SPRING LAKE PARK SCHOOLS

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

Grade Level Competency: Kindergarten Students will interpret, analyze, and communicate their scientific understanding.				
Criteria	Extending	Proficient	In Progress	Beginning
Analyzing and Interpreting Data	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can connect data and observations to help answer a scientific question.	I am acquiring the skills to connect data to a scientific question.	I can look at data to help answer a scientific question.

MDE grade level benchmarks embedded explicitly in the rubric

Kindergarten

0L.2.1.1.3 Record and use observations to describe patterns of what plants and animals (including humans) need to survive.** (P: 4, CC: 1, CI: LS1)

0P.2.2.1.1 Identify and describe patterns that emerge from the effects of different strengths or different directions of pushes and pulls on the motion of an object.** (P: 5, CC: 2, CI: PS2)

0P.4.1.1.1 Construct an argument supported by evidence for whether a design solution works as intended to change the speed or direction of an object with a push or a pull.* (P: 7, CC: 2, CI: PS2, ETS1)

0P.4.2.1.1 Communicate design ideas for a structure that reduces the warming effect of sunlight on Earth's surface.* (P: 8, CC: 2, CI: PS3, ETS1)

1E.2.2.1.1 Use quantitative data to identify and describe patterns in the amount of time it takes for Earth processes to occur and determine whether they occur quickly or slowly. (P: 5, CC: 7, CI: ESS1)

0P.2.2.1.1 Identify and describe patterns that emerge from the effects of different strengths or different directions of pushes and pulls on the motion of an object.** (P: 5, CC: 2, CI: PS2)

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Learning Progressions
Kindergarten
Supporting Benchmarks
Kindergarten
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Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

Grade Level Competency: Grades 1-2 Students will interpret, analyze, and communicate their scientific understanding.				
Criteria	Extending	Proficient	In Progress	Beginning
Claim and Evidence Analyzing Data and Constructing Evidence to Develop a Claim Includes: Observations, readings, models, measurements, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can use data to make a claim to answer a scientific question. ☐ Grade 1 ☐ Grade 2	I can use data to support a claim to answer a scientific question. ☐ Grade 1 ☐ Grade 2	I can connect data and observations to help answer a scientific question. ☐ Grade 1 ☐ Grade 2

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 1 1P.2.1.1.1 Identify and describe patterns obtained from testing different materials and determine which materials have the properties that are best suited for producing and/or transmitting sound.* (P: 4, CC: 1, CI: PS1, ETS1) 1E.4.1.1.1 Construct an argument based on observational evidence for how plants and animals (including humans) can change the non-living aspects of the environment to meet their needs. (P: 7, CC: 4, CI: ESS2) 1E.4.1.2.1 Construct an argument with evidence to evaluate multiple solutions designed to slow or prevent wind or water from changing the shape of the land.* (P: 7, CC: 7, CI: ESS2, ETS2) 1E.4.2.1.1 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* (P: 8, CC: 4, CI: ESS3) 1L.4.2.1.2 Obtain information using various features of texts and other media to determine patterns in the behavior of parents and offspring that help offspring survive. (P: 8, CC: 1, CI: LS1) 2E.2.1.1.1 Represent data to describe typical weather conditions expected during a particular season. (P: 4, CC: 1, CI: ESS2)	**Grade 2** 2L.4.1.1.1 Construct an argument with evidence that evaluates how, in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all. (P: 7, CC: 2, CI: LS4, ETS2) 2E.2.1.1.2 Analyze data from tests of objects designed to reduce the impacts of weather-related hazards and compare the strengths and weaknesses of how each performs.* (P: 4, CC: 2, CI: ESS3, ETS1) 2E.4.2.1.1 Obtain and use information from multiple sources to identify where water is found on Earth. (P: 8, CC: 1, CI: ESS2) 2E.4.2.1.2 Obtain and use information from multiple sources, including electronic sources, to describe climates in different regions of the world.** (P: 8, CC: 1, CI: ESS2) 2P.1.1.1.1 Ask questions about an object's motion based on observation that can be answered by an investigation. (P: 1, CC: 1, CI: PS2)

