

STANDARD NAME	STANDARD DEFINITION	ADVANCED	PROFICIENT	DEVELOPING	EMERGING
<b>Energy can be transformed, transferred, and conserved</b>					
SC.EN.A.01.02	Demonstrates energy (nuclear, electromagnetic, chemical, mechanical, thermal) transfers and transformations by comparing useful energy to total energy (entropy)	<ul style="list-style-type: none"> <li>*Describes a specific example of each 8 types of energy transformation</li> <li>* Defines entropy</li> <li>* Defines conservation of energy and momentum</li> <li>*Designs and conducts an investigation of the laws of thermodynamics</li> </ul>	<ul style="list-style-type: none"> <li>*Describes a specific example of 6 types of energy transformation</li> <li>* Defines entropy</li> <li>* Defines conservation of energy and momentum</li> <li>*Conducts an investigation of the laws of thermodynamics</li> </ul>	<ul style="list-style-type: none"> <li>*Describes a specific example of 4 types of energy transformation</li> <li>* Defines entropy</li> <li>* Defines conservation of energy and momentum</li> </ul>	<ul style="list-style-type: none"> <li>*Describes a specific example of 2 types of energy transformation</li> <li>* Defines entropy</li> </ul>
SC.EN.A.02.02	Researches applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (I.e. $E=MC^2$ )	<ul style="list-style-type: none"> <li>*Investigates the history of nuclear reactions</li> <li>*Describes the benefits of nuclear energy</li> <li>*Describes the potential danger of nuclear energy</li> <li>*Defines radioactivity and investigates radioactive elements</li> <li>*Compares and contrasts fusion and fission</li> </ul>	<ul style="list-style-type: none"> <li>*Investigates the history of nuclear reactions</li> <li>*Identifies the benefits of nuclear energy</li> <li>*Identifies the potential danger of nuclear energy</li> <li>*Defines radioactivity and investigates radioactive elements</li> </ul>	<ul style="list-style-type: none"> <li>*Identifies the benefits of nuclear energy</li> <li>*Identifies the potential danger of nuclear energy</li> <li>*Defines radioactivity</li> </ul>	<ul style="list-style-type: none"> <li>*Identifies the benefits of nuclear energy</li> <li>*Identifies the potential danger of nuclear energy</li> </ul>
SC.EN.A.03.02	Researches environmental problems associated with energy and suggests ways to solve the problems	<ul style="list-style-type: none"> <li>*Identify three systems of energy transfer which contribute to global issues (economic, ecological, social, environmental)</li> <li>*Conducts research on historic use of energy</li> <li>*Collect and analyze energy data on renewable and non renewable resources</li> <li>*Suggests two potential solutions to environmental issues associated with energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>*Identify two systems of energy transfer which contribute to global issues (economic, ecological, social, environmental)</li> <li>*Collect and analyze energy data on renewable and non renewable resources</li> <li>*Suggests two potential solutions to environmental issues associated with energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>*Identify a system of energy transfer which contributes to global issues (economic, ecological, social, environmental)</li> <li>*Collect energy data on renewable and non renewable resources</li> </ul>	<ul style="list-style-type: none"> <li>*Identify a system of energy transfer which contributes to global issues (economic, ecological, social, environmental)</li> </ul>

SC.EN.A.04.02	Researches the motion and energy of waves, including sound, light and seismic waves, and waves through water	<ul style="list-style-type: none"> <li>*Describes P waves</li> <li>*Describes S waves</li> <li>*Investigates and reports on motion of waves through various media</li> <li>*Identifies the use of waves in three modern fields of study (medical, biological, meteorological, etc)</li> </ul>	<ul style="list-style-type: none"> <li>*Describes P waves</li> <li>*Describes S waves</li> <li>*Investigates motion of waves through various media</li> <li>*Identifies the use of waves in two modern fields of study (medical, biological, meteorological, etc)</li> </ul>	<ul style="list-style-type: none"> <li>*Describes P waves</li> <li>*Describes S waves</li> <li>*Investigates motion of waves through various media</li> </ul>	<ul style="list-style-type: none"> <li>*Describes P waves</li> <li>*Describes S waves</li> <li>*Investigates motion of waves</li> </ul>
SC.EN.A.05.02	Explains reflection, refraction, absorption and transmission of light	<ul style="list-style-type: none"> <li>*Compares and contrasts reflection and refraction</li> <li>*Describes and illustrates the effects of light absorption and reflection on Earth</li> <li>*Describes the role albedo plays in climate regulation</li> <li>*Describes the electromagnetic spectrum and how wavelength effects reflection, refraction, absorption and transmission of light</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts reflection and refraction</li> <li>*Describes the effects of light absorption and reflection on Earth</li> <li>*Describes the role albedo plays in climate regulation</li> <li>*Describes the electromagnetic spectrum</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts reflection and refraction</li> <li>*Describes the effects of light absorption and reflection on Earth</li> <li>*Describes the role albedo plays in climate regulation</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts reflection and refraction</li> <li>*Describes the effects of light absorption and reflection on Earth</li> </ul>
