Physical Science
Credits - 1  Duration - 1 Year
Course Overview

The Physical Science course provides opportunities for students to develop and communicate an understanding of physics and chemistry through lab-based activities, mathematical expressions, and concept exploration. Concepts covered in this course include structure of matter, chemical and physical properties and changes, kinematics, dynamics, energy, waves, electromagnetic spectrum, electricity, and magnetism. Laboratory activities, the use of technology, and the effective communication of results through various methods are integral components of this course.

Grading Scale
A 100-90
B 89-80
C 79-70
D 69-60
F 59 and below

Grading Scheme:
Tests: 50%
Daily Activities: 40%
Homework: 10%

Materials and Resources
Textbook
Occasional Electronic Device (for Quizlet, Khan Academy, Google Classroom, Kahoot, etc assignments)
Paper, pen/pencil, binder/notebook

Prerequisites
Algebra 1 as pre- or co-requisite

TERM I
**Term Topics & Duration**

| | |
|---|---|
| Classroom Success/ACT prep activities | Ongoing |
| Session 1: The Nature of Science | 2 Week(s) |
| Session 2 Physical Science Methods | 2 Week(s) |
| Session 3: Moving Objects | 2 Week(s) |
| Session 4: Acceleration and Momentum | 2 Week(s) |

Students will learn about problem solving using the scientific methods and learn to use laboratory equipment to collect data. Throughout the term, students will practice analyzing data and using various problem solving methods. Sessionss three and four will introduce concepts from physics such as speed, velocity, acceleration, mass, force, and momentum. Students will practice using math to solve problems based in real-world scenarios.

**Essential Questions/Concepts**
Compare and contrast "pure" science and technology.
Define physical science.
Distinguish between problems and exercises.
Evaluate approaches to solving problems.
Compare and contrast hypothesis, theory, and law.

Describe some of the environmental issues presently being studied by scientists.
Examine how scientific controversies arise.
Appreciate the importance of following guidelines in doing experiments.
Define constant, independent, and dependent variable.
Recognize the need for standards of measurement.
Name the prefixes used in SI and tell what multiple of ten each represents.
Identify SI units and symbols for length, volume, mass, density, time, and temperature.
Identify three types of graphs and explain the correct use of each type.
Analyze the benefits and drawbacks of universal use of SI measurements.
Compare and contrast speed, velocity, and acceleration.
Evaluate the effects of wearing seat belts during a car crash.
Form an opinion about whether laws should make people wear seat belts.
Identify cause and effect relationships between force and changes in velocity.
Explain Newton's first law of motion.
Examine how gravitational force is related to mass and distance.
Explain how force, mass, and acceleration are related.
Explain why things that are thrown or shot follow a curved path.
Compare motion in a straight line with circular motion.
Analyze the advantages and disadvantages of exposing astronauts to weightlessness.
Draw conclusions about the safety of space travel.
Explain conservation and momentum.

**Term Academic Vocabulary**

constant
control
critical thinking
dependent variable
experiment
greenhouse effect
hypothesis
independent variable
model
observation
ozone layer
physical science
scientific law
technology
theory
density
derived unit
graph
kelvin
kilogram
liter
mass
meter
second
SI
standard
time
volume
acceleration
average speed
balanced forces
constant speed
force
friction
gravity
inertia
instantaneous speed
net force
speed
velocity
weight
air resistance
centripetal acceleration
centripetal force
isometric exercise
law of conservation of momentum
momentum
Newton's second law of motion
Newton's third law of motion
projectile
terminal velocity

TERM II

**Description**

During this term students will explore the different types of energy and use the law of conservation of energy to explain changes in energy. They will then apply this knowledge to the discussion of different types of simple machines. Students will then move into the discussion of Chemistry, including identification and discussion of different types of matter and the different states that matter may appear in. Students will learn about matter at a subatomic level and discuss the trends apparent in the periodic table of elements.

**Topics & Duration**

| | |
|---|---|
| Chapters 5 and 6: Energy and Work | 2 Week(s) |
| Chapter 7: Simple Machines | 2 Week(s) |
| Chapter 8: States of Matter | 2 Week(s) |
| Chapters 9 and 10: Matter and Atoms | 2 Week(s) |

**Term Essential Questions**

What is the difference between kinetic and potential energy?
What is the difference between heat, temperature, and kinetic energy?
How do we measure changes in thermal energy?
What are the differences among conduction, convection, and radiation?
How do machines make work easier?
What are the six types of simple machines?
Explain mechanical advantage, power and efficiency.
What are the four states of matter?
How does the kinetic theory of matter relate to the characteristics of solids, liquids, and gases?
What are ways that we can reduce water waste and pollution?
How can we explain the relationship between the pressure, temperature and volume of gases within a container?
What are the differences between pure substances and mixtures?
What is smog, how is it created and how does it affect our environment?
Describe the differences between physical and chemical properties and change?
How is the atomic model arranged?
What is the difference between mass number and average atomic mass?
How is the periodic table arranged?

