Alaska Science Standards: Locally Assessed Performance Expectations Grades 3-5					
Content Area	**Grade**	**Domain**	**Strand (Big Idea)**	**Standard Code**	**Expectations**
Science	3	Physical Sciences	Forces and Interactions	3-PS2-1	**Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]
Science	3	Physical Sciences	Forces and Interactions	3-PS2-4	**Define a simple design problem that can be solved by applying scientific ideas about magnets.*** [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]
Science	4	Physical Sciences	Energy	4-PS3-4	**Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*** [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]
Science	4	Physical Sciences	Waves	4-PS4-3	**Generate and compare multiple solutions that use patterns to transfer information.*** [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]
Science	5	Physical Sciences	Structure and Properties of Matter	5-PS1-1	**Develop and use a model to describe that matter is made of particles too small to be seen.** [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]
Science	5	Physical	Structure and	5-PS1-4	**Conduct an investigation to determine whether the mixing of two or more substances results**
Science	5	Life Sciences	Matter and Energy in Organisms and Ecosystems	5-LS1-1	**Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]
Science	3	Earth and Space Sciences	Weather and Climate	3-ESS3-1	**Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*** [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent storm erosion or flooding (e.g., from storm surges), or buildup of snow drifts; wind resistant roofs, lightning rods, and other weather hazards such as white-out conditions.]
Science	4	Earth and Space Sciences	Earth's Systems: Processes that Shape the Earth	4-ESS3-2	**Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*** [Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]
Science	5	Earth and Space Sciences	Earth's Systems	5-ESS3-1	**Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**
Science	5	Earth and Space Sciences	Space Systems	5-ESS1-1	**Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.** [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, and stage).]
Science	5	Engineering and Technology Science	Engineering Design	3-5-ETS1-1	**Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
Science	5	Engineering and Technology Science	Engineering Design	3-5-ETS1-2	**Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**
Science	5	Engineering and Technology Science	Engineering Design	3-5-ETS1-3	**Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

Alaska Science Standards: Locally Assessed Performance Expectations Grades 6-8					
Content Area	**Grade**	**Domain**	**Strand (Big Idea)**	**Standard Code**	**Expectations**
Science	6-8	Physical Sciences	Chemical Reactions	MS-PS1-6	**Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*** [Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of chemical process designs could involve dissolving ammonium chloride or calcium chloride and chemical heat packs. Examples of physical process designs could involve a plastic bag and hot water. Alaskan physical examples could include: countercurrent exchange in the limbs and surfaces of Arctic animals and the DIFFERENCE IN THE albedo effect of open ocean water vs. sea ice.] [Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.]
Science	6-8	Life Sciences	Matter and Energy in Organisms and Ecosystems	MS-LS2-1	**Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources. This emphasis should include local ecosystem processes and traditional native ways of knowing.]
Science	6-8	Life Sciences	Interdepend. Relationships in Ecosystems	MS-LS2-5	**Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*** [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]
Science	6-8	Engineering and Technology Science	Engineering Design	MS-ETS1-1	**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.**
Science	6-8	Engineering and Technology Science	Engineering Design	MS-ETS1-2	**Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**
Science	6-8	Engineering and Technology Science	Engineering Design	MS-ETS1-3	**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.**
Science	6-8	Engineering and Technology Science	Engineering Design	MS-ETS1-4	**Develop a model to generate data for repetitive testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**

Alaska Science Standards: Locally Assessed Performance Expectations High School					
Content Area	**Grade**	**Domain**	**Strand (Big Idea)**	**Standard Code**	**Expectations**
Science	HS	Physical Sciences	Structure and Properties of Matter	HS-PS1-3	**Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.** [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [Assessment Boundary: Assessment does not include Raoult's law calculations of vapor pressure.
Science	HS	Physical Sciences	Chemical Reactions	HS-PS1-4	**Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.** [Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved.] [Assessment Boundary: Assessment does not include calculating the total bond energy changes during a chemical reaction from the bond energies of reactants and products.]
Science	HS	Physical Sciences	Chemical Reactions	HS-PS1-6	**Make arguments based on kinetic molecular theory to explain how altering conditions affects the forward and reverse rates of a reaction at equilibrium.** [Clarification Statement: Emphasis is on the application of Le Chatelier's Principle and on refining designs of chemical reaction systems, including descriptions of the connection between changes made at the macroscopic level and what happens at the molecular level. Examples of designs could include different ways to increase product formation including adding reactants or removing products.] [Assessment Boundary: Assessment is limited to specifying the change in only one variable at a time. Assessment does not include calculating equilibrium constants and concentrations.]
Science	HS	Physical Sciences	Forces and Interactions	HS-PS2-4	**Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields.] [Assessment Boundary: Assessment is limited to systems with two objects.]
Science	HS	Physical Sciences	Energy	HS-PS3-5	**Develop and use a model of two objects interacting through electrical or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction (Coulomb's Law).** [Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.] [Assessment Boundary: Assessment is limited to systems containing two objects.]
Science	HS	Physical Sciences	Waves and Electromagnetic Radiation	HS-PS4-2	**Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information with respect to that of forms other than digital, including analog.** [Clarification Statement: Examples of advantages could include that digital information is stable because it can be stored reliably in computer memory, transferred easily, and copied and shared rapidly. Disadvantages could include issues of easy deletion, security, and theft.]
Science	HS	Life Sciences	Structure and Function	HS-LS1-2	**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.** [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]
Science	HS	Engineering and Technology Science	Engineering Design	HS-ETS1-1	**Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.**
Science	HS	Engineering and Technology Science	Engineering Design	HS-ETS1-2	**Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.**
Science	HS	Engineering and Technology Science	Engineering Design	HS-ETS1-3	**Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.**
Science	HS	Engineering and Technology Science	Engineering Design	HS-ETS1-4	**Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.**