Science - Grade 7

Course Description:

The Indian Community School cultivates an enduring cultural identity and critical thinking by weaving indigenous teachings with a distinguished learning environment. The curriculum for this course is developed from the Next Generation Science Standards and the framework of the ICS Our Ways Cultural Calendar. In this course, students are part of a spiraling curriculum in which aspects of life science, physical science, earth/space science, and engineering/technology are addressed each school year. In grade seven the life science topics include energy and matter flow in organisms and ecosystem interactions. The physical science topics include matter and its interactions. The earth/space science topic is the formation of the Earth. Engineering design and human impact is covered in all aspects of the curriculum.

Enduring Understandings:

- Scientists understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within different systems.
- Scientists identify evidence from patterns in rock formations, fossils in rock layers, and continental plates to support an explanation for changes in a landscape over time.
- Scientists analyze and interpret data to predict how human impact on Earth's systems can influence natural disasters.
- Scientists can use physical and chemical properties of matter in order to identify, classify, and predict how it can react and form new substances.
- Scientists investigate chemical reactions in order to understand what happens at an atomic and molecular level.
- Scientists develop models that describe the cycling of matter and the flow of energy among the living and nonliving parts of an ecosystem.
- Scientists interpret evidence and data for how resource availability, changes to the physical and biological components in an ecosystem, and patterns of interactions among organisms will affect an ecosystem.
- Scientists help people successfully manage ecosystems by being able to propose and evaluate different solutions for maintaining or restoring biodiversity.
- The engineering design process is used to design, evaluate, and analyze solutions to problems.
- Problem solving involves a safe, detailed, and orderly process, so that knowledge can be acquired, presented, and critiqued by doing experiments and investigations.
- Reading in the content areas requires interaction and interpretation of various discipline-specific texts in order to integrate and evaluate content, build knowledge, make meaning, construct evidence-based arguments, and select reliable and relevant resources for research.
- Writing in the content areas requires clear and coherent written products which are planned and developed with supporting evidence to demonstrate focused understanding of composition, written expression, and usage/mechanics in order to communicate a discipline-specific purpose to an appropriate audience.

PHYSICAL SCIENCE

- I can develop models that show the atomic composition of simple molecules. (MS-PS-1)
- I can develop models that show the atomic composition of extended structures. (MS-PS-1)
- I can analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-2)
- I can gather information to describe that synthetic materials come from natural resources. (MS-PS1-3)
- I can gather information to describe how synthetic materials impact society. (MS-PS1-3)
- I can develop a model that predicts and describes changes in particle motion of a pure substance when thermal energy is added or removed. (MS-PS1-4)
- I can develop a model that predicts and describes changes in temperature of a pure substance when thermal energy is added or removed. (MS-PS1-4)
- I can develop a model that predicts and describes changes in the state of a pure substance when thermal energy is added or removed. (MS-PS1-4)
- I can develop and use a model to describe how the total number of atoms does not change in a chemical reaction. (MS-PS1-5)
- I can explain the Theory of Conservation of Mass. (MS-PS1-5)
- I can use the design process to create a device that either releases or absorbs thermal energy by chemical processes. (MS-PS-1-6)

LIFE SCIENCE

- I can construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter into and out of organisms. (MS-LS1-6)
- I can construct a scientific explanation based on evidence for the role of photosynthesis in the flow of energy into and out of organisms. (MS-LS1-6)
- I can develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. (MS-LS1-7)
- I can analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)
- I can construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)
- I can develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3)
- I can construct an argument supported by empirical evidence that changes to physical components of an ecosystem affect populations. (MS-LS2-4)
- I can construct an argument supported by empirical evidence that changes to biological components of an ecosystem affect populations. (MS-LS2-4)
- I can evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5)

EARTH AND SPACE SCIENCE

- I can 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. (MS-ESS1-4)
- I can develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. (MS-ESS2-1)
- I can construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. (MS-ESS2-2)
- I can analyze and interpret data on the distribution of fossils and rocks to provide evidence of the past plate motions. (MS-ESS2-3)
- I can analyze and interpret data on continental shapes to provide evidence of the past plate motions. (MS-ESS2-3)
- I can analyze and interpret data on seafloor structures to provide evidence of the past plate motions. (MS-ESS2-3)
- I can construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral resources are the result of past and current geoscience processes. (MS-ESS3-1)
- I can construct a scientific explanation based on evidence for how the uneven distributions of Earth's energy resources are the result of past and current geoscience processes. (MS-ESS3-1)
- I can construct a scientific explanation based on evidence for how the uneven distributions of Earth's groundwater resources are the result of past and current geoscience processes. (MS-ESS3-1)
- I can analyze and interpret data on natural hazards to forecast future catastrophic events. (MS-ESS3-2)
- I can use this information to inform the development of technologies to mitigate their effects. (MS-ESS3-2)
- I can apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. (MS-ESS3-3)
- I can construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. (MS-ESS3-4)

ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE

- I can define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. (MS-ETS1-1)
- I can take into account relevant scientific principles and potential impacts on people that may limit possible solutions. (MS-ETS1-1)
- I can take into account relevant scientific principles and potential impacts the natural environment that may limit possible solutions. (MS-ETS1-1)
- I can evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-2)
- I can analyze data from tests to determine similarities and differences among several design solutions. (MS-ETS1-3)

ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE (continued)
• I can identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-3) • I can develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (MS-ETS1-4)