SC.EN.A.06.02	Experiments with and illustrates how concave and convex lenses and mirrors affect light	<ul style="list-style-type: none"> <li>*Compares and contrasts concave and convex lenses</li> <li>*Illustrates and describes how light is affected by mirrors, concave lenses, and convex lenses</li> <li>*Designs and conducts a valid experiment with concave and convex lenses and mirrors</li> <li>*Describes how mirrors, convex lenses and concave lenses are used in modern technology</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts concave and convex lenses</li> <li>*Illustrates how light is affected by mirrors, concave lenses, and convex lenses</li> <li>*Designs and conducts a valid experiment with both concave and convex lenses</li> <li>*Describes how mirrors, convex lenses, and concave lenses are used in modern technology</li> </ul>	<ul style="list-style-type: none"> <li>*Illustrates how light is affected by mirrors, concave lenses, and convex lenses</li> <li>*Conducts a valid experiment with mirrors, concave lenses, and convex lenses</li> </ul>	<ul style="list-style-type: none"> <li>*Illustrates how light is affected by mirrors, concave lenses, and convex lenses</li> <li>*Conducts an experiment with both concave and convex lenses</li> </ul>
<b>Force, motion, their characteristics, relationships, and effects</b>					

SC.FM.A.01.02	Explains the relationship of motion to an object's mass, and the applied force (i.e. usefulness of machines based on mechanical advantage)	<ul style="list-style-type: none"> <li>*Describes and models Newton's second law of motion</li> <li>*Compares and contrasts acceleration and velocity</li> <li>*Mathematically describes the relationship between force, mass and motion</li> <li>*Designs a tool/machine which provides a mechanical advantage, using Newton's second law</li> </ul>	<ul style="list-style-type: none"> <li>*Describes and models Newton's second law of motion</li> <li>*Defines acceleration and velocity</li> <li>*Mathematically describes the relationship between force, mass and motion</li> <li>*Describes a tool/machine which provides a mechanical advantage, using Newton's second law</li> </ul>	<ul style="list-style-type: none"> <li>*Describes and models Newton's second law of motion</li> <li>*Defines acceleration and velocity</li> <li>*Mathematically describes the relationship between force, mass and motion</li> </ul>	<ul style="list-style-type: none"> <li>*Describes Newton's second law of motion</li> <li>*Defines acceleration and velocity</li> </ul>
SC.FM.A.02.02	Conducts an experiment to explore the relationship between magnetic forces and electric forces to show they can be thought of as different aspects of a single electromagnetic force (e.g. generators and motors)	<ul style="list-style-type: none"> <li>*Accurately calculates charge and magnetism using mathematical formulae (Coulomb's Law &amp; The Universal Law of Gravitation)</li> <li>*Explains the inverse nature of charge and distance</li> <li>*Designs and conducts an experiment on electromagnetism which clearly identifies electric and magnetic forces</li> </ul>	<ul style="list-style-type: none"> <li>*Accurately calculates charge and magnetism using mathematical formulae (Coulomb's Law &amp; The Universal Law of Gravitation)</li> <li>*Investigates the inverse nature of charge and distance</li> <li>*Conducts an experiment on electromagnetism which clearly identifies electric and magnetic forces</li> </ul>	<ul style="list-style-type: none"> <li>*Calculates charge and magnetism using mathematical formulae (Coulomb's Law &amp; The Universal Law of Gravitation)</li> <li>*Investigates the inverse nature of charge and distance</li> </ul>	<ul style="list-style-type: none"> <li>*Attempts to calculate charge and magnetism using mathematical formulae (Coulomb's Law &amp; The Universal Law of Gravitation)</li> </ul>
SC.FM.A.03.02	Explains how different kinds of materials respond to electric and magnetic forces (i.e. conductors, insulators, magnetic and non-magnetic materials) and the interactions between magnetism and electricity (i.e. generators, motors, doorbells, etc.)	<ul style="list-style-type: none"> <li>*Compares and contrasts magnetic and non-magnetic material</li> <li>*Compares and contrasts magnetism and electricity</li> <li>*Describes how 5 different machines use both magnetic and electric forces</li> <li>*Describes the properties of conductors, insulators, magnetic and non-magnetic materials</li> <li>*Designs and conducts experiment to study magnetism and electricity</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts magnetism and electricity</li> <li>*Describes how 3 different machines use both magnetic and electric forces</li> <li>*Describes the properties of conductors, insulators, magnetic and non-magnetic materials</li> <li>*Conducts experiment to study magnetism and electricity</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts magnetism and electricity</li> <li>*Describes the properties of conductors, insulators, magnetic and non-magnetic materials</li> </ul>	<ul style="list-style-type: none"> <li>*Compares and contrasts magnetism and electricity</li> <li>*Lists the properties of conductors, insulators, magnetic and non-magnetic materials</li> </ul>

