Science – Grade 5 - IPC
Vertical Alignment Matrix

Strand 1: Nature of Science

Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Nature of Science	Safety	**SCI.5.1.01** Demonstrate safe practices during classroom and field investigations.	**SCI.6.1.01** Demonstrate safe practices during classroom and field investigations.	**SCI.7.1.01** Demonstrate safe practices during classroom and field investigations.	**SCI.8.1.01** Demonstrate safe practices during classroom and field investigations.	**IPC.1.01** Demonstrate safe practices during classroom and field investigations.
		SCI.5.1.02 Make wise choices in the use and conservation of resources and the disposal or recycling of materials.	**SCI.6.1.02** Make wise choices in the use and conservation of resources and the disposal or recycling of materials.	**SCI.7.1.02** Make wise choices in the use and conservation of resources and the disposal or recycling of materials.	**SCI.8.1.02** Make wise choices in the use and conservation of resources and the disposal or recycling of materials.	**IPC.1.02** Make wise choices in the use and conservation of resources and the disposal or recycling of materials.
	Inquiry	**SCI.5.1.03** Plan and implement descriptive and simple controlled investigations including asking well-defined questions, formulating testable hypotheses, identifying controlled, manipulate, and responding variables, and selecting and using grade-appropriate, content-embedded equipment and technology.	**SCI.6.1.03** Plan and implement investigative procedures including asking questions, formulating testable hypotheses, identifying variables, and selecting and using grade-appropriate, content-embedded equipment and technology.	**SCI.7.1.03** Plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using grade-appropriate, content-embedded equipment and technology.	**SCI.8.1.03** Plan and implement investigative procedures, including asking questions, formulating testable hypotheses, identifying variables, conducting multiple trials, and selecting and using grade-appropriate, content-embedded equipment and technology.	**IPC.1.03** Plan and implement investigative procedures, including asking questions, formulating testable hypotheses, identifying variables, conducting multiple trials, and selecting course-specific, content-embedded equipment and technology.
		SCI.5.1.04 Collect information by observing and measuring.	**SCI.6.1.04** Collect data by observing and measuring.	**SCI.7.1.04** Collect data by observing and measuring.	**SCI.8.1.04** Collect data by observing and measuring.	**IPC.1.04** Collect data and make measurements with precision.
		SCI.5.1.05 Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.	**SCI.6.1.05** Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.	**SCI.7.1.05** Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.	**SCI.8.1.05** Analyze and interpret information to construct reasonable explanations from direct and indirect evidence.	**IPC.1.05** Organize, analyze, evaluate, make inferences, and predict trends from data.
		SCI.5.1.06. Communicate valid conclusions.	**SCI.6.1.06** Communicate valid conclusions.	**SCI.7.1.06** Communicate valid conclusions.	**SCI.8.1.06** Communicate valid conclusions.	**IPC.1.06** Communicate valid conclusions.
		SCI.5.1.07 Construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information.	**SCI.6.1.07** Construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.	**SCI.7.1.07** Construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.	**SCI.8.1.07** Construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.	
	Critical Thinking	**SCI.5.1.08** Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.	**SCI.6.1.08** Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.	**SCI.7.1.08** Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.	**SCI.8.1.08** Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.	**IPC.1.07** Analyze, review, and critique scientific explanation, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.
		SCI.5.1.09 Draw inferences based on information related to promotional materials for products and services.	**SCI.6.1.09** Draw inferences based on data related to promotional materials for products and services.	**SCI.7.1.09** Draw inferences based on data related to promotional materials for products and services.	**SCI.8.1.09** Draw inferences based on data related to promotional materials for products and services.	**IPC.1.08** Draw inferences based on data related to promotional materials for products and services.
		SCI.5.1.10 Represent the natural world using models and identify their limitations.	**SCI.6.1.10** Represent the natural world using models and identify their limitations.	**SCI.7.1.10** Represent the natural world using models and identify their limitations.	**SCI.8.1.10** Represent the natural world using models and identify their limitations.	**IPC.1.09** Evaluate the impact of research on scientific thought, society, and the environment.

