Grade 3: NAEP Powders, NAEP Seeds
- Grade 4: CASAP Ramp, CASAP Magnets/Mystery Circuits
- Grade 5: CASAP Mystery Magnifiers
- Grade 6: NAEP Soils
- Grade 7: NAEP Powders
- Grade 8: CASAP Rebound Ramp.
Materials

☑ Basic Measuring Equipment: Rulers, Balances, StopWatch, MeterStick/Tape Cylinders, Beakers, Thermometers

☑ Useful: String, HotPlates, Gloves, Goggles, Wood, Batteries, Magnifying Glasses, Etc..

☑ Other….

Time

☐ must be specifically scheduled in the day.

☐ NHPS reports in their SSPs 80 hours per year for elementary students.

☐ Minimum scheduled science time is expected to be

☐ >100 minutes per week for grades K-4,

☐ (2 50 min periods better than 4 20 min periods)

☐ >135 minutes per week for grades 5-6, and

☐ > 200 minutes per week for grades 7-8.

☐ for every student
## Time K-6

- Time focused on the skills and concept standards
- Includes application of literacy
- Short non-fiction, writing of open-ended responses, and math application skills.
- Centered around inquiry-based investigations. (STC Kits have great teacher manuals!)
- Every classroom teacher K-6 should take responsibility for planning and implementing science instruction.

## Grade Level Expectations

- Draft in Summer 2007, sequential conceptual developments, include vocab words found on CMTs, teacher language
  [http://www.newhavenscience.org/6-8MSScienceGLEs.doc](http://www.newhavenscience.org/6-8MSScienceGLEs.doc)
- Draft2 in Summer 2008, shorter, use kid language and expectation.
- BOTH can be used!
- Not available for High School (CAPT) :(
Grade 8

Forces and Motion

8.1 — An object’s inertia causes it to continue moving the way it is moving unless it is acted upon by a force.

<table>
<thead>
<tr>
<th>State Framework</th>
<th>Grade-Level Expectations</th>
<th>CMT Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1.a</td>
<td>The motion of an object can be described by its position, direction of motion, and speed.</td>
<td>Calculate the average speed of an object and distinguish between instantaneous speed and average speed of an object.</td>
</tr>
<tr>
<td>8.1.b</td>
<td>An unbalanced force acting on an object changes its motion.</td>
<td>Design an experiment to determine the relationship between gravitational acceleration and fluid friction (air resistance) on a falling object.</td>
</tr>
<tr>
<td>8.1.c</td>
<td>Objects moving in circles must experience force acting toward the center.</td>
<td>Express mathematically how the mass of an object and the force acting on it affect its acceleration.</td>
</tr>
</tbody>
</table>

Science Curriculum Overview:

Vision

Science is for All Students

Science Literacy

Active Learning

Teachers Facilitators

- C22. Calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time.
- C23. Describe the qualitative relationships among force, mass and changes in motion.
- C24. Describe the forces necessary on an object to make it circular.
Science Curriculum Overview

**Instruction Philosophy**

- **Concepts**: The overall instructional strategy for teaching science skills and concepts is that of learning by doing. Abstract concepts in science are explained in class using diagrams, models, simulations, and a variety of media. Students take notes in class, and participate in class discussions.

- **Learning CYCLE (5 E's)**: A useful structure for inquiry-based learning is a 5E LEARNING CYCLE model. One such model is the “5E Model”, which envisions the learning to observe, inquire, and apply scientific concepts. The five stages of this model are:
  - Engagement: orientates students' interest, curiosity, and preconceptions.
  - Exploration: first-hand experiences with concepts without direct instruction.
  - Explanation: students’ explanations followed by introduction of formal terms and clarifications.
  - Elaboration: applying knowledge to solve a problem. Students frequently develop and complete their own well-designed investigations.
  - Evaluation: students and teachers reflect on changes in conceptual understanding and ideas still under development.

See: 5E Model: [http://www.newhavenscience.org/5e.doc](http://www.newhavenscience.org/5e.doc)

**Assessment Philosophy**

Students are assessed with a variety of methods on their knowledge of science concepts and skills, and how they apply to the real world.

---

**Key Research Based Strategies**

- Create a Climate for Learning: well-planned lessons, positive teacher attitude, hall, music, enriching environment.
- Follow a Guided Inquiry Learning Cycle (5E Model): Each Guided Inquiry Lesson contains a guided inquiry into a student posed question by students leading to an inquiry based lesson.

