

HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand 1: Nature of Science

Strand	Grade 8	IPC	Biology	Chemistry	Physics
Safety	<p>SCI.8.1A Demonstrate safe practices during classroom and field investigations as outlined in the Texas Science Safety Standards.</p>	<p>IPC.1A Demonstrate safe practices during classroom and field investigations as outlined in the Texas Science Safety Standards. Student modeling and simulations may be considered laboratory investigations</p>	<p>BIOL.1A Demonstrate safe practices during classroom and field investigations as outlined in the Texas Science Safety Standards.</p>	<p>CHEM.1A Demonstrate safe practices during all field and laboratory investigations as outlined in the Texas Science Safety Standards.</p>	<p>PHYS.1A Demonstrate safe practices during classroom and field investigations as outlined in the Texas Science Safety Standards.</p>
	<p>SCI.8.1B Make informed choices in the use and conservation of resources such as the disposal of hazardous products and recycling of materials.</p>	<p>IPC.1B Make wise choices in the use and conservation of resources and the disposal or recycling of materials.</p>	<p>BIOL.1B Make wise choices in the use and conservation of resources and the disposal or recycling of materials.</p>	<p>CHEM.1B Make wise choices, and demonstrate an understanding of, the use and conservation of resources and the disposal or recycling of materials.</p>	<p>PHYS.1B Make wise choices in the use and conservation of resources and the disposal or recycling of materials.</p>
Inquiry	<p>SCI.8.2A Plan and implement investigative procedures, including asking questions, formulating testable hypotheses, conducting multiple trials, and selecting and using grade appropriate, content-embedded equipment and technology.</p>	<p>IPC.2A Plan and safely implement investigative procedures, including asking questions, formulating testable hypotheses, identifying variables, conducting multiple trials, and selecting, content-specific, content-embedded equipment and technology.</p>	<p>BIOL.2A Plan and safely implement investigative procedures, including asking questions, formulating testable hypotheses, identifying variables, conducting repeated trials, and selecting course specific, content-embedded equipment and technology.</p>	<p>CHEM.2A Plan and safely implement investigative procedures including asking questions, making inferences, formulating testable hypotheses, identifying variables, conducting repeated trials, calculating percent yield, and selecting the appropriate equipment and technology needed to solve a specific problem.</p>	<p>PHYS.2A Plan and safely implement experimental procedures including asking questions, formulating testable hypotheses, identifying variables, conducting repeated trials, calculating percent error, and selecting content-specific, content-embedded equipment and technology.</p>
	<p>SCI.8.2B Collect information by observing and measuring using the metric system (SI).</p>	<p>IPC.2B Collect data and make measurements with accuracy and precision.</p>	<p>BIOL.2B Collect data and make measurements with accuracy and precision.</p>	<p>CHEM.2B Collect data and make measurements with accuracy and precision.</p>	<p>PHYS.2B Make quantitative observations and measurements with accuracy and precision.</p>
				<p>CHEM.2C Express and manipulate chemical quantities, including moles, using both scientific and mathematical processes including dimensional analysis, scientific notation and significant figures</p>	
	<p>SCI.8.2C Organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence.</p>	<p>IPC.2C Organize, analyze, evaluate, make inferences, and predict trends from data including graphing data to observe and identify relationships between variables.</p>	<p>BIOL.2C Organize, analyze, evaluate, make inferences, and predict trends from data.</p>	<p>CHEM.2D Organize, analyze, evaluate, make inferences and predict trends from data</p>	<p>PHYS.2C Organize, analyze, evaluate, make inferences, and predict trends from data.</p>
	<p>SCI.8.2D Communicate valid conclusions from supporting data.</p>	<p>IPC.2D Communicate valid conclusions</p>	<p>BIOL.2D Communicate valid conclusions through methods such as lab reports, journals, summaries, oral reports and technology based reports.</p>	<p>CHEM.2E Communicate valid conclusions</p>	<p>PHYS.2D Communicate valid conclusions</p>



What is it we want all students to learn?

