Physical Science

Science Curriculum Framework

Revised 2005

Course Title: Physical Science
Course/Unit Credit: 1
Teacher Licensure: Physical/Earth Science
Grades: 9-12

Physical Science

Physical science should begin the study of higher-level physics and chemistry and continue educating the student in the nature of science. A student who masters these Student Learning Expectations should transition smoothly into other science courses. Students should be expected to use suitable mathematics and collect and analyze data. Instruction and assessment should include both appropriate technology and the safe use of laboratory equipment. Students should be engaged in hands-on laboratory experiences at least 20% of the instructional time.

Strands	Standard
Chemistry	
	1. Students shall demonstrate an understanding of matter's composition and structure.
	2. Students shall demonstrate an understanding of the role of energy in *chemistry*.
	3. Students shall compare and contrast *chemical reactions*.
	4. Students shall classify organic compounds.
Physics	
	5. Students shall demonstrate an understanding of the role of energy in physics.
	6. Students shall demonstrate an understanding of the role of forces in physics.
	7. Students shall demonstrate an understanding of wave and particle motion.
	8. Students shall demonstrate an understanding of the role of electricity and *magnetism* in the physical world.
Nature of Science	
	9. Students shall demonstrate an understanding that science is a way of knowing.
	10. Students shall design and safely conduct a scientific inquiry to solve valid problems.
	11 Students shall demonstrate an understanding of historical trends in physical science.
	12. Students shall use mathematics, science equipment, and technology as tools to communicate and solve physical science problems.
	13. Students shall describe the connections between pure and *applied science*.
	14. Students shall describe various *physical science* careers and the training required for the selected career.

Strand: Chemistry

Standard 1: Students shall demonstrate an understanding of *matter*'s composition and structure.

C.1.PS.1	Compare and contrast *chemical* and *physical properties* of *matter,* including but not limited to *flammability*, *reactivity, density, buoyancy*, *viscosity*, *melting point* and *boiling point*
C.1.PS.2	Compare and contrast *chemical* and *physical changes,* including but not limited to rusting, burning, *evaporation*, *boiling* and *dehydration*
C.1.PS.3	Discuss and *model* the relative size and placement of *sub-atomic particles*
C.1.PS.4	Illustrate the placement of *electrons* in the first twenty *elements* using *energy levels* and *orbitals*
C.1.PS.5	Distinguish among *atoms, ions,* and *isotopes*
C.1.PS.6	Model the *valence electrons* using *electron dot structures (Lewis electron dot structures)*
C.1.PS.7	Explain the role of *valence electrons* in determining *chemical properties*
C.1.PS.8	Explain the role of *valence electrons* in forming *chemical bonds*
C.1.PS.9	Model bonding: • *ionic* • *covalent* • *metallic*
C.1.PS.10	Identify commonly used *polyatomic ions*
C.1.PS.11	Write formulas for *ionic* and *covalent compounds*
C.1.PS.12	Name *ionic* and *covalent compounds*
C.1.PS.13	Identify the *mole* and *amu (atomic mass unit*) as units of measurement in *chemistry*
C.1.PS.14	Calculate the *molar mass* of *compounds* based on *average atomic mass*.

Key: C.1.PS.1 = Chemistry. Standard 1. Physical Science. 1st Student Learning Expectation

Strand: Chemistry

Standard 2: Students shall demonstrate an understanding of the role of *energy* in *chemistry.*

C.2.PS.1	Identify the *kinetic theory* throughout the phases of *matter*
C.2.PS.2	Create and label *heat* versus *temperature* graphs (*heating curves*): • *solid* • *liquid* • *gas* • *triple point* • *heat of fusion* • *heat of vaporization*
C.2.PS.3	Relate *thermal expansion* to the *kinetic theory*
C.2.PS.4	Compare and contrast *Boyle's law* and *Charles' law*
C.2.PS.5	Compare and contrast *endothermic* and *exothermic reactions* as *energy* is transferred
C.2.PS.6	Distinguish between *nuclear fission* and *nuclear fusion*
C.2.PS.7	Compare and contrast the emissions produced by *radioactive decay:* • *alpha particles* • *beta particles* • *gamma rays*

Key: C.2.PS.1 = Chemistry. Standard 2. Physical Science. 1st Student Learning Expectation

