Science 8 Course Overview

Unit	Major Concepts	Skills	Summative Assessments
Chemical Interactions	All common matter on Earth is made of elements. Each element is represented by a unique, defining particle called an atom. Atoms are arranged in the periodic table by both mass and chemical characteristics. A kinetic particulate model can be used to explain observations of the macroscopic properties and behaviors of solids, liquids, and gases. All matter consists of individual particles in constant motion. Energy transfers to, from, and through matter when particles collide (conduction), and always from higher-energy particles to lower-energy particles. Phase of matter is determined by the relationship between the particles of a mass. Substances react chemically in characteristic ways with other substances to form new substances with different characteristic properties. In chemical reactions, mass and energy are conserved. Products of a chemical reaction are limited by the quantities of the reactants present.	Choose appropriate measurement instruments and units for specific tasks. Measure mass, volume, and temperature of substances accurately. Apply a kinetic particulate model to explain the behavior of solids, liquids, and gases at the macroscopic and particle levels, including expansion, compression, contraction, and phase change. Calculate energy transfer in calories. Calculate heat of fusion from data. Use atom models and chemical formulas to demonstrate how reactants rearrange during chemical reactions to form new substances. Work collaboratively with peers to analyze science investigations. Apply scientific thinking processes to conduct investigations and build explanations. Appy the engineering design process to evaluate and optimize design options applying knowledge of conduction, convection and radiation.	Write up - controlled experiment using temperature as a dependent variable. Elements R Us video presentation Mid-summative and Final Assessments Thermal Engineering Challenge

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Force and Motion	The motion of an object can be described by its position, direction of motion, and speed. Motion can be measured, calculated, and represented on a graph. An object that is not being subjected to a (net) force will continue to move at a constant speed. If more than one force acts on an object then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will change the speed or direction of an object's motion. Acceleration is the change in velocity of an object over time. Waves can be described using wavelength, altitude, and frequency. When light shines on an object, the light is reflected, absorbed, or transmitted through the object. Waves can be used to communicate over long distances using fiber optics.	Describe an object's motion in terms of change of position. Apply equations to calculate linear motion and various aspects of change of position - distance, displacement, speed, velocity, and acceleration. Transform narrative accounts of motion events into graphic representations. Analyze illustrations of forces in motion. Gather, graph, and analyze data. Apply math skills in the context of science. Work collaboratively with peers to succeed and optimize design choices in NASA engineering challenges. Analyze spectra of visible light and determine refraction characteristics using filters. Create a standing wave.	Write up - controlled experiment using distance as a dependent variable. Mid-Summative Assessments Nasa Engineering Challenge - Lunar Buggy and Launch Lunar Buggy Sound Wave FOSS Engineering Challenge
Waves	Key features of waves are crests, troughs, and nodes. Waves are repeating events. The amplitude, frequency, and wavelength of a wave are related to the energy transferred by that wave. A sound wave is a mechanical wave. A wave model can be used to explain the properties of light.	Collect frequency data from multiple sources. Create and describe longitudinal and transverse waves. Calculate the speed of a wave from frequency and wavelength data. Modify a model to see the impact on different properties of waves. Evaluate information about a historical engineering failure.	Acoustic Engineering Challenge Unit tests

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	Light travels in straight lines except at the interface between transparent media where refraction occurs. The angle of reflection equals the angle of incidence. Light can be transmitted long distances through optical fibers. Complex information must be encoded to be sent with light. Digital waves have the same information as analog waves, but digital waves can be improved by using smaller increments. Many modern communication devices use digitized signals as a reliable way to encode and transmit information. Modern technology encodes information to improve transmission quality, reliability, and speed.	Design a sound studio to minimize energy transfer. Use lasers to carry out investigations on optical properties using different media. Use light spectra to identify light sources, and collect evidence to support light-wave explanations about color. Transmit data through optical fibers to test design constraints. Analyze graphical displays of carrier waves, sound waves, and modulated waved to understand their relationships and describe their properties.	
Planetary Science	All perceptions of motion are relative to the observer's frame of reference. Scale is the size relationship between a representation of an object and the object. The Moon shines as a result of reflected light from the Sun. Half of the Moon is always illuminated (except during a lunar eclipse). Craters can be categorized by size and physical characteristics. The solar system formed during a sequence of events that started with a nebula.	Compare and contrast apparent and real motion using examples and explain the role of the observer's frame of reference. Construct scale models of the Earth/Moon system and the solar system. Identify and classify major moon surface features. Use models of the Sun, Moon and Earth to explain the mechanics of Moon phases. Describe the conditions required to produce solar and lunar eclipses, and explain why they do not occur every month.	Oral Report in the Science Forum Scale model Solar System Origin Video Mid-Summative and Final Assessments NASA Engineering Challenge

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	The distance between solar system objects is enormous. Liquid water is essential to life as we know it. Scientific missions provide data about the composition and environmental conditions on the planets, moons, and other bodies in the solar system. Planetary-system objects move in measurable and predictable patterns.	Determine the effect of meteoroid size and speed on crater characteristics. Use a spectroscope to analyze light coming from different light sources. Work collaboratively with peers to analyze science investigations. Apply scientific thinking processes to conduct investigations and build explanations.	