Science Process Skills:
All students can explore the world by developing skills in...

SPS1: Scientific Inquiry and Critical Thinking Skills (INQ)

Topic	By the End of Grade 6 apply skills from previous grades and…	By the End of Grade 8 apply skills from previous grades and…
1. MAKING OBESERVATIONS AND ASKING QUESTIONS.	S(SPS1)-6-1.1 Make observations and record measurements using a variety of tools and instruments. S(SPS1)-6-1.2 Plan observations based on a given purpose. S(SPS1)-6-1.3 Identify and investigate similarities and differences among observations and sets of observations. S(SPS1)-6-1.4 Use appropriate units and precision of metric measurement when recording data. S(SPS1)-6-1.5 Use a classification key, such as a dichotomous key, to identify and distinguish among members of a group or set. S(SPS1)-6-1.6 Construct a simple classification key. S(SPS1)-6-1.7 Compare methods of classification for a specific purpose. S(SPS1)-6-1.8 Ask questions about relationships between and among observations. S(SPS1)-6-1.9 Determine what observations will be helpful to a given investigation. S(SPS1)-6-1.10 Distinguish between those questions that can be answered by science and those that cannot.	S(SPS1)-8-1.1 Use appropriate tools to accurately collect and record both qualitative and quantitative data gathered through observations. (i.e. temperature probes, electronic balances, spring scales, microscopes, stop watches, etc) S(SPS1)-8-1.2 Given the tool, determine the degree of accuracy that can be obtained using a given instrument. S(SPS1)-8-1.3 Investigate similarities and differences noted when making observations. S(SPS1)-8-1.4 Construct and use a dichotomous key to classify a given set of objects or organisms. S(SPS1)-8-1.5 Evaluate methods of classification for a specific purpose. S(SPS1)-8-1.6 Rephrase questions so that they can be tested or investigated using scientific methodologies. S(SPS1)-8-1.7 Ask questions about relationships between and among observable variables.

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SPS1: Scientific Inquiry and Critical Thinking Skills (INQ)		
Topic	**By the End of Grade 6** apply skills from previous grades and…	**By the End of Grade 8** apply skills from previous grades and…
2. DESIGNING SCIENTIFIC INVESTIGATIONS	S(SPS1)-6-2.1 Design and record a simple step-by-step procedure to follow in order to carry out a fair test of a scientific question. S(SPS1)-6-2.2 Identify and utilize appropriate tools/technology for collecting data in designing investigations. S(SPS1)-6-2.3 Incorporate components of good experimental design, such as controls and multiple trials into investigations.	S(SPS1)-8-2.1 Identify the manipulated, responding and controlled variables in an experiment. S(SPS1)-8-2.2 Design a controlled experiment, identifying and controlling the major variables. S(SPS1)-8-2.3 Identify flaws or omissions in the design of simple experiments.
3. CONDUCTING SCIENTIFIC INVESTIGATIONS	S(SPS1)-6-3.1 Carry out simple student or teacher developed procedures or experiments. S(SPS1)-6-3.2 Use appropriate tools to collect and record data. S(SPS1)-6-3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.	S(SPS1)-8-3.1 Use appropriate laboratory techniques to carry out student- or teacher-developed procedures or experiments. S(SPS1)-8-3.2 Use appropriate tools to gather data as part of an investigation (i.e., ruler, meter stick, thermometer, spring scale, graduated cylinder, calipers, balance, probes, microscopes, etc.). S(SPS1)-8-3.3 Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.

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SPS1: Scientific Inquiry and Critical Thinking Skills (INQ)		
	By the End of Grade 6 apply skills from previous grades and…	**By the End of Grade 8** apply skills from previous grades and…
4. REPRESENTING AND UNDERSTANDING RESULTS OF INVESTIGATIONS	S(SPS1)-6-4.1 Use appropriate tools to organize, represent, analyze and explain data. S(SPS1)-6-4.2 Make and record observations using a pre-determined format. S(SPS1)-6-4.3 Compare and display data in a variety of student or computer generated formats (such as diagrams, flow charts, tables, bar graphs, line graphs, scatter plots, and histograms). S(SPS1)-6-4.4 Identify patterns and relationships in data and formulate basic explanations. S(SPS1)-6-4.5 Draw appropriate conclusions based on data collected.	S(SPS1)-8-4.1 Use appropriate tools - including computer hardware and software - to collect, organize, represent, analyze and explain data. S(SPS1)-8-4.2 Identify sources of error in experiments S(SPS1)-8-4.3 Draw appropriate conclusions regarding the scientific question under investigation, based on the data collected.
5. EVALUATING SCIENTIFIC EXPLANATIONS	S(SPS1)-6-5.1 Determine if the results of an experiment support or fail to support the scientific idea tested. S(SPS1)-6-5.2 Explain how a hypothesis is a direct extension of a scientific idea and therefore makes that idea “testable.”	S(SPS1)-8-5.1 Determine if the results of an experiment support or refute the scientific idea tested. S(SPS1)-8-5.2 Evaluate whether the information and data collected allows an evaluation of the scientific idea under investigation. S(SPS1)-8-5.3 Determine what additional information would be helpful in answering the scientific question.