Strand: Chemistry

Standard 3: Students shall compare and contrast *chemical reactions.*

C.3.PS.1	Identify and write balanced *chemical equations:* • *decomposition reaction* • *synthesis reaction* • *single displacement reaction* • *double displacement reaction* • *combustion reaction*
C.3.PS.2	Predict the *product(s*) of a *chemical reaction* when given the *reactants* using *chemical symbols* and words
C.3.PS.3	Balance *chemical equations* using the *Law of Conservation of Mass*
C.3.PS.4	Determine *mole ratio* from a balanced reaction *equation*
C.3.PS.5	Compare and contrast the properties of *reactants* and *products* of a *chemical reaction*
C.3.PS.6	Model the role of *activation energy* in *chemical reactions*
C.3.PS.7	Examine factors that affect the rate of *chemical reactions,* including but not limited to *temperature*, light, *concentration*, *catalysts, surface area, pressure*
C.3.PS.8	Identify the observable evidence of a *chemical reaction*: • formation of a *precipitate* • production of a *gas* • color change • changes in *heat* and light
C.3.PS.9	Relate fire safety measures to conditions necessary for *combustion*

Key: C.3.PS.1 = Chemistry. Standard 3. Physical Science. 1st Student Learning Expectation

Strand: Chemistry

Standard 4: Students shall classify *organic compounds.*

C.4.PS.1	Summarize carbon bonding: • *allotropes* (diamond, graphite*, fullerenes)* • carbon-carbon (single, double, triple) • *isomers* (branched, straight-chain, ring*)*
C.4.PS.2	Identify *organic compounds* by their: • formula • structure • properties • functional groups
C.4.PS.3	Distinguish between *saturated* and *unsaturated hydrocarbons*
C.4.PS.4	Describe *organic compounds* and their functions in the human body: • *carbohydrates* • *lipids* • *proteins* • *nucleic acids*

Key: C.4.PS.1 = Chemistry. Standard 4. Physical Science. 1st Student Learning Expectation

Strand: Physics

Standard 5: Students shall demonstrate an understanding of the role of *energy* in *physics.*

P.5.PS.1	Distinguish among *thermal energy, heat,* and *temperature*
P.5.PS.2	Calculate changes in *thermal energy* using: $q = mc_p\Delta T$ Where q = heat energy, m = mass, c_p = specific heat, ΔT = change in temperature

Key: P.5.PS.1 = Physics. Standard 5. Physical Science. 1st Student Learning Expectation

Strand: Physics

Standard 6: Students shall demonstrate an understanding of the role of *forces* in *physics.*

P.6.PS.1	Analyze how *force* affects *motion:* • one-dimensional (linear) • two-dimensional (*projectile* and *rotational*)
P.6.PS.2	Explain how *motion* is relative to a *reference point*
P.6.PS.3	Compare and contrast among *speed*, *velocity* and *acceleration*
P.6.PS.4	Solve problems using the formulas for *speed* and *acceleration:* • $v = \frac{d}{t}$ • $a = \frac{\Delta v}{\Delta t}$ Where a = acceleration, v = speed (velocity), Δt = change in time, Δv = change in velocity, t = time and d = distance
P.6.PS.5	Interpret graphs related to *motion:* • distance versus time (d-t) • *velocity* versus time (v-t) • *acceleration* versus time (a-t)
P.6.PS.6	Compare and contrast Newton's three laws of motion
P.6.PS.7	Design and conduct investigations demonstrating Newton's first law of motion
P.6.PS.8	Conduct investigations demonstrating Newton's second law of motion
P.6.PS.9	Design and conduct investigations demonstrating Newton's third law of motion

Key: P.6.PS.1 = Physics. Standard 6. Physical Science. 1st Student Learning Expectation

Strand: Physics

Standard 6: Students shall demonstrate an understanding of the role of *forces* in *physics.*

P.6.PS.10	Calculate force, mass, and *acceleration* using Newton's second law of motion: $F = ma$ Where F =force, m =mass, a =acceleration
P.6.PS.11	Relate the *Law of Conservation of Momentum* to how it affects the movement of objects
P.6.PS.12	Compare and contrast the effects of forces on fluids: • *Archimedes' principle* • *Pascal's principle* • *Bernoulli's principle*
P.6.PS.13	Design an experiment to show conversion of *energy:* • mechanical (potential and kinetic) • chemical • thermal • *sound* • light • nuclear
P.6.PS.14	Solve problems by using formulas for *gravitational potential* and *kinetic energy:* • $KE = \frac{1}{2}mv^2$ • $PE = mgh$ Where KE = kinetic energy, PE = potential energy, m = mass, v = velocity