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Nature of Science	Critical Thinking (cont)	**SCI.5.1.11** Evaluate the impact of research on scientific thought, society, and the environment.	**SCI.6.1.11** Evaluate the impact of research on scientific thought, society, and the environment.	**SCI.7.1.11** Evaluate the impact of research on scientific thought, society, and the environment.	**SCI.8.1.11** Evaluate the impact of research on scientific thought, society, and the environment.	**IPC.1.10** Describe connections between physics and chemistry and future careers.
		SCI.5.1.12 **Connect Grade 5 science concepts with the history of science and contributions of scientists.**	**SCI.6.1.12** **Connect Grade 6 science concepts with the history of science and contributions of scientists**	**SCI.7.1.12** **Connect Grade 7 science concepts with the history of science and the contributions of scientists.**	**SCI.8.1.12** **Connect Grade 8 science concepts with the history of science and the contributions of scientists.**	**IPC.1.11** **Research and describe the history of physics, chemistry, and contributions of scientists.**
	Tools	**SCI.5.1.13** Collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, double pan and triple beam balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles.	**SCI.6.1.13** Collect, analyze, and record information using tools including beakers, Petri dishes, meter sticks, graduated cylinders, weather instruments, timing devices, hot plates, test tubes, safety goggles, spring scales, magnets, balances, microscopes, telescopes, thermometers, calculators, field equipment, compasses, computers, and computer probes.	**SCI.7.1.13** Collect, analyze, and record information to explain phenomenon using tools including beakers, Petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, timing devices, magnets, and compasses.	**SCI.8.1.13** Collect, analyze, and record information using tools.	
		SCI.5.1.14 Demonstrate that repeated investigations may increase the reliability of results.	**SCI.6.1.14** Identify patterns in collected information using percent, average, range, and frequency.	**SCI.7.1.14** Collect and analyze information to recognize patterns such as rates of change.	**SCI.8.1.14** Extrapolate from collected information to make predictions.	
	Science and Technology	**SCI.5.1.15** Propose, construct, and test a solution to a simple design problem or challenge and describe the reasons for the effectiveness of the solution.	**SCI.6.1.15** Propose, implement, and document the scientific design process used to solve a problem or challenge including defining the problem, steps to do the solve the problem and testing of the proposed solutions to the problem.	**SCI.7.1.15** Identify a design problem, propose a solution, create a model based on proposed solution and test the model.	**SCI.8.1.15** Identify a design problem and propose a solution.	**IPC.1.12** Identify a design problem and use technology to implement a solution to the problem.
					SCI.8.1.16 Design and test a model to solve the problem.	
					SCI.8.1.17 Evaluate the model and make recommendations for improving the model.	

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Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Interdependence of Living Systems			
Living Systems	Systems		**SCI.6.2.01** Identify and give examples that show an organism's response to internal stimuli such as hunger or thirst. **SCI.6.2.02** Investigate and describe the effect of external stimuli, including heat or light, on organisms.	**SCI.7.2.01** Illustrate and describe how the human body maintains relatively constant internal conditions such as temperature and blood sugar. **SCI.7.2.02** Analyze changes in organisms such as a fever or vomiting that may result from internal stimuli. **SCI.7.2.03** Analyze responses in organisms to external stimuli found in the environment such as changes in temperature or the presence or absence of light. **SCI.7.2.04** Describe and give examples of homeostasis. **SCI.7.2.05** Describe how organisms maintain stable internal conditions while living in changing external environments. **SCI.7.2.06** Demonstrate how equilibrium is established, disrupted, and re-established in human body systems. **SCI.7.2.07** Compare and contrast the mechanisms by which warm-blooded and cold-blooded animals control their internal environment.	**SCI.8.2.01** **Describe interactions among systems in the human organism.** **SCI.8.2.02** **Identify feedback mechanisms that maintain equilibrium of systems such as body temperature, turgor pressure, and chemical reactions.** **SCI.8.2.03** **Investigate and describe the role of human body systems in maintaining homeostasis.** **SCI.8.2.04** **Identify the role of the brain in feedback mechanisms such as temperature and heart rate regulation and breathing.**
		Ecosystems: Interdependence and Interaction			
	Systems	**SCI.5.2.02** Explain symbiosis and differentiate between the types of symbiosis; mutualism, parasitism, and commensalism.	**SCI.6.2.03** Describe how decomposition of biomass in soil produces a chemical change. **SCI.6.2.04** Illustrate and describe the flow of energy in living systems such as food chains and food webs. **SCI.6.2.05** Trace the path of solar energy through a simple food chain and through food webs that include humans.	**SCI.7.2.08** Observe and describe how organisms including producers, consumers, and decomposers live together in an environment and use existing resources.	**SCI.8.2.05** Identify that changes in environmental conditions can affect the survival of individuals and of species.