Learning Cycle

**Engagement**: stimulate students’ interest, curiosity and preconceptions;

**Exploration**: first-hand experiences with concepts without direct instruction;

**Explanation**: students’ explanations followed by introduction of formal terms and clarifications;

**Elaboration**: applying knowledge to solve a problem. Students frequently develop and complete their own well-designed investigations;

**Evaluation**: students and teachers reflect on change in conceptual understanding and identify ideas still “under development”.

See: 5E Model: [http://www.newhavenscience.org/5e.doc](http://www.newhavenscience.org/5e.doc)
**Science Standards**

<table>
<thead>
<tr>
<th>Content Standards</th>
<th>Expected Performances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCIENTIFIC INQUIRY</strong></td>
<td></td>
</tr>
<tr>
<td>• Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain, and predict natural phenomena.</td>
<td>C INQ.1: Identify questions that can be answered through scientific investigation.</td>
</tr>
<tr>
<td>• Scientific inquiry progresses through a continuous process of questioning, data collection, analysis, and application.</td>
<td>C INQ.2: Read, interpret and examine the credibility of scientific claims in different sources of information.</td>
</tr>
<tr>
<td>• Scientific inquiry is not just about setting up experiments, but also involves the presentation of results and ideas for critical review by others.</td>
<td>C INQ.3: Design and conduct appropriate types of scientific investigations to answer different questions.</td>
</tr>
<tr>
<td><strong>Important Science Inquiry &amp; Literacy Standards</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SCIENTIFIC LITERACY</strong></td>
<td></td>
</tr>
<tr>
<td>• Scientific literacy involves speaking, listening, presenting, interpreting, reading and writing about science.</td>
<td>C INQ.4: Use mathematical operations to analyze and interpret data.</td>
</tr>
<tr>
<td>• Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.</td>
<td>C INQ.7: Identify and present relationships between variables in appropriate graphs.</td>
</tr>
<tr>
<td><strong>SCIENTIFIC NUMERACY</strong></td>
<td></td>
</tr>
<tr>
<td>• Scientific numeracy includes the ability to</td>
<td>C INQ.8: Draw conclusions and identify sources of error.</td>
</tr>
<tr>
<td></td>
<td>C INQ.9: Provide explanations to investigated problems or questions.</td>
</tr>
<tr>
<td></td>
<td>C INQ.10: Communicate about science in different formats using relevant science vocabulary, supporting evidence and clear logic.</td>
</tr>
</tbody>
</table>

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**Scientific INQUIRY SKILLS**

- Inquiry (Experiments)
- Numeracy (Math connection)
- Literacy: includes Science, Technology, Society
INQUIRY SKILLS

☐ apply science process skills
☐ read and write science-related texts
☐ search scientific databases
☐ use mathematics to make sense out of data
☐ pose and evaluate arguments based on evidence
☐ apply logical conclusions from such arguments

WHAT DOES THIS MEAN?:

☐ Classroom activities and lessons need to include the USE of science and the discussion of its impact:
☐ ASSESSMENT of students on these skills.
**Elem Inquiry Standards**

<table>
<thead>
<tr>
<th>Scientific Inquiry</th>
<th>B INQ.1 Make observations and ask questions about objects, organisms and the environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B INQ.2 Seek relevant information in books, magazines and electronic media.</td>
</tr>
<tr>
<td></td>
<td>B INQ.3 Design and conduct simple investigations.</td>
</tr>
<tr>
<td></td>
<td>B INQ.4 Employ simple equipment and measuring tools to gather data and extend the senses.</td>
</tr>
<tr>
<td></td>
<td>B INQ.5 Use data to construct reasonable explanations.</td>
</tr>
<tr>
<td></td>
<td>B INQ.6 Analyze, critique and communicate investigations using words, graphs and drawings.</td>
</tr>
<tr>
<td>Scientific Literacy</td>
<td>B INQ.7 Read and write a variety of science-related fiction and nonfiction texts.</td>
</tr>
<tr>
<td></td>
<td>B INQ.8 Search the Web and locate relevant science information.</td>
</tr>
<tr>
<td>Scientific Numeracy</td>
<td>B INQ.9 Use measurement tools and standard units (e.g., centimeters, meters, grams, kilograms) to describe objects and materials.</td>
</tr>
<tr>
<td></td>
<td>B INQ.10 Use mathematics to analyze, interpret and present data.</td>
</tr>
</tbody>
</table>