Strand: Physics

Standard 7: Students shall demonstrate an understanding of *wave* and particle *motion.*

P.7.PS.1	Compare and contrast a *wave*'s *speed* through various *mediums*
P.7.PS.2	Explain *diffraction* of *waves*
P.7.PS.3	Explain *Doppler effect* using examples
P.7.PS.4	Calculate problems relating to *wave properties:* • $\lambda = vt$ • $f = \frac{1}{T}$ • $v = f\lambda$ *Where* $\lambda = wavelength, f = frequency, T = period, v = velocity$
P.7.PS.5	Describe how the *physical properties* of *sound waves* affect its perception
P.7.PS.6	Define light in terms of *waves* and particles
P.7.PS.7	Explain the formation of color by light and by pigments
P.7.PS.8	Investigate the separation of white light into colors by *diffraction*
P.7.PS.9	Illustrate *constructive* and *destructive interference* of light *waves*
P.7.PS.10	Differentiate among the *reflected images* produced by *concave*, *convex,* and *plane mirrors*
P.7.PS.11	Differentiate between the *refracted images* produced by *concave* and *convex lenses*
P.7.PS.12	Research current uses of *optics* and *sound*

Key: P.7.PS.1 = Physics. Standard 7. Physical Science. 1st Student Learning Expectation

Strand: Physics

Standard 8: Students shall demonstrate an understanding of the role of *electricity* and *magnetism* in the *physical* world.

<table>
<tr><td>P.8.PS.1</td><td>Calculate voltage, current, and resistance from a schematic diagram:

<table>
<tr><th>Ohm’s Law</th><th>Series</th><th>Parallel</th></tr>
<tr><td>$V = IR$</td><td>$V_{source} = V_1 + V_2 + V_3 \ldots$</td><td>$V_{source} = V_1 = V_2 = V_3 \ldots$</td></tr>
<tr><td>$I = \frac{V}{R}$</td><td>$I_{source} = I_1 = I_2 = I_3 \ldots$</td><td>$I_{source} = I_1 + I_2 + I_3 \ldots$</td></tr>
<tr><td>$R = \frac{V}{I}$</td><td>$R_{total} = R_1 + R_2 + R_3 \ldots$</td><td>$R_{total} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots$</td></tr>
</table>

Where V = voltage, I = current, R = resistance</td></tr>
<tr><td>P.8.PS.2</td><td>Calculate electrical power using current and voltage: $P = IV$

Where $P = power$, $I = current$, $V = voltage$</td></tr>
<tr><td>P.8.PS.3</td><td>Calculate electrical energy using electrical power and time: $E = Pt$

Where $E = energy$, $P = power$, $t = time$</td></tr>
<tr><td>P.8.PS.4</td><td>Explain the use of electromagnets in step-up and step-down transformers</td></tr>
<tr><td>P.8.PS.5</td><td>Research current uses of electromagnets</td></tr>
</table>

Key: P.8.PS.1 = Physics. Standard 8. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 9: Students shall demonstrate an understanding that science is a way of knowing.

NS.9.PS.1	Explain why science is limited to natural explanations of how the world works
NS.9.PS.2	Compare and contrast *hypotheses*, *theories*, and *laws*
NS.9.PS.3	Distinguish between a scientific *theory* and the term "theory" used in general conversation
NS.9.PS.4	Summarize the guidelines of science: • explanations are based on observations, evidence, and testing • *hypotheses* must be testable • understandings and/or conclusions may change with additional empirical data • scientific knowledge must have peer review and verification before acceptance

Key: NS.9.PS.1 = Nature of Science. Standard 9. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 10: Students shall design and safely conduct a scientific inquiry to solve valid problems.