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					SCI.8.2.06 Describe the effects of human activities on the survival of individuals and of species. **SCI.8.2.07** Investigate and describe how abiotic and biotic components of ecosystems interact.
		SCI 5.2.01 Describe some structures and processes that are found in a simple system including structures of a plant and plant growth.	**SCI.6.2.06** Describe how an ecosystem is the result of the combination of two or more systems.	**SCI.7.2.09** Investigate the interactions among components of an ecosystem.	**SCI.8.2.08** Relate characteristics of organisms to their role in an ecosystem.
		SCI.5.2.04 Describe cycles (including the water cycle), structures and processes that are found in a simple system such as an ecosystem.	**SCI.6.2.07** Describe how the properties of an ecosystem are influenced by the parts which make up the system.	**SCI.7.2.10** Identify and explain that radiant energy from the Sun is transferred Into chemical energy through the process of photosynthesis.	**SCI.8.2.09** Investigate and describe how the major source of energy in most ecosystems (sunlight) is converted into chemical energy.
			SCI.6.2.08 Illustrate and define components of an ecosystem to which organisms may respond.	**SCI.7.2.11** Describe how different environments support different varieties of organisms. **SCI.7.2.12** Observe and describe the role of ecological succession in maintaining equilibrium in an ecosystem.	**SCI.8.2.10** **Analyze how natural or human events may have contributed to the extinction of some species.**
				SCI.7.2.13 Observe and describe the role of ecological succession in ecosystems.	

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Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Structure & Function			
Living Systems	**Properties and Patterns**		**SCI.6.2.09** Differentiate between structure and function and apply to living systems.		
			SCI.6.2.10 Investigate research and determine that all organisms are composed of cells and explain why the cell is described as the basic unit of life.		
			SCI.6.2.11 Classify organisms as single-celled or multicellular.		
			SCI.6.2.12 Compare and contrast the major structures and functions of typical plant and animal cells.		
			SCI.6.2.13 Differentiate among cells, tissues, organs, and organ systems.		
			SCI.6.2.14 Illustrate how structure complements function at different levels of organization including cells, tissues, organs, organ systems, organisms and populations.	**SCI.7.2.14** Investigate and describe the function of human organ systems including circulatory, respiratory, integumentary, endocrine, digestive, excretory, skeletal, muscular, nervous, and reproductive systems.	
				SCI.7.2.15 Identify organ systems at work during a particular activity and describe their effect on each other.	
				SCI.7.2.16 Compare and contrast the human body organs and systems to those of other animals.	
				SCI.7.2.17 Relate forces to basic processes in living organisms such as an explanation of how contraction of muscle cells in the heart forces blood through vessels in the body.	
				SCI.7.2.18 Relate forces to basic processes in plant systems including an investigation into how seedlings emerge from seeds during germination.	

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Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Cycles			
Living Systems	Change	**SCI.5.2.07** Identify and observe actions that require time for changes to be measurable including growth.			
		SCI.5.2.05 Identify the significance of the water, carbon, and nitrogen cycles.	**SCI.6.2.15** Explain and illustrate the interactions between matter and energy in the water cycle and the relationship between the water cycle, organisms and ecosystems.		
		SCI.5.2.06 Describe and compare life cycles of plants and animals.			
		Heredity			
				SCI.7.2.19 Identify that sexual reproduction results in more diverse offspring and asexual reproduction results in more uniform offspring.	**SCI.8.2.11** Distinguish between inherited traits and acquired traits which result from interactions within an environment.
				SCI.7.2.20 Recognize advantages and disadvantages of sexual and asexual reproduction.	**SCI.8.2.12** Compare and contrast “homologous and analogous” structures of organisms.
				SCI.7.2.21 Identify and explain the function and importance of mitosis and meiosis.	
			SCI.6.2.16 Identify cells as structures containing genetic materials.	**SCI.7.2.22** Sequence a series of diagrams depicting the stages of cell division in both plant and animal cells.	
		SCI.5.2.08 Identify traits that are inherited from parent to offspring in plants and animals.	**SCI.6.2.17** Describe the relationship between cells and genes, and Interpret the role of genes in inheritance.	**SCI.7.2.23** Identify the role of genetics in the transmission of traits and characteristics in organisms.	**SCI.8.2.13** Make predictions about possible outcomes of various genetic combinations of inherited characteristics.
				SCI.7.2.24 Distinguish between dominant and recessive traits.	**SCI.8.2.14** Examine crosses using Punnett squares, defining and describing dominant and recessive traits, genotype, and phenotype.
		SCI.5.2.03 Differentiate between inherited traits and learned characteristics resulting from the influence of the environment including examples of each.	**SCI.6.2.18** Identify some changes in traits that can occur over several generations through natural occurrence and selective breeding.	**SCI.7.2.25** Distinguish between reproductive processes such as selective breeding.	
				SCI.7.2.26 Compare traits of organisms of different species that enhance their survival and reproduction.	