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SPS1: Scientific Inquiry and Critical Thinking Skills (INQ)	
	By the End of Grade 8
TRI-STATE TARGETS FOR INQUIRY **(MAY BE SUBJECT OF PERFORMANCE COMPONENT)**	<u>TRI-STATE SCIENCE TARGETS</u>: *NH CODE* — *[TRI-STATE CODE NUMBER]* S(ESS1) – 8 - 2.2 — [ESS1(5-**8**)INQ+POC-1] S(ESS1) – 8 - 6.4 — [ESS1(5-**8**)INQ+POC-5] S(LS1) – 8 - 2.5 — [LS1(5-**8**)INQ + SAE – 1] S(LS2) – 8 - 1.3 — [LS2 (5-**8**) INQ + SAE – 5] S(LS4) – 8 - 2.4 — [LS4(5-**8**) INQ –10] S(LS1) – 8-3.7 — [LS4(5-**8**) INQ + POC–11] S(LS4) – 8 - 3.4 — [LS4(5-**8**) INQ + POC–11] S(PS1) – 8 - 2.4 — [PS1(5-**8**) INQ – 1] S(PS1) – 8 - 2.5 — [PS1(5-**8**) INQ + POC – 2] S(PS1) – 8 - 1.6 — [PS1(5-**8**) INQ + SAE – 3] S(PS2) – 8 - 3.6 — [PS2(5-**8**) INQ + SAE + POC – 7] S(PS3) – 8 - 1.3 — [PS3 (5-**8**) INQ + POC – 8]

Science Process Skills:
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SPS2: Unifying Concepts of Science.

	By the End of Grade 6 Apply skills from previous grades and…	By the End of Grade 8 Apply skills from previous grades and…
1. NATURE OF SCIENCE (NOS)	S(SPS2)-6-1.1 Scientists do not pay much attention to claims about how something works unless they are backed up with evidence that can be confirmed and with a logical argument. S(SPS2)-6-1.2 Describe how results of similar and repeated investigations may vary and suggest possible explanations for variations. S(SPS2)-6-1.3 Sometimes similar investigations get different results because of unexpected differences in the things being investigated, the methods used, or the circumstances in which the investigation is carried out, and sometimes just because of uncertainties of observations. S(SPS2)-6-1.4 If more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributable to any one of the variables.	S(SPS2)-8-1.1 Scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence. S(SPS2)-8-1.2 When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and this often requires more investigations. S(SPS2)-8-1.3 Knowledge, based on science, is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way. S(SPS2)-8-1.4 Some scientific knowledge is very old and yet is still applicable today. S(SPS2)-8-1.5 Some matters cannot be examined usefully in a scientific way. Among them are matters that by their nature cannot be tested objectively and those that are essentially matters of morality. S(SPS2)-8-1.6 Science can sometimes be used to inform ethical decisions by identifying the likely consequences of particular actions but cannot be used to establish that some action is either moral or immoral. TRI-STATE SCIENCE TARGETS: NH CODE [TRI-STATE CODE] S(ESS2) – 8 - 4.1 [ESS2(5-**8**)NOS-7]

Science Process Skills:
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SPS2: Unifying Concepts of Science