SC.FM.A.04.02	Conducts an experiment to demonstrate when one thing exerts a force on another, an equal amount of force is exerted back on it	*Describes and models Newton's third law of motion *Conducts an experiment which demonstrates Newton's third law *Presents experiment to a group of peers using appropriate scientific language	*Describes Newton's third law of motion *Conducts an experiment which demonstrates Newton's third law *Describes experiment using appropriate scientific language	*Describes Newton's third law of motion *Conducts an experiment which demonstrates Newton's third law	*Conducts an experiment which demonstrates Newton's third law
<b>Electricity, Magnetism, and Heat</b>					
SC.EM.A.01.02	Explore how electricity works and analyze simple arrangements of electrical components in series and parallel circuits including finding the current, resistance, voltage, and power.	*Explains in own words each of the following terms: power, electrical charge, current, resistance, voltage *Compares and contrasts series circuits with parallel circuits *Creates model of both circuits and describes significance of each *Describes three renewable resources used to generate electricity *Describes three non-renewable resources used to generate electricity	*Defines each of the following terms: power, electrical charge, current, resistance, voltage *Compares and contrasts series circuits with parallel circuits *Describes two renewable resources used to generate electricity *Describes two non-renewable resources used to generate electricity	*Defines each of the following terms: power, electrical charge, current, resistance, voltage *Compares and contrasts series circuits with parallel circuits *Describes two renewable resources used to generate electricity	*Defines two of the following terms: power, electrical charge, current, resistance, voltage *Compares and contrasts series circuits with parallel circuits
<b>Kinematics and Newton's Laws</b>					
SC.KN.A.01.02	Solve kinematics and dynamics problems in one and two dimensions (including projectile motion) using appropriate vector and scalar quantities.	*Defines vector and scalar *Accurately solves 15 kinematics problems in one dimension *Accurately solves 15 kinematics problems in two dimensions *Accurately predicts and calculates vector forces of projectile motion	*Defines vector and scalar *Accurately solves 10 kinematics problems in one dimension *Accurately solves 10 kinematics problems in two dimensions *Accurately calculates vector forces of projectile motion	*Defines vector and scalar *Accurately solves 5 kinematics problems in one dimension *Accurately solves 5 kinematics problems in two dimensions *Calculates vector forces of projectile motion	*Defines vector and scalar *Accurately predicts vector forces of projectile motion

SC.KN.A.02.02	Graph relations between displacement and time, and velocity and time, representing one and two-dimensional motion	<ul style="list-style-type: none"> <li>*Graphs relations between displacement and time, and velocity and time, representing one and two-dimensional motion</li> <li>*Conducts an experiment that demonstrates Newton's Second Law of Motion</li> <li>*Presets experiments to groups of younger students</li> </ul>	<ul style="list-style-type: none"> <li>*Graphs relations between displacement and time, and velocity and time, representing one and two-dimensional motion</li> <li>*Conducts an experiment that demonstrates Newton's Second Law of Motion</li> </ul>	<ul style="list-style-type: none"> <li>*Graphs relations between displacement and time, and velocity and time</li> <li>*Conducts an experiment that demonstrates Newton's Second Law of Motion</li> </ul>	<ul style="list-style-type: none"> <li>*Conducts an experiment that demonstrates Newton's Second Law of Motion</li> </ul>
<b>Scientific Process</b>					
SC.SP.A.01.02	Develops testable questions independently and as a group, based on predictions, observations, and inferences from past experiences and research. Hypothesizes about the outcome of the experiment using information gathered from relevant sources	<ul style="list-style-type: none"> <li>*Develops testable questions independently and defends methods to community members</li> <li>*Develops and defends testable questions as a group</li> <li>*Constructs valid hypotheses based on predictions, observations, research and inferences</li> <li>*Defends hypothesis based on prior experiences and research</li> <li>*Includes valid citation of sources</li> </ul>	<ul style="list-style-type: none"> <li>*Develops testable questions independently and defends methods to a group of peers</li> <li>*Develops and defends testable questions as a group</li> <li>*Constructs valid hypotheses based on predictions, observations, research and inferences</li> <li>*Defends hypothesis based on prior experiences and research</li> <li>*Includes citation of sources</li> </ul>	<ul style="list-style-type: none"> <li>*Develops testable questions independently</li> <li>*Develops testable questions as a group</li> <li>*Constructs valid hypotheses based on predictions, observations, research or inferences</li> <li>*Describes hypothesis based on prior experiences</li> </ul>	<ul style="list-style-type: none"> <li>*Develops testable questions independently</li> <li>*Develops testable questions as a group</li> <li>*Describes hypothesis based on prior experiences</li> </ul>