NS.10.PS.1	Develop and explain the appropriate procedure, *controls*, and *variables* (dependent and independent) in scientific experimentation
NS.10.PS.2	Research and apply appropriate safety precautions (refer to ADE Guidelines) when designing and/or conducting scientific investigations
NS.10.PS.3	Identify sources of *bias* that could affect experimental outcome
NS.10.PS.4	Gather and analyze data using appropriate summary statistics
NS.10.PS.5	Formulate valid conclusions without *bias*
NS.10.PS.6	Communicate experimental results using appropriate reports, figures, and tables

Key: NS.10.PS.1 = Nature of Science. Standard 10. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 11: Students shall demonstrate an understanding of historical trends in *physical science.*

NS.11.PS.1	Recognize the factors that constitute a scientific *theory*
NS.11.PS.2	Explain why scientific theories may be modified or expanded using additional empirical data, verification, and peer review
NS.11.PS.3	Summarize the development of the current *atomic theory*
NS.11.PS.4	Analyze the development of the *periodic table*
NS.11.PS.5	Research historical events in *physical science*
NS.11.PS.6	Research current events and topics in *physical science*

Key: NS.11.PS.1 = Nature of Science. Standard 11. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 12: Students shall use mathematics, science equipment, and technology as tools to communicate and solve *physical science* problems.

NS.12.PS.1	Use appropriate equipment and technology as tools for solving problems (e.g., balances, scales, calculators, probes, glassware, burners, computer software and hardware)
NS.12.PS.2	Collect and analyze scientific data using appropriate mathematical calculations, figures, and tables
NS.12.PS.3	Utilize technology to communicate research findings

Key: NS.12.PS.1 = Nature of Science. Standard 12. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 13: Students shall describe the connections between *pure* and *applied science.*

NS.13.PS.1	Compare and contrast *physical science* concepts in *pure science* and *applied science*
NS.13.PS.2	Discuss why scientists should work within ethical parameters
NS.13.PS.3	Evaluate long-range plans concerning resource use and *by-product disposal* for environmental, economic, and political impact
NS.13.PS.4	Explain how the cyclical relationship between science and technology results in reciprocal advancements in science and technology
NS.13.PS.5	Describe in detail the methods used by scientists in their research

Key: NS.13.PS.1 = Nature of Science. Standard 13. Physical Science. 1st Student Learning Expectation

Strand: Nature of Science

Standard 14: Students shall describe various *physical science* careers and the training required for the selected career.

NS.14.PS.1	Research and evaluate physical science careers using the following criteria: • educational requirements • salary • availability of jobs • working conditions

Key: NS.14.PS.1 = Nature of Science. Standard 14. Physical Science. 1st Student Learning Expectation

Acceleration	The rate of change of velocity
Activation energy	The minimum energy required to transform the reactants into an activated complex
Allotropes	Structural variations of single elements
Alpha particle	A particle (helium nucleus) released during nuclear decay
Applied science	Knowing about science with a purpose
Archimedes' principle	The principle that an object immersed in a fluid is buoyed up by a force equal to the weight of the fluid displaced by the object
Atom	The smallest unit of an element that maintains the properties of that element
Average atomic mass	The weighted average of the atomic masses of the naturally occurring isotopes of an element
Atomic mass unit (amu)	One-twelfth the mass of the carbon-12 atom
Atomic theory	The body of knowledge concerning the existence of atoms and their characteristic structure
Bernoulli's principle	The pressure exerted by a fluid decreases as its velocity increases
Beta particle	A particle (electron or positron) released during nuclear decay
Boiling	The conversion of a liquid to a vapor within the liquid as well as at its surface; occurs when the equilibrium vapor pressure of the liquid equals the atmospheric pressure
Boiling point	The temperature at which the equilibrium vapor pressure of a liquid equals the atmospheric pressure
Boyle's law	The volume of a fixed mass of gas varies inversely with pressure at constant temperature
Buoyancy	The force with which a more dense fluid pushes a less dense substance upward
By-product disposal	Means of disposing unusable material from the production of a product
Carbohydrate	An energy-rich, organic compound made of the elements carbon, hydrogen, and oxygen
Catalyst	A substance that changes the rate of a chemical reaction without itself being permanently consumed
Charles's law	The volume of a fixed mass of gas at constant pressure varies directly with the Kelvin temperature
Chemical bond	A mutual electrical attraction between the nuclei and valence electrons of different atoms that binds the atoms together
Chemical change	A change in which one or more substances are converted into different substances
Chemical equation	A representation, with symbols and formulas, of the identities and relative amounts of the reactants and products in a chemical reaction
Chemical property	The ability of a substance to undergo a change that transforms it into a different substance
Chemical symbol	Usually 1 or 2 letter set of characters that are used to identify an element
Chemistry	The study of the composition, structure, and properties of matter and the changes it undergoes
Combustion	The burning of a substance in the presence of oxygen
Combustion reaction	A reaction in which a substance combines with oxygen, releasing a large amount of energy in the form of light and heat