**Grades 6-8 Core Scientific Inquiry, Literacy and Numeracy**

*How is scientific knowledge created and communicated?*

**C INQ.1** Identify questions that can be answered through scientific investigation.

**C INQ.2** Read, interpret and examine the credibility of scientific claims in different sources of information.

**C INQ.3** Design and conduct appropriate types of scientific investigations to answer different questions.

**C INQ.4** Identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

**C INQ.5** Use appropriate tools and techniques to make observations and gather data.

**C INQ.6** Use mathematical operations to analyze and interpret data.

**C INQ.7** Identify and present relationships between variables in appropriate graphs.

**C INQ.8** Draw conclusions and identify sources of error.

**C INQ.9** Provide explanations to investigated problems or questions.

**C INQ.10** Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.
EXPERIMENTS

- What makes a good experiment?
- What are the parts to a good experiment?
- What is the scientific method?

SCIENTIFIC METHOD:
- finding out something to investigate (the "problem"),
- coming up with a theory or hypothesis based on observations: how one property (chemical, physical, environmental, biological) affects another.
- designing a good experiment to test the idea, and making a prediction.
- conducting the experiment.
- organizing and analyzing the results.
- drawing a conclusion and stating the validity.
HYPOTHESIS:
CAUSE and EFFECT

- One property affects another property
- (factor, stimuli, characteristic, measurement, observation, etc..), both can be observed/measured.
### HYPOTHESIS:

**CAUSE** and **EFFECT**

- Independent Variable and Dependent Variable
- "Control" and "Responding"
- "Manipulated" Measured Result
- Input Output

**What makes a good experiment?**

**CAUSE** AFFECTS **EFFECT**

- All other properties remain the same, they are "controlled".
- A "VALID" experiment is one that assures that the result output (dependent variable) is due to the input (independent variable), not to any other factor.
- It also has a starting point to compare to, the "control"
PARTS OF AN EXPERIMENT

- Amount of light (IV) affects how high plant grows (DV)

LIGHT AFFECTS GROWTH

- Prediction: more light, more growth
- Independent: amount of light
- Dependent: amount of growth
- Control Group: Room setup with NO light
- Experimental Group: Others

- Constants: everything else (food, air, etc. All CONTROLLED)
Data To Graphing

- **Light:** Height
  - 1 fc: 20 cm
  - 2 fc: 28 cm
  - 10: 114 cm

Example Graph
OPEN ENDED LAB ACTIVITIES (examples)

- THREE WORDS EXPLAINS IT ALL!

Thoughts

- How do you introduce the important points of experimental design in your science class?

- What are some good ways to teach the scientific method and parts of good experiments throughout the year?
KEY ESSENTIAL Lab QUESTIONS

- How would we help students be able to construct their hypothesis as cause/effect?
- What are the key parts to this experiment?
- After doing the experiment:
  - What scaffolding do students need? (Prior experiments, experience)
  - What skills do they need?
  - Which inquiry/numeracy/literacy standards for our grade does this address?
- What extensions can we make?
- What are the key elements of a good lab report? Rubric for scoring lab?
- What about post lab discussion, teacher observation?

ASSESSMENT/DATA K-5

- Data on use of STC Kits shared with principals
- STC Kits and units contain formative and summative assessments.
- New K-3 curriculum units, draft UNH 4-6 units, and new 7-8 curriculum all include some formative and summative assessments.
- Additional materials include materials from the NAEP test and the CASAP test that have hands on labs with assessment questions. These can also be used as formative assessment.
- Embedded Tasks grades 3-8 (one per grade) contain summative assessment reflection questions.
- Fifth Grade practice: Developed as part of the science full court press to be used in January/February, CMT like assessment to be reviewed with students.
- Additional CMT like assessments for STC units to be developed during the year.
What’s an Embedded Task?

2-3 part lab investigation, also involves inquiry, "fair test" and writing

Grade 3: Soggy Paper, Grade 4 Go With the Flow (Circuits), Grade 5 Catch It!

Grade 6 Dig In

Grade 7 Feel the Beat

Grade 8 Shipping and Sliding

Grade 9: Plastics, Acid Rain, Solar Cooker Labs PLUS STS: Plastics, Brownfield Sites, Energy Graphs

Grade 10: Apple Juice Enzyme, Yeast Populations Labs PLUS STS Bioengineered Food, Populations

Catch IT Task

MEASURE reaction time catching a ruler!