SC.SP.A.02.02	Designs and conducts an experiment, and gathers relevant data with the intent of solving or answering the proposed question	<ul style="list-style-type: none"> <li>*Designs an experiment with a clearly defined problem or question</li> <li>*Collects relevant data to answer the question</li> <li>*Formulates potential solution based on research</li> <li>*Defends outcome of experiment to peers</li> </ul>	<ul style="list-style-type: none"> <li>*Designs an experiment with a clearly defined problem or question</li> <li>*Collects relevant data to solve the problem or answer the question</li> <li>*Formulates potential solution based on research</li> </ul>	<ul style="list-style-type: none"> <li>*Designs an experiment with a defined question</li> <li>*Collects data to answer the question</li> </ul>	<ul style="list-style-type: none"> <li>*Designs an experiment</li> <li>*Collects data</li> </ul>

SC.SP.A.03.02	Analyzes data, makes inferences and develops models to represent the data collected	<ul style="list-style-type: none"> <li>*Analyzes collected data using three appropriate statistical methods</li> <li>*Communicates analysis using models and appropriate scientific language to members of the community</li> <li>*Presents models used to represent data to members of the community</li> </ul>	<ul style="list-style-type: none"> <li>*Analyzes collected data using two appropriate statistical methods</li> <li>*Communicates analysis using models and appropriate scientific language to a group of peers</li> <li>*Presents models used to represent data to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Analyzes collected data using an appropriate statistical method</li> <li>*Communicates analysis using appropriate scientific language to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Analyzes collected data using a statistical method</li> <li>*Communicates analysis to a group of peers</li> </ul>
SC.SP.A.04.02	Communicates entire process used in experiment, as well as results and models to depict data and conclusions	<ul style="list-style-type: none"> <li>*Describes each step of the research process including methods and results</li> <li>*Presents models used to depict data, analysis, and conclusion to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Describes each step of the research process including methods and results</li> <li>*Presents models used to depict data, analysis, and conclusion to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Describes some steps of the research process</li> <li>*Presents models used to depict data, analysis, and conclusion to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Describes some steps of the research process</li> </ul>
SC.SP.A.05.02	Recognizes and analyzes multiple explanations and models, using this information to revise own explanation or model if necessary	<ul style="list-style-type: none"> <li>*Examines three models and describes three multiple ways each model can be interpreted</li> <li>*Revises own model from previous experiment based on an alternative way to interpret the model</li> </ul>	<ul style="list-style-type: none"> <li>*Examines two models and describes two ways the model can be interpreted</li> <li>*Revises own model from previous experiment based on an alternative way to interpret the model</li> </ul>	<ul style="list-style-type: none"> <li>*Examines one model and describes one way the model can be interpreted</li> <li>*Attempts to revise own explanation using an alternative model</li> </ul>	<ul style="list-style-type: none"> <li>*Examines one model and describes one way the model can be interpreted</li> </ul>
SC.SP.A.06.02	Evaluates the credibility of cited sources when conducting own scientific investigation	<ul style="list-style-type: none"> <li>*Includes ten sources of information in a scientific investigation</li> <li>*Evaluates the credibility of these sources based on peer reviewed article</li> </ul>	<ul style="list-style-type: none"> <li>*Includes eight sources of information in a scientific investigation</li> <li>*Evaluates the credibility of these sources based on peer reviewed article</li> </ul>	<ul style="list-style-type: none"> <li>*Includes five sources of information in a scientific investigation</li> </ul>	<ul style="list-style-type: none"> <li>*Includes three sources of information in a scientific investigation</li> </ul>