Compound	A substance that is made from the atoms of two or more elements that are chemically bonded
Concave lens	A lens that is thinner in the center than at the edges
Concave mirror	A mirror with a surface that curves inward
Convex lens	A lens that is thicker in the center than at the edges
Convex mirror	A mirror with a surface that curves outward
Concentration	A measure of the amount of solute in a given amount of solvent or solution
Conservation of momentum	Momentum is neither created nor destroyed but conserved
Constructive interference	The interference that occurs when two waves combine to make a wave with a larger amplitude.
Controls	Standard for comparison that is often needed to draw a meaningful conclusion.
Covalent bond	A chemical bond resulting from the sharing of an electron pair between two atoms
Covalent compound	A compound held together by a covalent bond.
Current	The rate that electric charges move through a conductor
Decomposition reaction	A reaction in which a single compound produces two or more simpler substances
Dehydration	Process of removing water from a substance
Density	The ratio of mass to volume; or mass divided by volume
Destructive interference	Occurs at the point where a crest meets a trough
Diffraction	Bending of light waves around an object in its path.
Doppler effect	Decrease (or increase) in wavelength as the source and detector of waves move toward (or away from) each other
Double-replacement reaction	A reaction in which the ions of two compounds exchange places in an aqueous solution to form two new compounds
Electrical energy	The energy associated with electrical charges, whether moving or at rest
Electrical power	The rate at which electrical work is done
Electromagnet	Device in which a magnetic field is generated by an electric current
Electron	Subatomic particle of small mass and negative charge
Electron dot structure	An electron-configuration notation in which only the valence electrons of an atom of a particular element are shown, indicated by dots placed around the element's symbol
Element	A pure substance made of only one kind of atom
Energy	Capacity to do work or cause change
Energy level	Any of the possible energies an electron may have in an atom
Endothermic Reaction	A reaction that takes place with the absorption of heat

Exothermic reaction	A reaction that produces heat
Evaporation	The process by which particles escape from the surface of a non-boiling liquid and enter the gas state
Flammability	A chemical property that describes whether substances will react in the presence of oxygen and burn when exposed to a flame
Fullerenes	Spherical carbon compounds
Gamma rays	High-frequency electromagnetic waves (released during nuclear decay)
Gas	The state of matter in which a substance has neither definite volume nor definite shape
Heat	The energy transferred between samples of matter because of a difference in their temperature
Heat of fusion	The amount of heat energy required to melt one mole of solid at its melting point
Heat of vaporization	The amount of heat energy needed to vaporize one mole of liquid at its boiling point
Heating curve	A diagram (figure) showing the changes in the temperature of a substance as heat is transferred
Hydrocarbon	An organic chemical compound that is comprised only of carbon (C) and hydrogen (H) atoms
Hypothesis	A testable statement
Ion	An atom or group of bonded atoms with a charge (has a positive or negative charge)
Ionic bond	The chemical bond resulting from electrical attraction between large numbers of positive and negative ions (cations and anions)
Ionic compound	A compound composed of positive and negative ions (cations and anions) that are combined so that the numbers of positive and negative charges are equal
Isomers	Compounds that have the same molecular formula but different structures
Isotopes	Atoms of the same element that have different masses; same number of protons, different number of neutrons
Kinetic energy	Energy of an object due to its motion
Kinetic theory	A molecular theory based on the idea that molecular particles of matter are always in motion
Law	A descriptive generalization about how some aspect of the natural world behaves under stated circumstances, often stated in a form of a mathematical equation
Law of conservation of mass	The law stating that mass is neither created nor destroyed during ordinary chemical or physical reactions
Lewis electron dot structure	An electron-configuration notation in which only the valence electrons of an atom of a particular element are shown, indicated by dots placed around the element's symbol
Lipid	An energy-rich compound made of carbon, oxygen, and hydrogen; fats, oils, waxes, and cholesterol
Liquid	The state of matter in which the substance has a definite volume but an indefinite shape
Magnetism	The force of attraction or repulsion of magnetic materials
Matter	Anything that has mass and takes up space
Medium	The matter through which a wave travels
Melting point	The temperature at which a solid becomes a liquid
Metallic bond	A bond between two or more metal atoms in which the electrons are free to move around each nuclei
Model	An explanation of how phenomena occur and how data or events are related