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Learning Progressions	
Grade 1	**Grade 2**
Supporting Benchmarks	
Grade 1	**Grade 2**
1P.4.2.2.1 Communicate solutions that use materials to provide shelter, food, or warmth needs for communities, including Minnesota American Indian Tribes and communities.* (P: 8, CC: 2, CI: PS1, ETS2)	2P.4.2.2.1 Obtain information and communicate how Minnesota American Indian Tribes and communities and other cultures apply knowledge of the natural world in determining which materials have the properties that are best suited for an intended purpose.* (P: 8, CC: 2, CI: PS1, ETS1)

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

<table>
<tr><td colspan="5">Grade Level Competency: Grades 3-4
Students will interpret, analyze, and communicate their scientific understanding.</td></tr>
<tr><th>Criteria</th><th>Extending</th><th>Proficient</th><th>In Progress</th><th>Beginning</th></tr>
<tr><td>Claim and Evidence
Analyzing Data and Constructing Evidence to Develop a Claim

Includes:
Observations, readings, models, measurements, etc.</td><td rowspan="2">A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.</td><td>I can analyze data to make a claim about a scientific concept.

☐ Grade 3
☐ Grade 4</td><td>I can analyze data to make a claim about a scientific concept with support.

☐ Grade 3
☐ Grade 4</td><td>I can analyze data about a scientific concept.

☐ Grade 3
☐ Grade 4</td></tr>
<tr><td>Scientific Reasoning
Reasoning to Support the Claim</td><td>I can use evidence to explain a scientific concept, following an appropriate structure.

☐ Grade 3
☐ Grade 4</td><td>I can use evidence to explain some parts of a scientific concept.

☐ Grade 3
☐ Grade 4</td><td>I can use evidence to explain some parts of a scientific concept with support.

☐ Grade 3
☐ Grade 4</td></tr>
</table>

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 3 3E.2.1.1.1 Record observations of the sun, moon, and stars and use them to describe patterns that can be predicted.** (P: 4, CC: 1, CI: ESS1) 3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2. CI: LS4) 3L.4.1.1.1 Construct an argument about strategies animals use to survive. (P: 7, CC: 2, CI: LS2) 3L.4.2.1.1 Obtain information from various types of media to support an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** (P: 8, CC: 4, CI: LS1)	**Grade 4** 4E.2.2.1.1 Interpret charts, maps, and/or graphs of the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** (P: 5, CC: 4, CI: ESS2) 4E.3.2.1.1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (P: 6, CC: 1, CI: ESS1) 4E.3.2.2.1 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* (P: 6, CC: 2, CI: ESS3, ETS1) 4E.4.2.1.1 Read and comprehend grade appropriate complex texts and/or other reliable media to describe that energy and fuels are derived from natural resources and their uses affect the environment. (P: 8, CC: 2, CI: ESS3, ETS2) 4L.4.1.1.1 Construct or support an argument that traits can be influenced by different environments. (P: 7, CC: 2, CI: LS3) 4L.4.2.1.2 Obtain information from various media sources to determine that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** (P: 8, CC: 1, CI: LS3) 4P.1.1.1.1 Ask questions to determine cause and effect relationships of electric and magnetic interactions between two objects not in contact with each other. (P: 1, CC: 2, CI: PS2)

Science: Claim, Evidence and Reasoning

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Learning Progressions	
Grade 3	**Grade 4**
Supporting Benchmarks	
Grade 3	**Grade 4**
3E.2.2.1.1 Organize and electronically present collected data to identify 3E.4.2.2.1 Gather information and communicate how Minnesota American Indian Tribes and communities and other cultures use patterns in stars to make predictions and plans. (P 8, CC: 1, CI: ESS1)and describe patterns in the amount of daylight in different times of the year.** (P: 5, CC: 1, CI: ESS1)	4E.4.2.2.1 Obtain and combine multiple sources of information about ways individual communities, including Minnesota American Indian Tribes and communities and other cultures, use evidence and scientific principles to make decisions about the uses of Earth's resources.* (P: 8, CC: 4, CI: ESS3, ETS1)

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

Grade Level Competency: Grades 5-6:
Students will analyze information and construct appropriate ways to demonstrate scientific understanding to an audience.