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Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Adaptations			
Living Systems	Change	**SCI.5.2.09** Compare the adaptive characteristics of species that improve their ability to survive and reproduce in an ecosystem.		**SCI.7.2.27** Analyze how an adaptation can increase an organism's chances to survive and reproduce in a particular habitat.	**SCI.8.2.15** Classify adaptations of organisms as structural or physiological.
		SCI.5.2.10 Analyze and describe some adaptive characteristics that result in an organisms unique niche in an ecosystem.		**SCI.7.2.28** Compare and contrast adaptations and mutations.	
		SCI.5.2.11 Predict some adaptive characteristics required for survival and reproduction by an organism in an ecosystem.		**SCI.7.2.29** Suggest evidence of how species have adapted to changes in their habitats.	

Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
		Matter and Energy Interactions				
Physical science	Systems	**SCI.5.3.01** Differentiate among forms of energy including light, heat, electrical and solar energy.	**SCI.6.3.01** Define and describe matter and energy.		**SCI.8.3.01** Illustrate interactions between matter and energy.	**IPC.3.01** Illustrate energy transformations using the law of conservation of energy.
			SCI.6.3.02 Investigate and describe how energy can be used to bring about changes in matter such as melting an ice cube.		**SCI.8.3.02** Explain the concept of specific heat.	**IPC.3.02** Investigate the difference between heat and temperature, and the transference of heat through conduction, convection, and radiation in solids, liquids, and gases.
					SCI.8.3.03 Apply and use the concept of specific heat to relate energy input or output to the mass, composition, and temperature change of a sample.	
			SCI.6.3.03 Investigate and identify energy transformations occurring during the production of energy for human use such as electrical energy to heat energy or heat energy to electrical energy.		.	**IPC.3.03** Analyze the efficiency of energy conversions that are responsible for the production of electricity such as from radiant, nuclear, and geothermal sources, fossil fuels such as coal, gas, oil and the movement of water or wind including generators.
						IPC.3.04 Investigate, compare and evaluate the economic impact of various energy sources such as rechargeable or disposable batteries, and solar cells.

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical science	Systems	**SCI.5.3.02** Understand that energy cannot be created or destroyed, only changed into other forms, such as light bulbs giving off light and heat.	**SCI.6.3.04** Explain the principle of the conservation of energy and give examples to illustrate energy transformation.	**SCI.7.3.01** Illustrate and list multiple examples of potential and kinetic energy in everyday life and describe how they are interchangeable.	**SCI.8.3.04** Identify and demonstrate that loss or gain of heat energy occurs during exothermic and endothermic chemical reactions.	**IPC.3.26** Analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks to classify them as endergonic or exergonic reactions.
					SCI.8.3.05 Describe some chemical reactions as exothermic or endothermic and explain the energy change in both.	
			SCI.6.3.05 Describe how electricity is produced in hydroelectric and wind power plants, including the energy transformations involved.			**IPC.3.05** Investigate the factors that affect thermal conductivity and distinguish between thermal conductivity and resistance.
			SCI.6.3.06 Compare and contrast methods used to transform energy and heat water in gas and electric hot water heaters.			**IPC.3.06** Investigate the factors that affect electrical conductivity and distinguish between conductivity and resistance.
			SCI.6.3.07 Using empirical evidence, conclude why insulation is important to heating and cooling systems.			
			SCI.6.3.08 Research and describe energy types from their source to their use and determine if the type is renewable, non-renewable, or inexhaustible.			
		SCI.5.3.06 Demonstrate that electricity can flow in a circuit and produce heat, light, sound and magnetic effects.				**IPC.3.07** Investigate the flow of electrical current in series and parallel circuits and solve mathematical problems using Ohm's Law in series and parallel circuits.
						IPC.3.08 Investigate and analyze the relationship between an electric current and the strength of its magnetic field using simple electromagnets through investigations
						IPC.3.09 Analyze and describe the effects of heating and cooling processes in systems such as weather, living and mechanical