Ⓢ Denotes Proposed Power Objectives

HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics
Nature of Science Critical Thinking	<p>Ⓢ SCI.8.2E Construct line and bar graphs, tables, maps, and charts using tools to organize, examine, and evaluate data including extrapolating information to make predictions</p>				<p>Ⓢ PHYS.2E Graph data to observe and identify relationships between variables.</p>
					<p>PHYS.2F Read the scale on scientific instruments with accuracy and precision</p>
	<p>Ⓢ SCI.8.3A Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.</p>	<p>Ⓢ IPC.3A Analyze, review, and critique scientific explanation, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.</p>	<p>BIOL.3A Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.</p>	<p>CHEM.3A Analyze, review, and critique scientific explanations pertaining to chemistry, including hypotheses and theories as to their strengths and weaknesses using scientific evidence and information.</p>	<p>Ⓢ PHYS.3A Analyze, review, and critique scientific explanations, including hypotheses and theories as to their strengths and weaknesses using scientific evidence and information.</p>
					<p>Ⓢ PHYS.3B Express laws symbolically and employ mathematical procedures including vector addition and right-triangle geometry to solve physical problems.</p>
	<p>SCI.8.3B Draw inferences based on observations including data related to promotional materials for products.</p>	<p>Ⓢ IPC.3B Draw inferences based on data related to promotional materials for products and services and other real life scenarios.</p>	<p>BIOL.3B Evaluate promotional claims that relate to biological issues such as product labeling and advertisements.</p>	<p>CHEM.3B Draw inferences and make responsible choices based on data related to promotional materials for products and services using knowledge of chemistry.</p>	
	<p>SCI.8.3D Evaluate the impact of research on scientific thought, society, and the environment.</p>	<p>Ⓢ IPC.3C Evaluate the impact of research on scientific thought, society, and the environment and identify a design problem and use technology to implement a solution to the problem.</p>	<p>Ⓢ BIOL.3C Evaluate the impact of research on scientific thought, society, and the environment and research, propose, implement and document the scientific product used to solve a problem or challenge and evaluate the effectiveness of the solution.</p>	<p>CHEM.3C Evaluate the impact of chemical research on scientific thought, society, and the environment while researching, proposing, implementing, and documenting the scientific design process product used to solve a problem or challenge and evaluate the effectiveness of the solution</p>	<p>Ⓢ PHYS.3C Evaluate the impact of research on scientific thought, society, and the environment and identify a design problem and use technology to implement a solution to the problem.</p>
		<p>IPC.3D Describe connections between physics and chemistry and future careers.</p>	<p>BIOL.3D Describe the connection between biology and future careers.</p>	<p>CHEM.3D Describe the connection between chemistry and future careers.</p>	<p>PHYS.3D Describe the connection between physics and future careers.</p>
	<p>SCI.8.3C Represent the natural world using models and identify their limitations.</p>		<p>Ⓢ BIOL.3E Evaluate models according to their adequacy in representing biological objects or events.</p>		



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics
	SCI.8.3E Connect Grade 8 science concepts with the history of science and the contributions of scientists.	IPC.3E Research and describe the history of physics, chemistry, and contributions of scientists.	BIOL.3F Research and describe the history of biology and the contributions of scientists	CHEM.3E Research and describe the history of chemistry and contributions of scientists.	PHYS.3E Research and describe the history of physics and contribution of scientists.
	Tools SCI.8.4A Collect, analyze, and record information 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, water test kits, and timing devices.				
Nature of Science	Ⓢ SCI.8.4B Extrapolate from collected information to make predictions.				
	Ⓢ SCI.8.5A Identify a design problem and propose a solution.				
	SCI.8.5B Design and test a model to solve the problem.				
Science and Technology	SCI.8.5C Evaluate the model and make recommendations for improving the model.				



What is it we want all students to learn?