Criteria	Extending	Proficient	In Progress	Beginning
Claim and Evidence Analyzing Data and Constructing Evidence to Develop a Claim Includes: Observations, readings, models, measurements, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can select, organize, and analyze relevant data that relates to a scientific question or concept. From that evidence, I can make a claim. ☐ Grade 5 ☐ Grade 6	I can select and organize data that relates to scientific concepts and questions, and make a claim from that evidence. ☐ Grade 5 ☐ Grade 6	I can use data that relates to scientific concepts or questions to make a claim with support. ☐ Grade 5 ☐ Grade 6
Scientific Reasoning Reasoning to Support the Claim		I can use multiple pieces of evidence to explain a scientific question or concept using an appropriate structure. ☐ Grade 5 ☐ Grade 6	I can use evidence to explain a scientific concept or question using an appropriate structure. ☐ Grade 5 ☐ Grade 6	I can use evidence to explain a scientific concept, following an appropriate structure with support. ☐ Grade 5 ☐ Grade 6

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 5 5L.4.1.2.1 Evaluate the merit of a solution to a problem caused by changes in plant and animal populations as a result of environmental changes.* (P: 7, CC: 4, CI: LS4, ETS1) 5P.2.1.1.1 Analyze and interpret data to show that energy can be transferred from place to place by sound, light, heat, and electric currents. (P: 4, CC: 5, CI: PS3) 5L.4.1.2.1 Evaluate the merit of a solution to a problem caused by changes in plant and animal populations as a result of environmental changes.* (P: 7, CC: 4, CI: LS4, ETS1)	**Grade 6** 5E.2.2.1.2 Use data to describe patterns in the daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.** (P: 5, CC: 1, CI: ESS1) 6E.1.1.1.3 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (P: 1, CC: 7, CI: ESS3) 6E.2.1.1.1 Analyze and interpret data to determine similarities and differences among features and processes occurring on solar system objects. (P: 4, CC: 3, CI: ESS1) 6E.2.1.1.2 Analyze and interpret data on the distribution of fossils, rocks, continental shapes, and seafloor structures to provide evidence of past plate motions. (P: 4, CC: 1, CI: ESS2) 6E.2.1.1.3 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.* (P: 4, CC: 1, CI: ESS3, ETS1) 6E.3.2.1.1 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history. (P: 6, CC: 3, CI: ESS1) 6E.3.2.1.2 Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, or groundwater resources is the result of past geological processes. (P: 6, CC: 2, CI: ESS3) 6E.4.1.1.1 Construct an argument, supported by evidence, for how geoscience processes have changed Earth's surface at varying time and spatial scales. (P: 7, CC: 3, CI: ESS2) Use evidence to support an argument that the apparent brightness of the Sun and stars is due to their relative distances from Earth. (P: 7, CC: 3, CI: ESS15E.4.1.1.1)

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Learning Progressions	
Grade 5	**Grade 6**
Supporting Benchmarks	
Grade 5	**Grade 6**

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Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

Grade Level Competency: Grades 7-8
Students will analyze information and construct appropriate ways to demonstrate scientific understanding to an audience.

Criteria	Extending	Proficient	In Progress	Beginning
Claim and Evidence Analyzing Data and Constructing Evidence to Develop a Claim Includes: Observations, readings, models, measurements, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can select, organize, and analyze appropriate data to construct evidence to make and support an accurate claim. ☐ Grade 7 ☐ Grade 8	I can select, organize, and analyze limited or nonessential data to construct evidence to make and support an accurate claim. ☐ Grade 7 ☐ Grade 8	I can make an accurate claim and attempt to give evidence to support my thinking. ☐ Grade 7 ☐ Grade 8
Scientific Reasoning Reasoning to Support the Claim		I can use scientific vocabulary and concepts to explain the connection between my evidence and my claim. ☐ Grade 7 ☐ Grade 8	I can partially use scientific vocabulary and concepts to explain the connection between my evidence and claim. ☐ Grade 7 ☐ Grade 8	I attempt to use scientific vocabulary and concepts to explain the connection between my evidence and my claim. ☐ Grade 7 ☐ Grade 8