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical science	Systems					**IPC.3.10** Evaluate the role of isotopes and radioactive material in applications such as medicine and energy production.
		SCI.5.3.07 Verify that vibrating an object can produce a sound by conducting scientific experiments.				**IPC.3.11** Model and describe characteristics of waves (pitch, frequency, amplitude, loudness, intensity etc.), similarities and differences between sound and light waves using ropes, coils, and tuning forks.
						IPC.3.12 Demonstrate the application of acoustic principles such as in echolocation, musical instruments, noise pollution, and sonograms.
					SCI.8.3.06 Investigate and describe how waves transfer energy and move at different speeds in different materials.	**IPC.3.13** Distinguish between transverse and longitudinal waves and how they transfer energy.
					SCI.8.3.07 Describe a two-dimensional representation of a wave and the properties of waves.	**IPC.3.14** Interpret data on a seismic wave map.
					SCI.8.3.08 Differentiate between compression and rarefaction components of a longitudinal wave and relate pitch to frequency of compressions and rarefactions.	**IPC.3.15** Demonstrate and describe types of wave interactions including interference, polarization, reflection, refraction, and resonance within various materials.
		SCI.5.3.03 Identify and demonstrate everyday examples of how light is reflected such as from tinted windows and mirrors.				**IPC.3.16** Demonstrate and describe reflection, &and refraction of light rays/waves in plane, concave, and convex mirrors and lenses.
		SCI.5.3.04 Identify and demonstrate everyday examples of how light is refracted such as from cameras, telescopes, eye glasses, and a water-filled glass.				**IPC.3.17** Describe properties of waves in the electromagnetic spectrum.
		SCI.5.3.05 Demonstrate that curved surfaces cause light waves to bounce off in different directions causing images to be bigger, smaller, thinner, or wider than actual size.				**IPC.3.18** Identify uses and applications of electromagnetic waves in the operation of technological devices such as fiber optics, optical scanners, and microwaves.

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
		Physical and Chemical Properties				
Physical Science	Properties and Patterns	**SCI.5.3.08** Classify and record observations of matter based on its physical properties including magnetism, physical state, and the ability to conduct or insulate heat.				
		SCI.5.3.09 Demonstrate that some mixtures maintain the physical properties of their ingredients.				
		SCI.5.3.10 Identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt or sugar in water.				
		SCI.5.3.11 Observe and measure characteristic properties of substances that remain constant such as boiling points and melting points.			**SCI.8.3.09** **Ex**amine, describe, compare, and classify objects and substances based on physical and chemical properties.	**IPC.3.19** Investigate, describe, and differentiate between the physical properties of liquids and gases such as mass and weight, including density, viscosity, and buoyancy.
						IPC.3.21 Investigate and relate the constituents of various materials or objects such as metal salts, light sources, fireworks displays, and stars to the spectrographic data obtained from spectral-analysis techniques.
				SCI.7.3.02 Identify and demonstrate everyday examples of chemical phenomena such as rusting and tarnishing of metals and burning of wood.	**SCI.8.3.10** Differentiate between a chemical change and a physical change and give examples of each.	**IPC.3.24** Distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle
			SCI.6.3.09 Demonstrate that new substances can be made when two or more substances are chemically combined.		**SCI.8.3.11** Demonstrate that substances may react chemically to form new substances and explain how properties of the new substances are different from the original substances.	
			SCI.6.3.10 Identify that substances can combine physically to form mixtures	**SCI.7.3.03** Describe various types of chemical reactions by applying the laws of conservation of mass and energy.		