SC.SP.A.07.02	Conducts research and communicates results to solve a problem within the local environment (e.g. fish and game management, building permits, mineral rights, land use policies)	<ul style="list-style-type: none"> <li>*Conducts an investigation of a local issue</li> <li>*Presents a potential solution to a local issue based on research</li> <li>*Communicates solution to two or more specified interest groups</li> </ul>	<ul style="list-style-type: none"> <li>*Conducts an investigation of a local issue</li> <li>*Presents a potential solution to a local issue based on research</li> <li>*Communicates solution a specified interest group</li> </ul>	<ul style="list-style-type: none"> <li>*Conducts an investigation of a local issue</li> <li>*Presents a potential solution to a local issue based on research</li> <li>*Communicates solution a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Conducts an investigation of a local issue</li> <li>*Presents a potential solution to a local issue based on research</li> </ul>
SC.SP.A.08.02	Researches how social, economic, and political forces strongly influence which technology will be developed and used	<ul style="list-style-type: none"> <li>*Describes and illustrates how technology is influenced by social, economic and political forces</li> <li>*Identifies ways in which multiple factors influence technology used for the advancement of science</li> <li>*Researches two technological advancements which was prompted by a unique political, economic, or social force</li> </ul>	<ul style="list-style-type: none"> <li>*Describes how technology is influenced by social, economic and political forces</li> <li>*Identifies ways in which multiple factors influence technology used for the advancement of science</li> <li>*Researches a technological advancement which was prompted by a unique political, economic, or social force</li> </ul>	<ul style="list-style-type: none"> <li>*Describes how technology is influenced by social, economic and political forces</li> <li>*Researches a technological advancement which was prompted by a unique political, economic, or social force</li> </ul>	<ul style="list-style-type: none"> <li>*Describes how technology is influenced by social, economic and political forces</li> </ul>
SC.SP.A.09.02	Investigates the influences of societal and/or cultural beliefs on science	<ul style="list-style-type: none"> <li>*Researches two present scientific issues which are influenced by societal and/or cultural beliefs</li> <li>*Researches a historical scientific issue which was influenced by societal and/or cultural beliefs</li> <li>*Describes three scientific advancements which have been hindered by societal and/or cultural beliefs</li> </ul>	<ul style="list-style-type: none"> <li>*Researches a present scientific issue which is influenced by societal and/or cultural beliefs</li> <li>*Researches a historical scientific issue which was influenced by societal and/or cultural beliefs</li> <li>*Describes two scientific advancements which have been hindered by societal and/or cultural beliefs</li> </ul>	<ul style="list-style-type: none"> <li>*Researches a present scientific issue which is influenced by societal and/or cultural beliefs</li> <li>*Describes a scientific advancement which has been hindered by societal and/or cultural beliefs</li> </ul>	<ul style="list-style-type: none"> <li>*Researches a present scientific issue which is influenced by societal and/or cultural beliefs</li> </ul>

SC.SP.A.10.02	Describes the importance of logical arguments in the advancement of scientific knowledge (i.e. thought experiments by Einstein, Hawking, Newton)	<ul style="list-style-type: none"> <li>*Describes the role of philosophy in science</li> <li>*Describes the role of logic in scientific advancement</li> <li>*Investigates the parallels between mathematics and science</li> <li>*Presents thought experiments by influential scientists such as Einstein, Hawking, Newton, Galileo, etc, to a group of community members</li> </ul>	<ul style="list-style-type: none"> <li>*Describes the role of philosophy in science</li> <li>*Describes the role of logic in scientific advancement</li> <li>*Investigates the parallels between mathematics and science</li> <li>*Presents thought experiments by influential scientists such as Einstein, Hawking, Newton, Galileo, etc, to a group of peers</li> </ul>	<ul style="list-style-type: none"> <li>*Describes the role of philosophy in science</li> <li>*Describes the role of logic in scientific advancement</li> <li>*Investigates the parallels between mathematics and science</li> </ul>	<ul style="list-style-type: none"> <li>*Describes the role of philosophy in science</li> <li>*Describes the role of logic in scientific advancement</li> </ul>
SC.SP.A.11.02	Investigates instances when scientists' observations were not in accord with prevailing ideas of the time	*Describes five successful scientists who improved scientific knowledge and were criticized by the science community	*Describes three successful scientists who improved scientific knowledge and were criticized by the science community	*Describes one successful scientist who improved scientific knowledge and was criticized by the science community	*Researches one scientist who improved scientific knowledge