	By the End of Grade 6 Apply skills from previous grades and…	By the End of Grade 8 Apply skills from previous grades and…
2. SYSTEMS AND ENERGY (SAE) **(includes Systems, Order and Organization)**	S(SPS2)-6-2.1 Thinking about things as systems means looking for how every part relates to others. S(SPS2)-6-2.2 Collections of pieces (powders, marbles, sugar cubes or wooden blocks) may have properties that the individual pieces do not. S(SPS2)-6-2.3 Estimate or predict the effect of making a change in one part of the system will have on other parts and on the system as a whole. S(SPS2)-6-2.4 Energy exists in a variety of forms, including heat, light, sound, mechanical, electrical, and chemical energy. S(SPS2)-6-2.5 Energy can be transformed from one form to another, for example, from electrical energy to heat, light or mechanical energy.	S(SPS2)-8-2.1 Any system is usually connected to other systems, both internally and externally, thus a system may be thought of as containing subsystems and as being a subsystem of a larger system. S(SPS2)-8-2.2 The output of one part of a system, which can include materials, energy or information) can become the input to other parts. S(SPS2)-8-2.3 As the complexity of any system increases, gaining an understanding of it depends increasingly on summaries, such as averages and ranges, and on descriptions of typical examples of that system. S(SPS2)-8-2.4 When energy is transformed or converted from one type to another, there is no net loss of energy. S(SPS2)-8-2.5 Objects and substances can store energy, for example a battery, food or gasoline. TRI-STATE SCIENCE TARGETS: NH CODE [TRI-STATE CODE] S(ESS1) – 8 - 7.3 [ESS1(5-**8**)SAE-2] S(ESS1)-8-5.3 [ESS1(5-**8**)SAE+POC-4] S(ESS2) – 8 - 1.4 [ESS2(5-**8**)SAE+POC-8] S(ESS2)-8-3.5 [ESS2(5-**8**)SAE+POC-8] S(ESS2) – 8 - 4.1 [ESS2(5-**8**)NOS-7] S(LS1) – 8 - 2.5 [LS1(5**-8)**INQ+SAE-1] S(LS1) – 8 - 1.2 [LS1(5-**8**)SAE+FAF-2] S(LS2) – 8 - 1.3 [LS2(5-**8**)INQ+SAE-5] S(LS2) – 8 - 2.2 [LS2(5-**8**)SAE-6] S(LS2) – 8 - 3.6 [LS2(5-**8**)SAE-7] S(PS1) – 8 - 1.6 [PS1(5-**8**)INQ+SAE-3] S(PS1) – 8 - 2.6 [PS1(5-**8**)SAE+MAS-4] S(PS2)-8-2.2 [PS1(5-**8**)INQ+SAE-3] S(PS2) – 8 - 1.5 [PS2(5-**8**)SAE+POC-6] S(PS2) – 8 - 3.6 [PS2(5-**8**)INQ+SAE+POC-7]

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SPS2: Unifying Concepts of Science.

	By the End of Grade 6 Apply skills from previous grades and…	By the End of Grade 8 Apply skills from previous grades and…
3. MODELS AND SCALE (MAS) **(EVIDENCE, MODELS, MEASUREMENT, AND EXPLANATION)**	S(SPS2)-6-3.1 Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous. S(SPS2)-6-3.2 Finding out the biggest and smallest values of something are often as revealing as knowing what the usual value is.	S(SPS2)-8-3.1 Mathematical models can be displayed on a computer and then modifies to see what happens. S(SPS2)-8-3.2 Different models can be used to represent the same thing. What kind of model is used and how complex it should be depends on its purpose. The usefulness of a model is one of the instances in which intuition and creativity come into play in science, mathematics and engineering. S(SPS2)-8-3.3 Properties of systems that depend on volume, such as capacity and weight change, change out of proportion to properties that depend on area, such as strength or surface processes. S(SPS2)-8-3.4 As the complexity of any system increases, gaining an understanding increasingly depends on summaries, such as averages and ranges, and on descriptions of typical examples of that system. TRI-STATE SCIENCE TARGETS: *NH CODE* *[TRI-STATE CODE]* S(ESS2) – 8 - 3.4 [ESS2(5-**8**)MAS-6] S(LS3) – 8 - 2.3 [LS3(5-**8**)MAS+FAF-8] S(PS1) – 8 - 2.6 [PS1(5-**8**)SAE+MAS-4] S(PS1) – 8 - 1.7 [PS1(5-**8)**MAS-5]

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SPS2: Unifying Concepts of Science.

