Middle School Science Scope and Sequence

	September	October	November	December	January	Februrary	March	April	May	June
6	**Light and Matter** Students explain how light interacts with matter including how it can be absorbed, transmitted or reflected by different materials.		**Thermal Energy** Students develop a particle level model of thermal energy transfer within materials and between materials, for solids, liquids and gases. They apply the science ideas they figure out to design a device that slows thermal energy.	**Weather, Climate and Water Cycling** Students investigate the natural movement and distribution of water on the planet. Students figure out that precipitation patterns depend on geographic location (e.g., latitude, proximity to large bodies of water, altitude). Students explain patterns in weather and climate in terms of temperature patterns, humidity, and precipitation and develop the key mechanism in these processes of convection.		**Plate Tectonics and Rock Cycling** Students investigate changes on the Earth's surface, and figure out how geographic location (proximity to plate boundaries) determines the type of landforms near one's communities and the distribution of rocks and fossils. Students develop models for the cycling of matter and movement of plates to explain earthquakes, volcanoes, and changes in the Earth across geological time scales.		**Natural Hazards** Students investigate how earthquakes, tsunamis, volcanic eruptions, and catastrophic weather can be forecasted and how communities can plan to mitigate the effects of these hazards.	**Cells and Systems** Students investigate what is needed at the cellular and systems level for a multicellular organism to survive. Students use evidence to support the idea that living things are made of cells, and explain how the cells' and body system's structure and function contribute to the organism's ability to function.	
7	**Chemical Reactions and Matter** Students develop and use a model of atoms and molecules to represent different substances and how they are rearranged and mass is conserved in chemical reactions. Students investigate property changes in the stuff they have before and after a chemical reaction and after a phase change to argue for whether new substances are created in these processes.		**Chemical Reactions and Energy** Students develop a model of energy transfer in chemical reactions and design a device to transfer the thermal energy produced from a chemical reaction to other parts of a system.	**Metabolic Reactions** Students build on their model of energy and chemical reactions to explain how humans and other animals get the energy they need to survive and the building blocks to grow from the food that they eat. Students explain how this matter and energy transfer occurs as cells can make new substances out of food molecules through chemical reactions.		**Matter Cycling and Photosynthesis** Students build on their model of energy and matter in food to investigate how food molecules become a part of the food they eat (both natural and processed foods). Students investigate how plants make food molecules and the source of the matter and energy needed for this process to do this. Students develop a model to explain that the major atoms that make up food (carbon, hydrogen, and oxygen) are continually recycled between biotic and abiotic parts of our world.		**Ecosystem Dynamics and Biodiversity** Students investigate how interactions among organisms and changes to the environment (e.g. resource availability) can affect population sizes. Students develop a model including different type of relationships (competitive, predatory, etc.), and biotic/abiotic interactions to explain stability and change in ecosystems.		**Earth's Resources and Human Impact** Students investigate the uneven distribution of water, mineral, and fossil fuel resources on the planet. Students investigate how increase in human populations and percapita resource consumption affects Earth' s natural systems (climate, biosphere) in potentially hazardous ways. Students investigate natural carbon sinks, carbon sources, and the movement of carbon from fossil fuels into the atmosphere. Students develop a model of changes in the Earth's climate system, and design systems to mitigate human effects on natural systems.
8	**Contact Forces** Students investigate causes of motion, and develop the idea that objects that collide can push on one another while they are in contact. Students connect the changes in the kinetic energy of an object to the energy being transferred to and from the object due to forces, and determine that the kinetic energy of an object is based on the two factors of mass and speed.		**Sound Waves** Students investigate how the frequency and amplitude of a sound wave can explain other macroscopic phenomena (loudness and pitch of a sound). Students explain at the molecular level how the deformation of materials results in oscillations that lead to the propagation of collisions of particles across a medium, and how the amplitude of the vibration is related to the energy of the wave.	**Forces at a Distance** Students explain how at-a-distance forces transfer energy between interacting objects in a system as the objects change position. This involves developing the idea of potential energy stored in systems of objects (e.g., magnets) and the transfer of this potential energy to the movement of objects depending on the objects' position and orientation to each other.		**Earth In Space** Students investigate force and motion of objects in space, and how forces that act in a direction perpendicular to the motion of the object can lead to circular patterns of motion (an orbit). Students develop a model using gravity to explain patterns of motion of the earth, sun, moon, other planets and their moons, stars in our galaxy, and other galaxies. Students also investigate differences in the composition and surface features (crust, atmosphere, volcanoes) of planets in the solar system.		**Genetics** Students investigate patterns in inheritance data to develop a model for how heredity information is encoded in genes on chromosomes, how these molecules affect traits through production of proteins, and how these molecules provide a mechanism for passing traits across generations. Students use their models to explain how variation arises in sexual reproduction and how patterns in heredity occur. Students models and use the model to explain how variations in genetic information can affect traits through production of proteins.	**Natural Selection and Common Ancestry** Students develop a model of natural selection that explains how trait distributions in populations shift over time. Students explore how differences between individuals and species' characteristics and behaviors enhance their fitness and how environmental changes can lead to shifts in trait distributions in a population over time. Students build on this model to investigate evidence from anatomical similarities and differences between organisms living today and organisms in the fossil record, and patterns in the traits of embryos from different species that are alive today, to extend a natural selection model to explain speciation.	