

PISD Curriculum – Vertical Alignment of Science TEKS

High School – Integrated Physics & Chemistry (IPC)

1	For at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, ethical practices, and investigations.
1A Tested	Demonstrate safe practices during field and laboratory investigations. Including --- Interpret MSDS --- implement district safety program in every science class
1B Not Tested	Make wise choices in the use and conservation of resources and the disposal or recycling of materials.
2	Uses scientific methods during fields & laboratory investigations.
2A Tested	Plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology. Including --- Model the steps of the scientific method --- Write a scientific lab report
2B Tested	Collect data and make measurements with precision. (and accuracy), including --- Measure with photogate timers, triple-beam balances, thermometers, metric rulers, graduated cylinders, multimeters, and force meters.
2C Tested	Organize, analyze, evaluate, make inferences, and predict trends from data, including --- Identify independent and dependant variables --- Construct and interpret data from graphs and data table
2D Tested	Communicate valid conclusions.
3	Uses critical thinking and scientific problem solving to make informed decisions.
3A Tested	Analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.
3B Tested	Evaluate promotional claims that relate to biological issues such as product labeling and advertisements.
3C Not Tested	Evaluate the impact of research on scientific thought, society, and the environment.
3D Not Tested	Describe connection between biology and future careers.
3E Not Tested	Evaluate models according to their adequacy in representing physical science objects or events.
3F Not Tested	Research and describe the history of chemistry/physics and contributions of scientists. Such as Albert Einstein, Isaac Newton, Galileo Galilei, Georg Ohm, Niels Bohr, Marie Curie, and Dmitri Mendeleev

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4	The student knows concepts of force and motion evident in everyday life.
4A Tested	Calculate speed, momentum, acceleration, work, and power in systems. Including --- The human body --- Moving toys --- Machines --- Solve for different variables in problems of speed, work, force, momentum, power, and acceleration --- Describe the effect on motion by friction --- Calculate the net force in a simple system --- Differentiate between work input and work output, and calculate efficiency --- Distinguish between speed and velocity --- Define free fall and explain acceleration due to gravity --- Explain why all motion is relative --- Compare and contrast average speed, instantaneous speed, and terminal velocity
4B Tested	Investigate and describe applications of Newton's laws. Including --- Vehicle restraints --- Sports activities --- Geological processes --- Satellite orbits --- Explain Newton's three laws of motion --- Compare balanced and unbalanced forces --- Identify modern applications of Newton's laws in a variety of disciplines --- Define inertia and describes its effects in daily situations --- Explain the relationship between gravity and the universe and how it applies to astronomy
4C Not Tested	Analyze the effects caused by changing force or distance in simple machines. Including --- Household devices --- The human body --- Vehicles --- Classify simple machines as • Levers, or Pulleys, or Inclined Planes, or Wheels and axles (gears), or Wedge, or Screws --- Identify first-class, second-class, and third-class levers --- Describe the combination of simple machines that make up different complex machines
4D Tested	Investigate and demonstrate mechanical advantage and efficiency of various machines. Such as (and including) --- Levers --- Motors --- Wheels and axles (gears) --- Pulleys --- Inclined planes (screws) --- Define and calculate “mechanical advantage and efficiency “of various machines. --- Describe how each of the simple machine types makes work easier

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5	The student knows the effects of waves on everyday life.
5A Tested	Demonstrate wave types and their characteristics through a variety of activities. Such as --- Modeling with ropes and coils --- Activating tuning forks --- Interpreting data on seismic waves --- Identify and measure <ul style="list-style-type: none"> • Frequency • Wavelength • Period • Wave velocity --- Describe and give examples of transverse, compressional (longitudinal), and standing waves --- Solve problems involving frequency, period, velocity, and wavelength --- Illustrate the light spectrum --- Explain how light frequency and wavelength apply to light intensity --- Classify electromagnetic waves
5B Tested	Demonstrate wave interactions within various materials. Including --- Interference --- Polarization --- Reflection --- Refraction --- Resonance --- Absorption --- Illustrate the diffraction waves (spectroscopes) --- Identify the causes and effects of resonance --- Compare and contrast constructive and destructive interference --- Evaluate the law of reflection --- Describe light polarization and its uses --- Apply reflection to mirrors and refraction to lenses Teacher’s Note: Use ray diagrams
5C Not Tested	Identify uses of electromagnetic waves in various technological applications. Such as --- Fiber optics --- Optical scanners --- Microwaves --- Radar (Doppler Effect) --- X-Rays --- Laser --- Magnetic Resonance Imaging (MRI)
5D Tested	Demonstrate the application of acoustic principles. Such as --- Echolocation --- Musical instruments --- Noise pollution --- Sonograms --- Sonar --- Describe how sound waves are heard --- Relate loudness to intensity and pitch to frequency --- Illustrate the Doppler Effect