	By the End of Grade 6 Apply skills from previous grades and…	By the End of Grade 8 Apply skills from previous grades and…
4. PATTERNS OF CHANGE (POC) **(CONSTANCY, CHANGE, EVOLUTION AND EQUILIBRIUM)**	S(SPS2)-6-4.1 Things change in steady, repetitive, or irregular ways—or sometimes in more than one way at the same time. Often the best way to tell which kinds of change are happening is to make a table or graph of measurements. S(SPS2)-6-4.2 A system may stay the same because nothing is happening or because things are happening that exactly balance each other out.	S(SPS2)-8-4.1 Physical and biological systems tend to change until they become stable and then stay that way unless their surroundings change. S(SPS2)-8-4.2 Many systems contain feedback mechanisms that serve to keep changes within specified limits. S(SPS2)-8-4.3 Symbolic equations can be used to summarize how the quantity of something changes over time or in response to other changes. S(SPS2)-8-4.4 Symmetry (or the lack of it) may determine properties of many objects, from molecules and crystals to organisms and designed structures. S(SPS2)-8-4.5 Cycles, such as the seasons or body temperature, can be described by their cycle length or frequency, what their highest and lowest values are, and when those values occur. Different cycles range from many thousand years down to less than a billionth of a second. <u>TRI-STATE SCIENCE TARGETS:</u> *NH CODE* *[TRI-STATE CODE]* S(ESS1) – 8 - 2.2 [ESS1(5-**8**)INQ+POC-1] S(ESS1)- 8 - 5.2 [ESS1(5-**8**)POC-3] S(ESS1) – 8 - 6.4 [ESS1(5-**8**)INQ+POC-5] S(ESS2) – 8 - 1.4 [ESS2(5-**8**)SAE+POC-8] S(LS1) – 8 - 3.6 [LS1(5-**8**)POC-3] S(LS1) – 8-3.7 [LS4(5-**8**) INQ + POC–11] S(LS3) – 8 - 3.5 [LS3(5-**8**)POC-9] S(LS4) – 8 - 3.4 [LS4(5-**8**)INQ+POC-11] S(LS4) – 8 - 3.3 [LS4(5-**8**)POC-12] S(PS1) – 8 - 2.5 [PS1(5-**8**)INQ+POC-2] S(PS2) – 8 - 1.5 [PS2(5-**8**)SAE+POC-6] S(PS2) – 8 - 3.6 [PS2(5-**8**)INQ+SAE+POC-7] S(PS3) – 8 - 1.3 [PS3(5-**8**)INQ+POC-8]

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SPS2: Unifying Concepts of Science.		
	By the End of Grade 6 Apply skills from previous grades and…	**By the End of Grade 8** Apply skills from previous grades and…
5. FORM AND FUNCTION (FAF)	S(SPS2)-6-5.1 Describe the structure and function of organs. S(SPS2)-6-5.2 Diagram and label the structure of the primary components of representative organs in plants and animals. S(SPS2)-6-5.3 Investigate the relationship between various landforms and wind currents.	S(SPS2)-8-5.1 Describe the relationship between structure and function of organ systems in plants and animals. S(SPS2)-8-5.2 Describe the structure and function of various organ systems *(i.e., digestion, respiration, circulation, protection and support, nervous)* and how these systems contribute to homeostasis of the organism. S(SPS2)-8-5.3 Compare the structure and function of organ systems in one organism to the structure and function in another organism. TRI-STATE SCIENCE TARGETS: NH CODE [TRI-STATE CODE] S(LS1) – 8 - 1.2 [LS1(5-**8**)SAE+FAF-2] S(LS1) – 8 - 2.4 [LS1(5-**8**)FAF-4] S(LS3) – 8 - 2.3 [LS3(5-**8**)MAS+FAF-8]

Science Process Skills:
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SPS3: Personal, Social, and Technological Perspectives (Includes Design)

Topic	By the End of Grade 6 apply skills from previous grades and…	By the End of Grade 8 apply skills from previous grades and…
1. COLLABORATION IN SCIENTIFIC ENDEAVORS	S(SPS3)-6-1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S(SPS3)-6-1.2 Work collectively within a group toward a common goal. S(SPS3)-6-1.3 Demonstrate respect of one another's abilities and contributions to the group.	S(SPS3)-8-1.1 Work effectively within a cooperative group setting, accepting and executing assigned roles and responsibilities. S(SPS3)-8-1.2 Work collectively within a group toward a common goal. S(SPS3)-8-1.3 Demonstrate respect of one another's abilities and contributions to the group. S(SPS3)-8-1.4 Demonstrate an understanding of the ethics involved in scientific inquiry.
2. COMMON ENVIRONMENTAL ISSUES, NATURAL RESOURCES MANAGEMENT AND CONSERVATION	S(SPS3)-6-2.1 Develop, focus and explain questions about the environment and do environmental investigations. S(SPS3)-6-2.2 Design environmental investigations to answer particular questions. S(SPS3)-6-2.3 Explore evidence that human-caused changes have consequences for the immediate environment as well as for other places and future times. S(SPS3)-6-2.4 Explore how humans shape and control the environment while creating knowledge and developing new technologies. S(SPS3)-6-2.5 Investigate environmental and resource management issues at scales that range from local to national to global.	S(SPS3)-8-2.1 Locate and collect reliable information about the environment and environmental topics using a variety of methods and sources. S(SPS3)-8-2.2 Judge the weaknesses and strengths of the information they are using. S(SPS3)-8-2.3 Explore the uses and limitations of models. S(SPS3)-8-2.4 Synthesize observations and findings into coherent explanations about natural resources and the environment.