Molar mass	The mass of one mole of a pure substance
Mole	The amount of a substance that contains as many particles as there are atoms in exactly 12 g of carbon-12; equals 6.02 X 10^{23}
Mole ratio	A conversion factor that relates the amounts in moles of any two substances involved in a chemical reaction
Motion	The state in which one object's distance from another is changing
Nucleic acid	A very large organic compound made up of carbon, oxygen, hydrogen, nitrogen and phosphorous;(e.g., DNA and RNA)
Nuclear fission	A process in which a very heavy nucleus splits into more-stable nuclei of intermediate mass
Nuclear fusion	A process by which two or more nuclei join together to form a heavier nucleus
Optics	Study of light
Orbital	A three-dimensional region around the nucleus that indicates the probable location of an electron
Organic compound	A covalently bonded compound containing carbon, excluding carbonates and oxides
Pascal's principle	The principle that applied pressure is transmitted undiminished throughout a fluid
Periodic table	A table with an arrangement of the elements in order of their atomic numbers so that elements with similar properties fall in the same column or group
Physics	The science that examines the fundamental laws relating matter and energy
Physical change	A change in a substance that does not involve a change in the identity of the substance
Physical property	A characteristic that can be observed or measured without changing the identity of the substance
Physical Science	The study of matter, energy, and the changes that matter and energy undergo
Plane mirror	A flat mirror that produces an upright, virtual image the same size as the object
Polyatomic ion	A charged group of covalently bonded atoms
Potential energy	Energy of an object due to its position; stored energy or energy of position.
Precipitate	A solid that is produced as a result of a chemical reaction in solution and that separates from the solution
Pressure	The force per unit area on a surface
Product	A substance that is formed by a chemical change
Projectile motion	Motion of objects moving in two dimensions under the influence of gravity
Protein	An organic compound that is a polymer made of amino acids
Radioactive decay	The spontaneous disintegration, or decay, of a nucleus into a slightly lighter and more stable nucleus, accompanied by emission of mass particles, electromagnetic radiation, or both
Reactant	A substance that reacts in a chemical change
Reactivity	The ability of a substance to combine chemically with another substance
Reference point	A place or object used for comparison to determine if an object is in motion
Resistance	Opposition to flow of electric current
Saturated hydrocarbon	An organic molecule that has utilized all of its bonding electrons to make single bonds to other atoms
Schematic diagram	A graphic representation of an electric circuit or apparatus, with standard symbols for the electrical devices
Scientific bias	Factors that affect the outcome of an investigation
Single-displacement reaction	A reaction in which one element replaces a similar element in a compound
Solid	The state of matter in which the substance has definite volume and definite shape

Sound	A disturbance that travels through a medium as a longitudinal wave
Speed	The scalar ratio of distance traveled to the time interval
Sub-atomic particles	Includes protons, neutrons, and electrons
Surface area	The amount of a substance exposed
Synthesis reaction	A reaction in which two or more substances combine to form a new compound
Temperature	A measure of the average kinetic energy of the particles in a sample of matter
Thermal energy	Total energy of a material's particles due to their movement or vibration
Thermal expansion	Moving apart of particles as their temperature rises
Theory	An explanation of a phenomenon; a broad generalization that explains a body of facts or phenomena
Transformer	Device used to transfer energy from one circuit to another circuit by mutual inductance across two coils
Unsaturated hydrocarbon	An organic molecule that contains double or triple bonds between certain atoms
Valence electron	An electron that is available to be lost, gained, or shared in the formation of chemical compounds
Variable	A factor that changes or is changed during an experiment
Velocity	A quantity describing both speed and direction
Viscosity	The resistance of a fluid to flow
Voltage	The difference in electrical potential between 2 places
Wave	Traveling disturbance in a field or medium
Wavelength	The distance between two successive crests, or two successive troughs, of a wave; the distance between corresponding points on adjacent waves
Wave speed	The speed at which a wave passes through a medium

Appendix

Suggested Physical Science Labs

Strand	Suggested Labs
Chemistry	chemical and physical properties chemical and physical changes states of matter/heating curve Boyle's and Charles' laws endothermic and exothermic chemical reaction evidence chemical reaction rate factors combustion carbon bonding tests for presence of organic compound
Physics	transfer of thermal energy motion graph lab Newton's first law Newton's third law Archimedes, Pascal, Bernoulli's laws energy conversion wave speed through mediums wave property light diffraction interference lab mirror image concave and convex lenses Ohm's law power through a circuit transformer electromagnets