<table>
<thead>
<tr>
<th>Distance Ruler Dropped (in centimeters)</th>
<th>Reaction Time (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.05</td>
</tr>
<tr>
<td>2</td>
<td>.07</td>
</tr>
<tr>
<td>3</td>
<td>.08</td>
</tr>
<tr>
<td>4</td>
<td>.09</td>
</tr>
<tr>
<td>5</td>
<td>.10</td>
</tr>
<tr>
<td>10</td>
<td>.14</td>
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<tr>
<td>15</td>
<td>.18</td>
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<tr>
<td>20</td>
<td>.20</td>
</tr>
<tr>
<td>25</td>
<td>.23</td>
</tr>
<tr>
<td>30</td>
<td>.25</td>
</tr>
</tbody>
</table>
ELABORATE

Investigation #2: What Affects Reaction Time?

In Investigation #1, you may have noticed that people have different reaction times. Through your research, you have learned how the senses and the brain communicate to cause reactions. What human characteristics or environmental conditions do you think might affect how fast someone can react? In Investigation #2, you will identify a reaction time question to explore.

Experiment

Do your experiment following the steps below:

1. DECIDE on a research question. RECORD it in your science notebook.
2. DESIGN a plan to conduct your investigation.
3. CREATE a data table in your science notebook that will help you keep your measurements organized. You will also want to record any unexpected observations and questions.
4. CONDUCT your experiment. Collect and record data for each trial in your notebook.
5. CALCULATE the average for each trial. RECORD the average in your data table.
6. DRAW a graph that compares your measurements for the factor you tested.
7. INTERPRET the data. What conclusions can you draw based on the graph? Did the factor you investigated have an effect?
PRESENT

Present Your Findings:

Work with your partners to make a poster that summarizes your investigation. Use the poster to make a presentation to your class to share the results of your investigation. They will want to hear what you found out. Some of them may have done a similar investigation, and you will want to know if their findings were similar to yours.

Your poster should include:

- The question you were investigating;
- A brief description of how you did your experiment;
- A graph showing your findings; and
- The conclusion that is supported by your data.

Be prepared to tell your class about any data you collected that might not be accurate because of unexpected things that happened during your experiment.

Example MC Question

Some students did an experiment to find out which type of paper holds the most water. They followed these steps:

1. Fill a container with 25 milliliters of water.
2. Dip pieces of paper towel into the water until all the water is absorbed.
3. Count how many pieces of paper towel were used to absorb all the water.
4. Repeat with tissues and napkins.

If another group of students wanted to repeat this experiment, which information would be most important for them to know?

a. The size of the water container
b. The size of the paper pieces *
c. When the experiment was done
d. How many students were in the group
Example Constructed Response

- Imagine that you want to do a pulse rate experiment to enter in the school science fair. You’ve decided to investigate whether listening to different kinds of music affects people’s pulse rate.

- Write a step-by-step procedure you could use to collect reliable data related to your question. Include enough detail so that someone else could conduct the same experiment and get similar results.

Example CMT Science Rubric

- Score Point 2
  
  The response is correct, complete and appropriate. The student has demonstrated a strong understanding of scientific concepts and inquiry skills. The response may contain minor errors that will not necessarily lower the score.

- Score Point 1
  
  The response is partially correct and appropriate although minor inaccuracies or misconceptions may occur. The student has demonstrated limited evidence of an understanding of scientific concepts and inquiry skills.

- Score Point 0
  
  The response is an unsatisfactory answer to the question. The student has failed to address the question or does so in a very limited way. The student shows no evidence for understanding scientific concepts and inquiry skills. Serious misconceptions may exist.
Science Testing (K-8)

- Covers K-5 topics
- Half on Skills, Embedded Tasks
- Assessments part of curriculum
- Practice for Grade 5 in Feb

Science Testing (6-8)

- Covers 6-8 topics
- Half on Skills, Embedded Tasks
- Assessments part of curriculum
- Quarterly Assessments 7-8 CMT like
- Practice for Grade 8 in Feb
CMT Science AT-A-GLANCE

- First administration March 2008
- Not currently part of AYP; on the horizon?
- Cumulative knowledge & inquiry skills
  - Elementary science assessed at Gr. 5
  - Middle school science assessed at Gr. 8
  - No science CMT in Grades 3, 4, 6 or 7
- Science CMT Format posted at
- Handbook in Word form:

Elementary Science Knowledge & Skills Tested

- Elementary Science CMT administered at Gr. 5
  - 57% Science Knowledge, 43% Inquiry:
    - B.1 to B.25 Framework Expected Performances (21 items)
    - BINQ 1 to BINQ 10 Framework Inquiry Performances (18 items)
      - 3 to 6 of these are related to curriculum-embedded tasks
    - 3 short written response items assess CONTENT
  - 39 questions; 42 points; single 65-minute session
Middle School Science Knowledge & Skills Tested

- Middle School Science CMT administered at Gr. 8
  - 59% Knowledge, 41% Inquiry:
  - C.1 to C.30 Framework Expected Performances (30 items)
  - CINQ 1 to CINQ 10 Framework Inquiry Performances (18 items)
  - 3 short written response items assess INQUIRY in context of curriculum-embedded performance tasks

- 48 questions; 51 points; single 70-minute session

Testing Accommodations

- Accommodations – per student’s IEP or 504 Plan
- ELL students who must take any part of or all of the CMT or CAPT
- Bureau of Student Assessment accommodations guidelines available at:
CMT/CAPT Science Question Types

- Multiple choice and short written responses
- Types of knowledge assessed:
  - basic factual knowledge
  - conceptual understanding
  - application of knowledge & skills
- No hands-on task on the testing day
- INQUIRY is partially assessed by questions related to curriculum-embedded task contexts

About Multiple Choice Items

- Brief stem, 4 not brief answer choices
- Answers bubbled in booklet
- Scientific literacy terms (see Framework and GLEs) may be used in context
- Vocabulary definitions are not tested
- Readability – grade appropriate as determined by teacher advisory committees
ASSESSMENT AND SOURCES

- CMT and CAPT Science Handbooks (CT)
- CAPT Released Items:
  - CMT PRACTICE TESTS:
    - STUDENT GRADE: http://www.newhavenscience.org/8NHPSFeb07PracticeCMT.pdf
    - TEACHER GRADE: http://www.newhavenscience.org/8NHPSFeb07PracticeCMTTEACHER.pdf
  - CAPT PRACTICE: http://www.newhavenscience.org/capt/index.htm
- NAEP QUESTION TOOL: http://nces.ed.gov/nationsreportcard/tmrls/startsearch.asp
- State Tests Online: http://www.edinformatics.com/testing/testing.htm (MAST, NYS, Texas, Colorado recommended)
- AMSCO and other Test Prep Books (Prentice Hall includes CMT Science Explorer)

Guide to Writing Formative Assessment Multiple Choice for Science

- http://www.newhavenscience.org/misconcept.doc
- http://tep.uoregon.edu/resources/assessment/multiplechoicequestions/mc4critthink.html
- http://jonathan.mueller.faculty.unc.edu/toolbox/tests/gooditems.htm
- http://hotpot.uvic.ca/howto/mcquestion.htm
What Works?

- KEY RESEARCH BASED SCIENCE INSTRUCTIONAL STRATEGIES
  - Create a Climate for Learning: well planned lessons, positive teacher attitude, safe, secure, enriching environment.
  - Follow a Guided Inquiry Learning Cycle Model: Open Ended Inquiry - Guided Inquiry into a teacher posed question by students leads to students investigating their own questions.
  - Generating and Testing Hypotheses: students given the opportunity to investigate their ideas.
  - Setting Objectives/Providing Feedback: Objectives are always clear for all class activities, students always know how they are meeting objectives.
  - Use Warm-Up Activities, Questions, Cues, Advance Organizers: Starter questions generate interest, cue students as to learning activities, and provide a reference throughout a lesson.
  - Assess Prior Knowledge/Misconceptions: Students have to construct their internal model of science concepts and reconcile it with previous experience, often leading to hard to overcome misconceptions.
  - Self-Explanation/Discussion: Students given the opportunity to explain and discuss ideas are better able to connect prior and new knowledge and experiences.
  - Opportunities to Communicate/Cooperative Learning: Science is a group endeavor, as is its learning. Students learn best by communicating and learning from each other.
  - Vary the Way Students Work: Lab groups, learning centers, projects, and other alternatives to traditional lecture allow for individualized instruction.
  - Practice Effective Questioning Techniques: Questions are the tool to move towards a student-centered classroom, and different types of questions help guide instruction and learning.
  - Vary the Structure of Lessons, Use Research Based Strategies: Lesson structure depends on the concepts and skills being learned and assessed. Brain-based research in learning points to specific effective varying structures.
  - Identify Similarities and Differences/Graphic Organizers: Science concepts are often organized into structures by humans attempting to understand nature. Help students understand the classification and organization of knowledge by continually comparing, classifying, as well as describing analogies and relationships.
  - Scaffolded Writing Practice: Students can move from oral explanation to written explanation through careful guidance/practice, including both expository and persuasive writing in science.
  - Strengthen Comprehension for Content Area Reading Text: provide guided focus question, organizers, response and discussion questions, summaries, evaluative prompts based on reading.
  - Non-Linguistic Representations: Models, drawings, and pictures all can help understand science.
  - Allow Opportunities for Peer Review: Students are frequently asked to evaluate others’ work on standardized testing and must be given regular opportunities as part of their science experience.
  - Create and Embed Science, Technology and Society (STS), issues, and other items relevant to students’ lives: These interdisciplinary learning activities are designed to engage students in the applications of science using their critical thinking skills and content knowledge to afford students the opportunity to examine ideas and data related to historical, technological, and/or social aspects of science concepts and content.