Science Process Skills:
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SPS3: Personal, Social, and Technological Perspectives (Includes Design)		
	By the End of Grade 6 apply skills from previous grades and…	**By the End of Grade 8** apply skills from previous grades and…
3. SCIENCE AND TECHNOLOGY; TECHNOLOGICAL DESIGN AND APPLICATION	S(SPS3)-6-3.1 Identify problems/issues that can be addressed by design technology. S(SPS3)-6-3.2 Identify and describe the procedure for designing a product, including identifying a need, researching, brainstorming, selecting, developing a prototype, testing and evaluating. S(SPS3)-6-3.3 Evaluate technological designs using established criteria.	S(SPS3)-8-3.1 Design a product or solution to a problem. S(SPS3)-8-3.2 Build a product that has been designed in class. S(SPS3)-8-3.3 Evaluate student-designed products according to established criteria and recommend improvements or modifications.

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SPS4 Science Skills for Information, Communication and Media Literacy* * from the ICT Literacy Map for Science from www.21stCenturySkills.org	
Topic	**By the End of Grade 8** apply skills from previous grades and…
1. INFORMATION AND MEDIA LITERACY	S(SPS4)-8-1.1 Use a variety of information access tools to locate, gather, and organize potential sources of scientific information to answer questions. S(SPS4)-8-1.2 Collect real-time observations and data, synthesizing and building upon existing information (e.g., online databases, NOAA, EPA, USGS) to solve problems. S(SPS4)-8-1.3 Use appropriate tools to analyze and synthesize information (e.g., diagrams, flow charts, frequency tables, bar graphs, line graphs, stem-and-leaf plots) to draw conclusions and implications based on investigations of an issue or question.
2. COMMUNICATION SKILLS	S(SPS4)-8-2.1 Use a wide range of tools and a variety of oral, written, and graphic formats to share information and results from observations and investigations.
3. CRITICAL THINKING AND SYSTEMS THINKING	S(SPS4)-8-3.1 Execute steps of scientific inquiry to engage in the problem-solving and decision making processes. S(SPS4)-8-3.2 Apply new and unusual applications of existing knowledge to new and different situations. S(SPS4)-8-3.3 Make sketches, graphs, and diagrams to explain ideas and to demonstrate the interconnections between systems.
4. PROBLEM IDENTIFICATION, FORMULATION, AND SOLUTION	S(SPS4)-8-4.1 Formulate a scientific question about phenomena, a problem, or an issue and using a broad range of tools and techniques: plan and conduct an inquiry to address the question. S(SPS4)-8-4.2 Use evidence collected from observations or other sources and

Science Process Skills:
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	use them to create models and explanations.

SPS4 Science Skills for Information, Communication and Media Literacy* * from the ICT Literacy Map for Science from www.21stCenturySkills.org	
Topic	**By the End of Grade 8** apply skills from previous grades and…
5. CREATIVITY AND INTELLECTUAL CURIOSITY	S(SPS4)-8-5.1 Use a variety of media tools to make oral and written presentations, which include written notes and descriptions, drawings, photos, and charts to communicate the procedures and results of an investigation.
6. INTERPERSONAL AND COLLABORATIVE SKILLS	S(SPS4)-8-6.1 Work in diverse pairs/teams to answer questions, solve problems and make decisions. S(SPS4)-8-6.2 Plan and develop team science projects. S(SPS4)-8-6.3 Articulate understanding of content through personal interaction and sharing with peers.
7. SELF DIRECTION	S(SPS4)-8-7.1 Keep a journal of observations and investigations, and periodically evaluate entries to assess progress toward achieving the understanding of key ideas.
8. ACCOUNTABILITY AND ADAPTABILITY	S(SPS4)-8-8.1 Develop and execute a plan to collect and record accurate and complete data from various sources to solve a problem or answer a question. Gather and critically analyze data from a variety of sources. S(SPS4)-8-8.2 Participate in science competitions, where students are responsible for creating a product or participating in an event.
9. SOCIAL RESPONSIBILITY	S(SPS4)-8-9.1 Collaborate with a network of learners by phone, video, virtual classroom platform. S(SPS4)-8-9.2 Participate in simulation or role-playing activities in which students grapple with the ethics of complex issues.

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