Ⓢ Denotes Proposed Power Objectives

HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand 2: Life Science

Strand	Grade 8	IPC	Biology	Chemistry	Physics	
Life Science	Systems	System Parts				
		Ⓢ SCI.8.6A Describe interactions among systems in the human organism.		BIOL.5C Sequence the levels of organization in multi-cellular organisms from cell to organism, and from organism to biosphere		
				BIOL.10A Interpret the functions of systems in organisms including circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune.		
				Ⓢ BIOL.10B Analyze and compare interrelationships of organ systems to each other and to the body as a whole.		
		Interdependence of Living System				
		SCI.8.6B Identify feedback mechanisms that maintain equilibrium of systems including the role of the brain in regulating body temperature and heart rate, turgor pressure, and chemical reactions.		BIOL.11A Identify and describe the relationships between internal feedback mechanisms in the maintenance of homeostasis.		
				BIOL.11B Investigate and identify how organisms, including humans, respond to internal and external stimuli.		
				BIOL.11C Analyze the importance of nutrition, environmental conditions and physical exercise on health.		
				Ⓢ BIOL.11D Summarize the role of microorganisms in maintaining and disrupting equilibrium including diseases in plant and animals and decay in ecosystems.		



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics	
Life Science	Systems		BIOL.9B Compare reactants and products of energy flow and matter in photosynthesis to that of cellular respiration while identifying where photosynthesis and cellular respiration occur			
			BIOL.9C Investigate and identify the effects and importance of enzymes on food molecules			
		Ecosystems: Interdependence and Interaction				
		SCI.8.11A Identify that changes in environmental conditions, including the affects of human activities, can affect the survival of individuals and of species.		BIOL.9D Analyze the flow of matter and energy through different trophic levels between organisms and the physical environment as modeled in ecological pyramids, food chains and food webs		
				BIOL.12A Analyze the flow of energy through various cycles including the carbon, oxygen, nitrogen, and water cycles while relating the carbon and oxygen cycles to the process of photosynthesis, cellular respiration, and decomposition		
				BIOL.12B Interpret interactions among organisms exhibiting predation, parasitism, commensalism, and mutualism.		
		SCI.8.6C Describe interactions among living and nonliving components within ecosystems including how the major source of energy in most ecosystems (sunlight) is converted into chemical energy		BIOL.12C Compare variations, tolerances, and adaptations of plants and animals in different biomes.		
		BIOL.12E Investigate and explain the interactions in an ecosystem including food chains, food webs, and food pyramids.				
SCI.8.14B Analyze how natural or human events may have contributed to the extinction of some species		BIOL.12D Identify and illustrate that long-term survival of species is dependent on a resource base that may be limited				



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics	
Life Science	Systems	Structure & Function				
				<p>Ⓢ BIOL.9A Compare the structures and functions of different types of biomolecules including carbohydrates, lipids, proteins, and nucleic acids.</p>		
				<p>BIOL.4A Compare the similarities and differences of prokaryote and eukaryotes and relate to cellular structure, function and processes within those cells</p>		
				<p>Ⓢ BIOL.4B Investigate and identify cellular parts and processes including homeostasis, permeability, energy production, transportation of molecules, disposal of wastes, functions of cellular parts and synthesis of new molecules while discussing early events that led to understanding cell theory and cell structure.</p>		
				<p>Ⓢ BIOL.4C Compare the structure and function of viruses to cells and describe the role of viruses in causing diseases and conditions such as acquired immune deficiency syndrome, common colds, smallpox, influenza and warts.</p>		
				<p>BIOL.4D Identify and describe the role of bacteria in maintaining health such as in digestion and in causing diseases such as in Streptococcus infection and diphtheria.</p>		
			<p>Ⓢ BIOL.10C Analyze, identify, and describe characteristics and functions of plant systems, sub-systems and vascular plant systems.</p>			