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

MDE grade level benchmarks embedded explicitly in the rubric	
Grade 7 7L.2.1.1.1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** (P: 4, CC: 2, CI: LS2) 7L.2.1.1.2 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth. (P: 4, CC: 1, CI: LS4) 7L.2.1.1.3 Analyze visual data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. (P: 4, CC: 1, CI: LS4) 7L.3.2.1.1 Construct an explanation based on evidence for how environmental and genetic factors influence the growth of organisms and/or populations. (P: 6, CC: 2, CI: LS1, ETS2) 7L.3.2.1.2 Construct an explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (P: 6, CC: 2, CI: LS1) 7L.3.2.1.3 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. (P: 6, CC: 1, CI: LS4) 7L.3.2.1.4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (P: 6, CC: 2, CI: LS4) 7L.4.1.1.1 Support or refute an explanation by arguing from evidence for how the body is a system of interacting subsystems composed of groups of cells. (P: 7, CC: 4, CI: LS1) 7L.4.1.1.2 Support or refute an explanation by arguing from evidence and scientific reasoning for how animal behavior and plant structures affect the probability of successful reproduction. (P: 7, CC: 2, CI: LS1) 7L.4.1.2.1 Construct an argument supported by empirical evidence that changes in physical or biological components of an ecosystem affect populations.* (P: 7, CC: 7, CI: LS2) 7L.4.1.2.2 Evaluate competing design solutions for maintaining biodiversity or ecosystem services.* (P: 7, CC: 2, CI: LS2, ETS2) 7L.4.2.2.1 Gather multiple sources of information and communicate how Minnesota American Indian Tribes and communities and other cultures use knowledge to predict or interpret patterns of interactions among organisms across multiple ecosystems. (P: 8, CC: 1, CI: LS2, ETS2)	**Grade 8** 8P.2.1.1.1 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (P: 4, CC: 1, CI: PS1) 8P.3.2.1.1 Construct an explanation based on evidence and scientific principles of a common phenomenon that can be explained by the motions of molecules. (P: 6, CC: 3, CI: PS1) 8P.4.1.1.1 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (P: 7, CC: 3, CI: PS2) 8P.4.1.1.2 Compare and evaluate evidence to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (P: 7, CC: 5, CI: PS3) 8P.4.2.1.2 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.** (P: 8, CC: 6, CI: PS4)

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Learning Progressions	
Grade 7	**Grade 8**
Supporting Benchmarks	
Grade 7	**Grade 8**

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

Grade Level Competency: Grades 9-12
Students will utilize scientific language to accurately analyze evidence and construct an explanation. Students will effectively communicate evidence and explanations to an audience.

Criteria	Extending	Proficient	In Progress	Beginning
Claim and Evidence Analyzing Data and Constructing Evidence to Develop a Claim Includes: Observations, readings, models, measurements, etc.	A complex performance or application of learning that is transferred to new or novel situations beyond the content area, makes extended or abstract connections to authentic, real-world, multifaceted situations, and/or constructs entirely new ideas that are transformational.	I can evaluate data to construct evidence and make a valid claim about a problem or phenomena.	I can use evidence to develop a claim about a problem or phenomena that partially applies scientific concepts.	I can identify data as evidence needed to make a claim about a problem or phenomena.
Scientific Reasoning Reasoning to Support the Claim		I can support a claim about a problem or phenomena by connecting the evidence to all relevant and accurate scientific concepts.	I can support a claim about a problem or phenomena by partially connecting the evidence to relevant and accurate scientific concepts.	I can support a claim by starting to connect evidence to relevant scientific concepts.