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical Science	Physical and Chemical Properties		**SCI.6.3.11** Differentiate between a chemical change and a physical change by comparing the properties of the starting materials to the end products.	**SCI.7.3.04** Describe physical and chemical properties of elements and identify how these characteristics are used to position an element on the periodic table.	**SCI.8.3.12** Interpret information on the periodic table to demonstrate an understanding that physical and chemical properties are used to group elements.	**IPC.3.22** Relate the physical properties, and the chemical behavior of an element including bonding and compound formation, to its placement on the periodic table.
			SCI.6.3.12 Classify substances by their physical and chemical properties.	**SCI.7.3.05** Describe the properties of elements and give examples of substances that may be classified as elements.	**SCI.8.3.13** Compare and contrast families of elements on the periodic table and classify elements as metals, metalloids, or non-metals.	
			SCI.6.3.13 Differentiate between chemical properties and physical properties of substances and give examples of each.			
					SCI.8.3.14 Explain the arrangement of electrons in the energy levels of an atom and relate the outer configuration of electrons to the group or family.	
					SCI.8.3.15 Predict whether a simple compound is covalent or ionic by its elements and the position of the elements in the periodic table.	
				SCI.7.3.06 Illustrate and describe how two or more elements combine chemically to form one or more new substances called compounds.		**IPC.3.23** Classify samples of matter from everyday life as being elements, compounds, or mixtures
				SCI.7.3.07 Investigate and describe how compounds may only be broken down by chemical means into elements.		
					SCI.8.3.16 Describe the structure and parts of an atom including subatomic particles.	**IPC.3.20** Research, describe, summarize, and critique the various models in the historical development of the atomic theory.
					SCI.8.3.17 Describe the properties of an atom including mass, electrical charge, atomic number, and mass number for a variety of isotopes.	

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical Science	Physical and Chemical Properties					**IPC.3.27** Distinguish between types of nuclear reactions such as fission and fusion.
						IPC.3.28 Research, describe, and analyze the environmental and economic impact of the end-products of chemical reactions
					SCI.8.3.18 Recognize the importance of formulas and equation to express what happens in a chemical reaction and balance simple equations.	**IPC.3.25** Write balanced chemical equations by applying the law of conservation of mass to simple chemical reactions.
					SCI.8.3.19 Investigate, illustrate and communicate how physical and chemical properties influence the development and application of everyday materials.	**IPC.3.29** Investigate the properties and characteristics of different types of solutions and analyze the various factors that affect solubility including temperature, pressure, and nature of the solute and solvent.
						IPC.3.30 Investigate and demonstrate how factors such as particle size, temperature, agitation, and concentration influences the rate of dissolving.
						IPC.3.31 Relate the structure of water to its function to its properties as the universal solvent**.**
						IPC.3.32 Relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity.
						IPC.3.33 Simulate the effects of acid rain on soil, buildings, statues, or microorganisms, and analyze the causes of the pollution.

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Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical Science	Change	Force and Motion				
			SCI.6.3.14 Identify and describe the changes in position, direction of motion, and speed of an object when acted upon by force.		**8.3.20** Demonstrate how unbalanced forces are associated with motion and may cause change in speed and direction of an object.	**IPC.3.34** Differentiate between motion and displacement, speed and velocity, and calculate speed and velocity.
			SCI.6.3.15 Illustrate that an object going around a corner or moving in a circular path is changing its direction.		**SCI.8.3.21** Investigate situations where balanced forces are associated with no motion and with constant speed.	**IPC.3.35** Calculate acceleration (positive and negative) and force with respect to the human body, moving toys, and machines.
			SCI.6.3.16 Demonstrate that a change in direction of an object requires a force.		**SCI.8.3.22** Investigate and describe how the mass of an object affects the force needed to stop it, speed it up, slow it down, or change its direction.	**IPC.3.36** Calculate momentum with respect to the human body, moving toys, and machines.
			SCI.6.3.17. Demonstrate that changes in motion can be measured and graphically represented.	**SCI.7.3.08** Recognize and describe examples of Newton's Laws of Motion.		**IPC.3.37** Calculate work in the human body, moving toys, and machines .
			SCI.6.3.18 Interpret graphs and tables of motion and determine the distance traveled at specified instances of time.	**SCI.7.3.09** Measure and graphically represent motion of an object.		**IPC.3.38** Calculate power in the human body, moving toys, and machines.
						IPC.3.39 Investigate and discuss Newton's first law of motion in vehicle restraints, sports activities, geological processes, and satellite orbits.
						IPC.3.40 Investigate and discuss Newton's second law of motion in vehicle restraints, sports activities, geological processes, and satellite orbits.
				SCI.7.3.10 Demonstrate basic relationships between force and motion using simple machines.		**IPC.3.41** Investigate and discuss Newton's third law of motion in vehicle restraints, sports activities, geological processes, and satellite orbits.
				SCI.7.3.11 Measure and describe how simple machines such as levers and pulleys can change the strength and/or direction of a force.		**IPC.3.42** Describe the history and technological applications of simple machines.