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

				BIOL.5A Compare and contrast cells from different parts of plants and animals including roots, stems, leaves, muscles and bones to show specialization of structure and function.		
Strand	Grade 8	IPC	Biology	Chemistry	Physics	
Life Science	Systems	Structure & Function				
				BIOL.5B Identify cell differentiation in the development of organisms.		
				BIOL.5C Sequence the levels of organization in multi-cellular organisms from cell to organism, and from organism to biosphere.		
				BIOL.13A Evaluate the significance of structural and functional plant adaptations in their environment.		
Life Science	Changes	Heredity				
				BIOL.6A Describe components and structure of DNA and illustrate how DNA carries the information for traits.		
				BIOL.6B Explain replication, transcription, and translation as it relates to the structure and function of DNA and RNA.		
		SCI.8.11B Distinguish between inherited traits and other characteristics that result from interactions with the environment and compare and contrast homologous and analogous structures of organisms		BIOL.6C Identify and illustrate how changes in DNA cause mutations and evaluate the significance of these changes.		



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

		<p>Ⓢ SCI.8.11C Make predictions about possible outcomes of various genetic combinations of inherited characteristics using Punnett squares</p>	<p>BIOL.6D Compare genetic variations observed in plants and animals.</p>		
--	--	---	--	--	--

Life Science	Changes	Grade 8	IPC	Biology	Chemistry	Physics		
		Heredity						
					<p>Ⓢ BIOL.6E Compare and contrast the processes of mitosis and meiosis and their significance to sexual and asexual reproduction</p>			
					<p>BIOL.6F Identify and analyze karyotypes.</p>			
		Adaptations						
					<p>BIOL.8A Collect and classify organisms at several taxonomic levels such as species, phylum, and kingdom by applying dichotomous keys.</p>			
			<p>Ⓢ BIOL.8B Analyze relationships among organisms and develop a model of a hierarchical classification system based on similarities and differences using taxonomic nomenclature.</p>					
			<p>Ⓢ BIOL.8C Compare and contrast characteristics of kingdoms including monerans, protists, fungi, plants, and animals.</p>					



What is it we want all students to learn?

Ⓢ Denotes Proposed Power Objectives

HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

			<p>☉ BIOL.7A Identify evidence of change in species using fossils, DNA sequences, anatomical similarities, physiological similarities and embryology.</p>		
			<p>☉ BIOL.7B Illustrate the process and results of natural selection and its effect on speciation, diversity, phylogeny, adaptation, behavior and extinction.</p>		



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand 3: Physical Science

Strand	Grade 8	IPC	Biology	Chemistry	Physics
Physical Science Systems	Matter and Energy				
	<p>SCI.8.10A Illustrate interactions between matter and energy including specific heat.</p>	<p>IPC.6A Demonstrate, illustrate and apply energy transformations using the law of conservation of energy.</p>		<p>CHEM.5A Investigate and analyze changes in matter, determine the nature of the change, and examine the forms of energy involved in the change</p>	<p>PHYS.5D Demonstrate and apply the law of conservation of energy and momentum.</p>
		<p>IPC.6H Analyze and describe the effects of heating and cooling processes in systems such as weather, living and mechanical.</p>		<p>CHEM.5B Measure energy transformations and exchanges involved in chemical reactions and verify the law of conservation of energy by evaluating the energy exchange that occurs as a consequence of a chemical reaction.</p>	<p>PHYS.7A Analyze and explain everyday examples that illustrate the three laws of thermodynamics.</p>
		<p>IPC.6B Investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation.</p>		<p>CHEM.5C Measure, calculate, and analyze the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases including the use of interpretation of heating and cooling curves, specific heat, heat of vaporization, and heat of fusion</p>	<p>PHYS.7B Evaluate different methods of thermal energy transfer that result in an increasing amount of disorder.</p>
		<p>IPC.6C 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.</p>			<p>PHYS.5A Interpret situations for the applicability of the work-energy theorem.</p>
					<p>PHYS.5B Observe, describe and apply examples of kinetic and potential energy and their transformations.</p>
		<p>IPC.6D Investigate, compare and evaluate the economic and environmental impact of using various energy sources such as rechargeable or disposable batteries, and solar cells.</p>			
		<p>IPC.6E Measure and investigate the thermal and electrical conductivity and resistance of various materials and explain results.</p>			<p>PHYS.6C Identify and analyze the influences of charge and distance on electric forces.</p>



