

Seventh Grade Science

Course Description:

Semester 1: Students will spend the first semester discovering that most systems depend on the physical and chemical processes that occur within it, whether the system in question is a star, Earth’s atmosphere, a river, a bicycle, the human brain or a living cell. This semester will focus on: **Matter and its Interactions:** This unit will create an understanding that all substances are made from some 100 different types of atoms, which combine with one another in various ways. Atoms have substructures of their own and can combine into many different molecules with their own characteristics. Students will also explore how substances combine or react to make new substances. **Waves and their Applications:** This unit explores waves that transfer energy and information as well as their characteristic properties and behaviors. Students will explore how waves are used by scientists in life, earth, and physical sciences.

Semester 1

Measurable Learner Objectives:

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
			Develop models to describe the atomic composition of simple molecules and extended structures.
			Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
			Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
			Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
			Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
			Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
			Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
			Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

Semester 2: Students will spend the second semester learning about the driving forces that shape our Earth, including atmospheric and societal issues. **Earth’s Systems: Weather, Climate, and Water:** This unit encompasses the processes that drive Earth’s conditions and its continuing evolution. The unit also focuses on the vital role that water plays in all of the planet’s systems and surface processes. **Earth and Human Activity:** This unit addresses society’s interactions with the planet. Connecting the Earth and space sciences to the intimate scale of human life, this idea explains how Earth’s processes affect people through natural resources and natural hazards, and it describes as well some of the ways in which humanity in turn affects Earth’s processes.

Measurable Learner Objectives:

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
			Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
			Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
			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.
			Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
			Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
			Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
			Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
			Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
			Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
			Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Recall Level 1 (Basic Knowledge)	Application Level 2 (Skills)	Strategic Thinking Level 3 (Reasoning)	Extended Thinking Level 4 (Products/Performance)
			Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
			Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
			Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.