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Vertical Alignment Matrix

Strand		Grade 5	Grade 6	Grade 7	Grade 8	IPC
Physical Science	Change			**SCI.7.3.12** Calculate and explain mechanical advantages for levers, pulleys, and inclined planes.		**IPC.3.43** Diagram and analyze types of simple machines as seen in household devices, the human body and vehicles.
						IPC.3.44 Calculate work output and work input of simple machines.
						IPC.3.45 Investigate and calculate the efficiency of simple machines such as levers, motors, wheels and axles, pulleys, and ramps.
						IPC.3.46 Investigate and calculate the mechanical advantage of a lever, inclined plane, wheel and axle, and a pulley system.

Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Matter and Energy Interactions			
Earth/Space Systems	**Systems**		**SCI.6.4.01** Identify the solar system as a system that results from the combination of two or more other systems.		
			SCI.6.4.02 Describe how the properties of the solar system are influenced by the parts which make up the system.		
			SCI.6.4.03 **Explain and illustrate the interactions between matter and energy in the decay of biomass such as in a compost bin.**		
			SCI.6.4.04 Explain and illustrate the interactions between matter and energy in the water cycle.		**SCI.8.4.01** Explain how heating of the Earth's surface by the sun forms convection currents with the atmosphere and ocean.
			SCI.6.4.05 Infer why air temperatures are more moderate in areas near large bodies of water.		**SCI.8.4.02** Describe the water cycle, the composition and structure of the atmosphere, and the impact of oceans on large scale weather patterns.
			SCI.6.4.06 Describe where hurricanes form, trace their movement across the oceans, and predict what may happen as they move over land.		**SCI.8.4.03** Analyze weather-related data and make inferences and predictions about weather patterns.

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Vertical Alignment Matrix

Earth/Space Systems	Systems		**SCI.6.4.07** Relate heat transfer to the movement of air masses, high and low pressure areas, and fronts in the atmosphere.		**SCI.8.4.04** Investigate major ocean currents and compare climate patterns in land areas near the current.
			SCI.6.4.08 Compare characteristics and locations of global wind patterns such as trade winds and the jet stream and give examples of how these global patterns can affect local weather.		**SCI.8.4.05** Relate the roles of oceans to climate changes.

Strand		Grade 5	Grade 6	Grade 7	Grade 8
Earth/Space Systems	Properties & Patterns	**Natural World**			
		SCI.5.4.03 Compare the physical characteristics of the Earth to the physical characteristics of the moon.	**SCI.6.4.09** Investigate and describe characteristics of objects in our solar system including the sun, planets, meteoroids, comets, asteroids, and moons.	**SCI.7.4.01** Describe Earth's position and movement in the solar system.	**SCI.8.4.06** Describe characteristics of the universe such as stars and galaxies.
				SCI.7.4.02 Illustrate and explain how the spin of the Earth accounts for the length of a day.	**SCI.8.4.07** Determine the composition and the brightness of the sun and estimate distances to stars using apparent brightness and other methods.
		SCI.5.4.01 Describe the force of gravity and relate its role in the solar system. Identify the physical characteristics of the Earth and compare them to the physical properties of the moon.	**SCI.6.4.10** Differentiate between gravity on Earth and in space.	**SCI.7.4.03** Relate the relationship between the tilt of the Earth on its axis and the seasons.	
		SCI.5.4.02 Identify gravity as the force that keeps planets in orbit around the Sun and the moon in orbit around the Earth.	**SCI.6.4.11** Research and describe types of equipment and transportation needed for space travel.		
					SCI.8.4.08 Explain the use of light-years to describe distances in the universe.
		SCI.5.4.13 Identify events and describe changes that occur on a regular basis such as in daily, weekly, lunar, and seasonal cycles.		**SCI.7.4.04** Identify and illustrate how the position of the Sun and moon on Earth causes such phenomena as moon phases, solar and lunar eclipse, and tides.	**SCI.8.4.09** Analyze and predict changes in the lunar cycle including phases of the moon.
					SCI.8.4.10 Compare and contrast historical scientific theories of the origin of the universe.