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand		Grade 8	IPC	Biology	Chemistry	Physics	
Physical Science	Systems	Matter and Energy					
			<p>Ⓟ IPC.6F Investigate, the flow of electrical current in series and parallel circuits and solve mathematical problems using Ohm's Law in series and parallel circuits.</p>			<p>Ⓟ PHYS.6E Design and analyze electric circuits.</p>	
			<p>IPC.6G Investigate and analyze the relationship between an electric current and the strength of its magnetic field using simple electromagnets</p>			<p>Ⓟ PHYS.6D Demonstrate an understanding of the relationship between electricity and magnetism.</p>	
						<p>PHYS.6F Identify and describe examples of electrical and magnetic forces in everyday life including the design and operation of an electric motor and an electric generator.</p>	
						<p>Ⓟ PHYS.5C Calculate the mechanical energy in a physical system such as billiards, cars, and trains.</p>	
			<p>IPC.8D Evaluate the role of isotopes, radioactive material and nuclear reactions in applications such as medicine and energy production.</p>		<p>CHEM.9B Investigate radioactive elements to determine half-life by simulations and calculations.</p>		
					<p>CHEM.9C Evaluate the commercial use of nuclear energy and medical uses of radioisotopes.</p>		
					<p>CHEM.9D Evaluate environmental issues associated with the storage, containment, and disposal of nuclear wastes.</p>		
		Waves					
			<p>IPC.5D Demonstrate the application of acoustic principles such as in echolocation, musical instruments, noise pollution, and sonograms.</p>				
			<p>IPC.5C Describe properties of waves in the electromagnetic spectrum and identify uses and applications of electromagnetic waves in the operation of technological devices such as fiber optics, optical scanners, and microwaves.</p>			<p>PHYS.8B Identify and describe the characteristics and behaviors of sound and electromagnetic waves</p>	



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand		Grade 8	IPC	Biology	Chemistry	Physics
		Waves SCI.8.7B Differentiate between longitudinal and transverse waves including how they are generated and can travel through different media	IPC.5A Demonstrate wave types (transverse and longitudinal) and their characteristics through a variety of activities such as modeling with ropes and coils, activating tuning forks, and interpreting data on seismic waves			
			IPC.5B Demonstrate and describe types of wave interactions including interference, polarization, reflection, refraction, and resonance within various materials such as water, air and glass.			PHYS.8A Examine and describe a variety of waves propagated in various types of media and describe wave characteristics such as velocity, frequency, amplitude and behaviors such as reflection, refraction and interference.
Physical Science	Properties and Patterns	Matter Components and Properties SCI.8.9D Investigate, illustrate and communicate how physical and chemical properties influence the development and application of everyday materials such as cooking surfaces, insulation, adhesives and plastics.	IPC.7A Investigate, describe, and differentiate between the physical properties of liquids and gases including density, viscosity, and buoyancy.		CHEM.4A Differentiate between physical and chemical properties of matter including intensive and extensive properties	
					CHEM.4B Analyze examples of solids, liquids and gases to determine compressibility, structure, motion of particles, shape and volume, and density.	
		SCI.8.8A Describe the structure and parts of an atom including electrons, protons and neutrons	IPC.7B Research, describe, summarize, and critique the various models in the historical development of the atomic theory		CHEM.6A Describe the existence and properties of subatomic particles, locate the subatomic particles within the atom, and identify the interrelationships among subatomic particles.	
		SCI.8.8B Describe the properties of an atom including mass, electrical charge, atomic number, and mass number for a variety of isotopes.				PHYS.9A Describe the photoelectric effect and the duality of light.
			IPC.7C 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.			PHYS.9B Explain and interpret the line spectra from different gas-discharge tubes.