Science: Claim, Evidence and Reasoning

Competency: Analyzing data and communicating scientific thinking, using evidence-based reasoning, in multiple ways for multiple audiences.

MDE grade level benchmarks embedded explicitly in the rubric
Earth/Space 9E.2.1.1.1 Analyze data to make a valid scientific claim about the way stars, over their life cycle, produce elements. (P: 4, CC: 5, CI: ESS1) 9E.2.1.1.2 Analyze geoscience data to make a claim that one change to the Earth's surface can create feedbacks that cause changes to other Earth systems. (P: 4, CC: 7, CI: ESS2, ETS2) 9E.2.1.1.3 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems and human infrastructure.* (P: 4, CC: 7, ESS3, ETS1) 9E.3.2.1.1 Construct an explanation that links astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe to the Big Bang. (P: 6, CC: 5, CI: ESS1, ETS2) 9E.3.2.1.2 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (P: 6, CC: 7, CI: ESS1) 9E.3.2.2.1 Evaluate or refine a technological solution to reduce the human impacts on a natural system and base the evaluations or refinements on evidence and analysis of pertinent data.* (P: 6, CC: 7, CI: ESS3, ETS1, ETS2) 9E.4.1.1.1 Evaluate the evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. (P: 7, CC: 1, CI: ESS1) 9E.4.1.1.2 Evaluate the evidence and reasoning for the explanatory model that Earth's interior is layered and that thermal convection drives the cycling of matter. (P: 7, CC: 5, CI: ESS2) 9E.4.1.1.3 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* (P: 7, CC: 5, CI: ESS3, ETS1) 9E.4.2.1.1 Compare, integrate and evaluate sources of information in order to determine how specific factors, including human activity, impact the groundwater system of a region. (P: 8, CC: 2, CI: ESS2, ETS2) 9E.4.2.2.1 Apply place-based evidence, including those from Minnesota American Indian Tribes and communities and other cultures, to construct an explanation of how a warming climate impacts the hydrosphere, geosphere, biosphere, or atmosphere. (P: 8, CC: 4, CI: ESS3) **Biology** 9L.3.2.1.1 Construct an explanation based on evidence for how the structure of DNA determines the structure of the proteins that carry out the essential functions of life. (P: 6, CC: 6, CI: LS1) 9L.3.2.1.2 Construct and revise an explanation based on evidence for how various elements combine with carbon to form molecules that form the basis for life on Earth. (P: 6, CC: 5, CI: LS1) 9L.3.2.1.3 Construct and revise an explanation based on evidence about the role of photosynthesis and cellular respiration (including anaerobic processes) in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (P: 6, CC: 7, CI: LS2) 9L.3.2.1.4 Construct an explanation based on evidence that the process of evolution primarily results from four factors: reproduction within a species, heritable genetic variation of individuals in that species, competition for limited resources, and increased survival and reproduction of the individuals best suited for the environment. (P: 6, CC: 2, CI: LS4) 9L.3.2.1.5 Construct an explanation based on evidence for how natural selection leads to the adaptation of populations. (P: 6, CC: 2, CI: LS4) 9L.4.1.1.1 Evaluate evidence for the role of group behavior on an individual's and species' chances to survive and reproduce. (P: 7, CC: 2, CI: LS2) 9L.4.1.1.2 Make and defend a claim based on evidence that heritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (P: 7, CC: 2, CI: LS3) 9L.4.1.1.3 Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. (P: 7, CC: 2, CI: LS4) 9L.4.2.1.1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (P: 8, CC: 1, CI: LS4) 9L.4.2.2.1 Obtain and communicate information about how Minnesota American Indian Tribes and communities and other cultures construct solutions to mitigate threats to biodiversity.* (P: 8, CC: 7, CI: LS2, ETS1)