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Vertical Alignment Matrix

Strand		Grade 5	Grade 6	Grade 7	Grade 8
Earth/Space Systems	Properties & Patterns	**Earth's Materials**			
			SCI.6.4.12 Illustrate and describe the rock cycle and the processes involved in the formation of each type of rock.		**SCI.8.4.11** Analyze and predict events in the rock cycle.
			SCI.6.4.13 Relate the properties of minerals to the formation of rocks.		
			SCI.6.4.14 Distinguish between groundwater and surface water.		
			SCI.6.4.15 Identify and illustrate groundwater zones including water table, zone of saturation, and zone of aeration.		
			SCI.6.4.16 Describe components of the atmosphere, including nitrogen, oxygen, and water vapor.		**SCI.8.4.12** Predict the results of modifying the Earth's nitrogen, water, and carbon cycles.
			SCI.6.4.17 Compare and contrast the physical characteristics of the different layers of the atmosphere including troposphere, stratosphere, mesosphere, thermosphere, exosphere.		
			SCI.6.4.18 Relate the characteristics of the layers of the atmosphere such as temperature and composition of gases to different altitudes.		
		SCI.5.4.04 Interpret how landforms are the result of a combination of constructive and destructive forces such as deposition of sediment and weathering.		**SCI.7.4.05** Analyze effects of regional erosional deposition and weathering.	**SCI.8.4.13** Analyze examples of landscape modification including destruction, fragmentation, and degradation of habitats that have resulted in the decrease or extinction of populations of organisms.
				SCI.7.4.06 Determine the effect of sedimentation and erosion before and after a conservation plan is implemented.	**SCI.8.4.14** Investigate and describe how human activities have modified soils, water and air quality.
		SCI.5.4.05 Identify, observe, and record actions that require time for changes to be measurable, including erosion, dissolving, weathering, and flow.		**SCI.7.4.07** Identify factors affecting water flow, soil erosion, and deposition.	

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Vertical Alignment Matrix

Strand		Grade 5	Grade 6	Grade 7	Grade 8
		Earth's Forces			
Earth/Space Systems	Change		**SCI.6.4.19** Identify forces that shape features of the Earth including uplifting, movement of water and volcanic action.	**SCI.7.4.08** Describe how heat (thermal) energy flow and movement (convection currents) beneath Earth's crust cause catastrophic events such as earthquakes, volcanoes, and tsunamis.	**SCI.8.4.15** Predict land features resulting from gradual changes such as mountain building, beach erosion, land subsidence, and continental drift.
					SCI.8.4.16 Explain the role of plate tectonics in shaping Earth.
		SCI.5.4.06 Draw conclusions about "what happened before" using data from tree-growth rings and sedimentary rock sequences.			**SCI.8.4.17** Interpret topographic patterns that are the result of internal and external dynamic processes working on the landscape.
		SCI.5.4.07 Identify past events that led to the formation of the Earth's renewable, nonrenewable, and inexhaustible resources.	**SCI.6.4.20** Research and describe energy types from their source to their use and determine if the type is renewable, nonrenewable, and inexhaustible.	**SCI.7.4.09** Distinguish among and identify resources as renewable, non-enewable, and inexhaustible.	
		SCI.5.4.08 Explain that primary sources of energy including solar, wind, water, nuclear, biomass, geothermal and fossil fuels are naturally available on Earth.		**SCI.7.4.10** Identify ways in which various resources can be recycled and reused.	
		SCI.5.4.09 Know that renewable energy sources such as solar, biomass, hydropower, wind, and geothermal can be replenished.			
		SCI.5.4.11 Describe non-renewable energy sources as those that have limited supply such as fossil fuels (coals, oil, natural gas, and metals) and describe past processes that led to the formation of each nonrenewable energy source.		**SCI.7.4.11** Make inferences and draw conclusions about effects of human activities on Earth's resources.	
		SCI.5.4.10 Explain inexhaustible energy sources as being abundant and including air, sunlight, water, and rocks.			
		SCI.5.4.12 Describe the processes responsible for the formations of coal, oil, gas, and minerals.			