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics	
	Matter Components and Properties					
Physical Science	Properties and Patterns			CHEM.6B Analyze stable and unstable isotopes of an element to determine the relationship between the isotope's stability and its application.		
				CHEM.8A Identify characteristics of atoms involved in chemical bonding.		
				Ⓢ CHEM.8B Investigate and compare the physical and chemical properties of ionic and covalent compounds.		
				CHEM.8C Compare the arrangement of atoms in molecules, ionic crystals, polymers, and metallic substances.		
				CHEM.8D Describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds including London dispersion forces, dipole-dipole forces, and hydrogen bonding		
		Ⓢ SCI.8.9B Interpret information on the periodic table to demonstrate an understanding that physical and chemical properties are used to group elements	Ⓢ IPC.7D Relate the physical properties, and the chemical behavior of an element including bonding and compound formation, to its placement on the periodic table.		Ⓢ CHEM.4D Describe the physical and chemical characteristics of an element using the periodic table and make inferences and predictions about chemical behavior through use of periodicity.	
					CHEM.6C Summarize the historical development of the periodic table to understand the concept of periodicity.	
			IPC.7E Classify samples of matter from everyday life as being elements, compounds, or mixtures.		CHEM.4C Investigate matter and identify and analyze properties to classify matter as mixtures or pure substances.	
			Ⓢ CHEM.11A Identify common elements and compounds using scientific nomenclature and determine mass relationships in compounds.			



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand		Grade 8	IPC	Biology	Chemistry	Physics
		Matter Components and Properties				
Physical Science	Properties and Patterns				<p>CHEM.7A Describe the interrelationships among temperature, particle number, pressure, and volume of gases contained within a closed system.</p>	
					<p>CHEM.7B Illustrate and interpret the data obtained from investigations with gases in a closed system and determine if the data are consistent with the gas laws.</p>	
		<p>SCI.8.9A Demonstrate that substance may react chemically to form new substances and explain how properties of the new substances are different from the original substance</p>	<p>IPC.8A Distinguish between physical and chemical changes in matter such as oxidation (corrosion), digestion, changes in state and stages in the rock cycle.</p>		<p>CHEM.4A Differentiate between physical and chemical properties of matter including intensive and extensive properties.</p>	
		<p>SCI.8.9C Interpret formulas and equations to express what happens in a chemical reaction and accurately balance simple equations.</p>	<p>IPC.8C Write balanced chemical equations by applying the law of conservation of mass to simple chemical reactions.</p>		<p>CHEM.11B Demonstrate the use of symbols, formulas and equations in describing interactions of matter, including chemical reactions and nuclear reactions and classify chemical reactions as one of five types: synthesis, decomposition, single displacement, double displacement, and combustion</p>	
					<p>CHEM.11C Explain and balance chemical and nuclear equations using number of atoms, masses, and charge and explain the Law of Conservation of Mass using stoichiometry.</p>	
		<p>SCI.8.10C Analyze the loss or gain of heat energy occurring during exothermic and endothermic chemical reactions and measure the energy change occurring in both types of reactions.</p>	<p>IPC.8B 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.</p>		<p>CHEM.15A Verify the law of conservation of energy by analyzing an energy diagram that represents the energy exchange that occurs as a consequence of a chemical reaction.</p>	
			<p>IPC.8D Evaluate the role of isotopes, radioactive material and nuclear reactions in applications such as medicine and energy production</p>		<p>CHEM.9A Compare nuclear reactions including fission and fusion in terms of the masses of the reactants and products and the amount of energy released.</p>	