How Students Learn Science

- Principle #1: Engaging Prior Understandings (Pre/Misconceptions)
- Principle #2: Conceptual Frameworks in Understanding Factual Knowledge and, What does it Mean to Do Science
- Principle #3: The Importance of Self-Monitoring (Meta Cognition)
Learning Cycle

**Engagement:** stimulate students’ interest, curiosity and preconceptions;
**Exploration:** first-hand experiences with concepts without direct instruction;
**Explanation:** students’ explanations followed by introduction of formal terms and clarifications;
**Elaboration:** applying knowledge to solve a problem. Students frequently develop and complete their own well-designed investigations;
**Evaluation:** students and teachers reflect on change in conceptual understanding and identify ideas still “under development”.

See: 5E Model: [http://www.newhavenscience.org/5e.doc](http://www.newhavenscience.org/5e.doc)

Observation Expectations

- Class focused on skills, sound instruction (see strategies list, learning cycle)
- Discussion--> writing, HOTs (high ?)
- Not textbook, but concept/skills driven
- Goals/objectives
- EVIDENCE OF PLAN, adherence to standards and ideas
- Hands on.. As often as possible!
- Real life connections for these kids
- Teacher/student rapport to make a difference
Other important ideas

- Technology: United Streaming, EMAIL!
- Science Fair: May 12, 13, 14
- 90 day period
- Materials: School based budget.. Some Title I supplies from CO.
- OSHA/Safety regs esp 7th, 9-11th grade

New Haven Science Fair

- Important New Haven Science Fair Dates (08/09):
  - 10/30/08  CT State Science Fair School Registration Online
  - 11/20/08-2/1/09  NH Request Help from SRC Committee
  - 10/1/08-2/1/09  NH Mentor Request Form
  - 12/1/08  CT State Science Fair Registration Deadline (HS)
  - 2/24/09  NH SRC-Scientific Review Committee Deadline
  - 3/12/09  NH SRC resubmission Deadline
  - 2/24/09  NH School Participation Form
  - 2/15/09  CT State Science Fair Registration (MS), Abstracts (HS) Final Deadline
  - 12/1/08-2/20/09  NH Project Board Display Form
  - 3/10/09-3/14/09  CT State Science Fair
  - 4/09/09  NH School Science Fairs Deadline
  - 4/17/09  NHPS Science Fair Registration Forms Due
  - 5/05/09  NH Project Allocations, Bus Schedules Finalized
  - 5/12/09  Project Setup at Yale Commons AM, Project Pre Judging PM
  - 5/13/09  NHPS Science Fair: All students present for judging 9am-12pm, projects on public display in afternoon
  - 5/14/09: Projects picked up AM, Awards ceremony PM Woolsey Hall, Yale
For More Information

- All presentations, tests, rubrics, info found at
  - www.newhavenscience.org

- Richard Therrien
- 203-946-7933, 203-946-8664 (fax)
- Richard.therrien@new-haven.k12.ct.us

- Science Resource Center (KITS):
  - Cindy.vieira@new-haven.k12.ct.us  203-946-2818