Chemistry

9C.2.1.1.1 Analyze patterns in air or water quality data to make claims about the causes and severity of a problem and the necessity to remediate or to recommend a treatment process. (P: 4, CC:2, CI: PS1)
9C.3.1.1.1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of valence electrons. (P: 2, CC: 1, CI: PS1)
9C.3.2.1.1 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (P: 6, CC: 1, CI: PS1)
9C.3.2.1.2 Apply scientific principles and evidence to provide an explanation about the effects of changing the surface area, agitation, temperature, and concentration of the reacting particles on the rate at which the reaction occurs. (P: 6, CC: 1, CI: PS1)
9C.3.2.1.3 Construct an explanation for the phenomenon of solution creation and identify from patterns how the properties of the resulting solution depend on the interactions between solute and solvent or on concentrations of solutes. (P: 6, CC: 1, CI: PS1)
9C.4.2.1.1 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* (P: 8, CC: 6, CI: PS1)

Physics

9P.1.1.1.1 Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information.* ** (P: 1, CC: 7, CI: PS4, ETS1)

9P.2.1.1.1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (P: 4, CC: 2, CI: PS2)

9P.4.1.1.1 Evaluate the claims, evidence, and reasoning behind the argument that electromagnetic radiation can be described using either a wave model or a particle model, and that for some phenomena, one model is more useful than the other. (P: 7, CC: 4, CI: PS4)

9P.4.2.1.1 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (P: 8, CC: 2, CI: PS4)

9P.4.2.1.2 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* (P: 8, CC: 2, CI: PS4))

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Learning Progressions	
Earth Space	**Biology**
☐	☐ Describe how carbon is moved through an ecosystem during photosynthesis and Cellular Respiration (9L.3.2.1.3) ☐ Identify the types of behavior (9L.4.1.1.1) ☐ Determine how changes in the environment impact a species survival (9L.4.1.1.3) ☐ Draw a pedigree. (9L.4.2.1.1)
Supporting Benchmarks	
Earth/Space	**Biology**
	Construct and revise an explanation based on evidence for how various elements combine with carbon to form molecules that form the basis for life on Earth. (9L.3.2.1.2) Obtain and communicate information about how Minnesota American Indian Tribes and communities and other cultures construct solutions to mitigate threats to biodiversity.* (9L.4.2.2.1)

Learning Progressions	
Chemistry	**Physics**
☐ 9C.3.2.2.1 Evaluate the design and function of products and processes involving organic compounds to meet desired needs in relationship to the molecular structures and, in particular, the functional groups involved.* (P: 6, CC: 6, CI: PS1, ETS1) ☐ 9C.4.2.2.1 Communicate and evaluate claims by various stakeholders, including Minnesota American Indian Tribes	☐ Recognize when an object has constant velocity or constant acceleration (9P.2.1.1.1) ☐ Recognize when forces are balanced. (9P.2.1.1.1.) ☐ Recognize when forces are unbalanced. (9P.2.1.1.1.) ☐ Recognize direction of net force (9P.2.1.1.1) ☐ Explain wave-particle duality. (9P.4.1.1.1) ☐ Explain how the colors we see are associated with the frequencies absorbed

and communities and other cultures, about the environmental impacts of various chemical processes on natural resources. (P: 8, CC: 2, CI: PS1) ☐ Determine and model the interactions between atoms based on types of bonds (9C3.1.1.1) ☐ Determine chemical formula of chemical compounds. (9C.3.1.1.1)	by an object (matter). (9P.4.2.1.1)

Supporting Benchmarks	
Chemistry	**Physics**
Name and draw organic compounds (9C.3.2.2.1) Properties of elements/atoms (9C.3.1.1.1) Periodic table vocabulary (9C.3.1.1.1) Valence electrons patterns (9C.3.1.1.1) Name chemical compounds (9C.3.1.1.1) Recognize and determine type of reactions (9C.3.2.1.1) Use solubility rules to determine the outcome of a reaction (9C.3.2.1.1) Draw a particulate representation of a solution to show solubility and concentration (9C.3.2.1.3) Calculate molarity (9C.3.2.1.3)	9P.3.2.2.2 Evaluate a solution to a complex energy-related problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, aesthetics, and maintenance, as well as social, cultural, and environmental impacts.* (P: 6, CC: 2, CI: PS3, ETS1)