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6	The student knows the impact of energy transformations in everyday life.
6A Tested	Describe the law of conservation of energy. Including --- Calculate Gravitational Potential energy and Kinetic energy --- Conversions between KE and GPE --- Analyze energy transformations <ul style="list-style-type: none"> • Solar to electrical • Chemical to electrical • Solar to chemical (photosynthesis) --- Describe the relationship between work and energy
6B Tested	Investigate and demonstrate the movement of heat through solids, liquids, and gases by convection, conduction, and radiation. Including --- Particle motion according to the Kinetic Theory --- Describe materials as conductors or insulators --- Compare and contrast the different temperature scales and units (K, °F, & °C) --- Calculate specific heat
6C Not Tested	Analyze the efficiency of energy conversions that are responsible for the production of electricity. Such as --- Radiant (solar) --- Hydroelectric --- Nuclear --- Geothermal sources --- Fossil fuels
6D Tested	Investigate and compare economic and environmental impacts of using various energy sources. Including --- Rechargeable or disposable batteries, fossil fuels, nuclear, wind, hydroelectric, solar cells, and fuel cells --- Differentiate between batteries, generators, transformers, and motors.
6E Not Tested	Measure the thermal and electrical conductivity of various materials and explain results. Including --- Demonstrate the relationship between electrical and thermal conductivity of a variety of materials
6F Tested	Investigate and compare series and parallel circuits. Including --- Describe the difference in open and closed circuits --- Assemble a series and parallel circuit --- Using Ohm’s Law calculate resistance using voltage and current --- Identify the symbols in a schematic diagram --- Distinguish between direct current and alternate current --- Calculate electric power
6G Not Tested	Analyze the relationship between an electric current and the strength of its magnetic field using simple electromagnets. Including --- Describe the earth’s magnetic field and it’s effect on a compass --- Describe an electric field
6H Not Tested	Analyze the effects of heating and cooling processes in systems. Such as --- Weather --- Living (environmental) --- Mechanical (heat pumps)

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7	The student knows relationships exist between properties of matter and its components.
7A Tested	Investigate and identify properties of fluids. Including <ul style="list-style-type: none"> • Density (including solids) • Viscosity • Buoyancy --- Describe density qualitatively and quantitatively --- Describe Bernoulli’s Principle and its application --- Describe Pascal’s principal and its applications --- Interpret phase change diagrams
7B Not Tested	Research and describe the historical development of the atomic theory. Such as --- Describe the history of the development of the atomic model <ul style="list-style-type: none"> • Thompson • Dalton • Rutherford • Bohr • Mendeleev • Lewis
7C Not Tested	Identify constituents of various materials or objects. Such as --- Metal salts --- Light sources --- Fireworks displays --- Stars using spectral-analysis techniques --- Flame testing for metals
7D Tested	Relate the chemical behavior of an element including bonding, to its placement on the periodic table. Including --- Compare and contrast ionic, covalent, and metallic bonds --- Use the periodic table to determine the number of protons, electrons, and neutrons in an atom --- Determine an element’s placement as related to period and group --- Place metals, nonmetals, metalloids, and transition metals in the proper place on a periodic table --- Identify elements by their symbols --- Recognize polyatomic ions --- Predict oxidation numbers --- Write basic chemical formulas --- Naming compounds --- Apply octet-rule/Lewis dot diagram
7E Tested	Classify samples of matter from everyday life as being elements, compounds, or mixtures. Including --- Pure substances – Elements and compounds --- Mixtures <ul style="list-style-type: none"> • Heterogeneous mixture • Homogeneous mixture • Solutions (colloids and suspensions)

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8	The student knows that changes in matter affect everyday life.
8A Tested	Distinguish between physical and chemical changes in matter. Including --- Oxidation --- Digestion --- Changes in states <ul style="list-style-type: none"> • Liquid • Solid • Gas • Plasma --- Stages in the rock cycle --- Identify indications of a chemical change <ul style="list-style-type: none"> • Release of gas • Precipitate formation • Energy change --- Classify chemical and physical changes --- Analyze a phase change diagram
8B Not Tested	Analyze energy changes that accompany chemical reactions to classify them as endergonic or exergonic reactions. Such as --- Heat packs --- Cold packs --- Glow sticks --- Explain <ul style="list-style-type: none"> • Exothermic reactions • Endothermic reactions • Activation energy • Catalysts
8C Tested	Investigate and identify the law of conservation of mass. Including --- Identify the parts of a chemical equation: <ul style="list-style-type: none"> • Reactants • Product --- Balance chemical equations <ul style="list-style-type: none"> • Determine the number of atoms in a chemical compound --- Classify different reaction types <ul style="list-style-type: none"> • Synthesis • Decomposition • Combustion • Single displacement • Double displacement
8D Not Tested	Describe types of nuclear reactions and their roles in applications such as medicine and energy production. Such as --- Radioisotopes (radioactive decay) --- Balance nuclear reactions (Fission and Fusion)
8E Not Tested	Research and describe the environmental and economic impact of the end-products of chemical reactions. Including --- Greenhouse Gasses --- Toxic Waste

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9	The student knows how solution chemistry is a part of everyday life.
9A Tested	Relate the structure of water to its function as the universal solvent. Including --- Describe water as a polar molecule
9B Tested	Relate the concentration of ions in a solution to physical and chemical properties. Including --- pH <ul style="list-style-type: none"> • Strong acid • Weak acid • Strong base • Weak base --- Electrolytic behavior --- Reactivity --- Saturated solutions --- Unsaturated solutions --- Supersaturated solutions --- Know the pH scale, common acids and bases
9C Tested	Simulate the effects of acid rain on soil, buildings, statues, or microorganisms. Including --- Propose ways to eliminate or reduce acid rain
9D Tested	Demonstrate how various factors influence solubility. Including --- Temperature --- Pressure --- Nature of the solute and solvent --- Analyze solubility graph for different elements Teacher Note: Compare and contrast solubility of solids, gasses, and liquids.
9E Not Tested	Demonstrate how factors influence the rate of dissolving. Such as --- Particle size --- Temperature --- Pressure --- Agitation

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