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand	Grade 8	IPC	Biology	Chemistry	Physics	
Physical Science	Properties and Patterns	Matter Components and Properties				
					CHEM.10A Identify, interpret, and balance oxidation-reduction processes including half reactions.	
			IPC.8E Research, describe and analyze the environmental and economic impact of the end-products of chemical reactions.		CHEM.10B Demonstrate, document, and evaluate the effects and importance of oxidation-reduction processes on corrosion, electroplating, voltaic cells, and electrolytic cells.	
					CHEM.15B Relate the rate of a chemical reaction to temperature, concentration, surface area, and presence of a catalyst and describe the effect of changes in temperature, concentration, pressure, and catalyst on a system at equilibrium	
		Solutions				
			IPC.9D 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.		CHEM.12A Demonstrate and explain effects of temperature, pressure and the nature of solute and solvent on the solubility of substances.	
			IPC.9E Investigate and demonstrate how factors such as particle size, temperature, agitation, and concentration influence the rate of dissolving		CHEM.12B Develop and apply general rules for solubility through investigations with aqueous solutions.	
			IPC.9A Relate the structure of water to its property and function as the universal solvent.		CHEM.12C Evaluate the significance of water as a solvent in living organisms and in the environment.	
			IPC.9B Relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity.		CHEM.13A Compare and contrast unsaturated, saturated, and supersaturated solutions.	
					CHEM.13B Interpret relationships among ionic and covalent compounds, electrical conductivity, and colligative properties of solutions.	



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand		Grade 8	IPC	Biology	Chemistry	Physics	
Physical Science	Properties and Patterns	Solutions					
					<p>Ⓟ CHEM.13C Measure and compare the rates of reaction of a solid reactant in solutions of varying concentration and measure and compare the factors that affect the rate of dissolving a solid solute when making a solution</p>		
					<p>Ⓟ CHEM.14A Analyze and measure common household products and laboratory solutions using a variety of indicators and pH to classify the products as acids or bases.</p>		
					<p>Ⓟ CHEM.14B Demonstrate the electrical conductivity of acids and bases.</p>		
					<p>Ⓟ CHEM.14C Describe the characteristics of a neutralization reaction and interpret and apply data obtained from neutralization reactions.</p>		
			<p>IPC.9C Simulate and analyze the effects of acid rain on soil, buildings, statues, or microorganisms</p>		<p>CHEM.14D Describe the effects of acids and bases on an ecological system and in everyday life.</p>		
	Change	Force and Motion					
							<p>Ⓟ PHYS.4A Generate and interpret graphs describing motion, including the use of real time technology.</p>
		<p>Ⓟ SCI.8.7A Demonstrate and calculate how unbalance forces are associated with motion and may cause change in speed and direction of an object.</p>	<p>Ⓟ IPC.4A Calculate speed, momentum, acceleration, work, and power in systems such as in the human body, moving toys and machines</p>				<p>Ⓟ PHYS.4B Analyze examples and solve problems of uniform and accelerated motion including linear, projectile and circular</p>
							<p>PHYS.5D Demonstrate and apply the law of conservation of energy and momentum.</p>
						<p>Ⓟ PHYS.4D Develop and interpret free-body diagram for force analysis.</p>	
					<p>PHYS.4E Identify and describe motion relative to different frames of reference.</p>		



HS SCIENCE - Grade 8, IPC, Biology, Chemistry, Physics Vertical Alignment Matrix 8–12

Strand		Grade 8	IPC	Biology	Chemistry	Physics
		Force and Motion				
Physical Science	Physical Science					PHYS.5C Calculate the mechanical energy in a physical system such as billiards, cars and trains
			Ⓢ IPC.4B Investigate and describe applications of Newton's first law of motion, Newton's second law of motion, and Newton's third law of motion in vehicle restraints, sports activities, geological processes, and satellite orbits.			Ⓢ PHYS.4C Demonstrate the effects of forces on the motion of objects including Newton's three Laws of Motion.
			IPC.4C Analyze the effects caused by changing forces or distance in simple machines as demonstrated in household devices, the human body and machines			
			IPC.4D Investigate, demonstrate and calculate mechanical advantage and efficiency of simple machines such as levers, motors, wheel and axles, pulleys, and ramps.			
						PHYS.6A Identify the influence of mass and distance on gravitational forces.
						PHYS.6B Research and describe the historical development of the concepts of gravitational, electrical, and magnetic force; while comparing and contrasting Newton's Law of Universal gravitation and Coulomb's Law of Electrostatics and Magnetism