**Term Academic Vocabulary**

energy
kinetic energy
potential energy, work, mechanical energy, law of conservation of energy, temperature, thermal energy, heat, magma, specific heat, convection, conduction, radiation, insulators, thermal pollution, cooling towers, combustion, machine, simple machine, effort force, resistance force, ideal machine, mechanical advantage, lever, fulcrum, effort arm, resistance arm, pulley, wheel and axle, inclined plane, screw, wedge, compound machine, efficiency, power, watt, states of matter, kinetic theory of matter, crystals, plasma, thermal expansion, polluted water, evaporation, condensation, heat of fusion, heat of vaporization, pressure, pascal, Boyle's Law, Charles's Law, buoyant force, Archimede's Principle, Pascal's Principle, Bernoulli's Principle, element, compound, substance, heterogeneous mixture, homogeneous mixture, solution, colloid, suspension, Tyndall effect, smog, physical property, physical change, chemical change, chemical property, law of conservation of mass, chemical symbol, nucleus, electrons, protons, neutrons, atomic number, electron cloud, quarks, mass number, isotopes, average atomic mass, periodic table, groups, dot diagram, periods, metals, nonmetals, metalloids

TERM III

**Description**

Students will learn about different types of solutions and how to classify them as acidic, basic, or neutral. Students will also practice balancing chemical equations. After finishing the chemistry-based units, students will move back into physic-based subjects with a discussion of waves, specifically as related to sounds.

| **Topics &** | **Duration** |
|---|---|
| Chapter 15: Solutions | 2 Week(s) |
| Chapter 16: Chemical Reactions | 2 Week(s) |
| Chapter 17: Acids and Bases | 2 Week(s) |
| Chapter 18: Waves and Sound | 2 Week(s) |

**Term Essential Questions**

Classify solutions into three types and identify their solutes and solvents.
Identify reactants and products in a chemical reaction.
Explain how a chemical reaction satisfies the law of conservation of mass.
Describe four types of chemical reactions using their generalized formulas.
Demonstrate how to write a balanced chemical equations.Define characteristic properties of acids and bases.
Relate the process of ionization and dissociation to the formation of acids and bases.
Describe the relationship between pH and the strength of an acid or a base.
Discuss the problems surrounding acid rain.
Describe a neutralization reaction.
Differentiate salts, esters, soaps, and detergents.

**Term Academic Vocabulary**

solute, solvent, desalilnation, distillation, solubility, saturated solution, unsaturated solution, supersaturated solution, dissociation, ionization, electrolyte, non electrolyte, chemical reaction, reactants, products, coefficients, CFCs, balanced chemical equation, synthesis reaction, decomposition reaction, single displacement reaction, double displacement reaction, precipitate, endothermic, exothermic, catalyst, inhibitor, acid, indicator, dehydrating agent, pickling, base, hydronium ion, strong acid, weak acid, strong base, weak base, pH, acid rain, plankton, neutralization, salt, titration, soaps, saponification, detergents, ester, waves, medium, transverse wave, crests, troughs, wavelength, amplitude, frequency, compressional wave, pitch, intensity, loudness, noise pollution, music, noise, resonance, quality, interference, reverberation, acoustics

TERM IV
Description
Students will explore the electromagnetic spectrum, mirrors and lenses, electricity, fossil fuels, nuclear energy and alternative energy sources.

**Topics & Duration**

| | |
|---|---|
| Chapter 19: Light | 2 Week(s) |
| Chapter 20: Mirrors and Lenses | 2 Week(s) |
| Chapter 21: Electricity | 2 Week(s) |
| Chapter 25: Energy Sources | 2 Week(s) |

**Term Essential Questions**

Compare and contrast different types of waves.
Describe the arrangement of waves on the electromagnetic spectrum.
Describe transparent, translucent, and opaque materials.
Analyze advantages and disadvantages of different types of lighting.
Describe properties of light, including reflection and refraction and diffraction.
Explain how an image is formed in two types of mirrors.
Identify examples and uses of plane, concave, and convex mirrors.
Explain how lenses are used to correct vision.
Describe how several different optical instruments work.
Describe polarized light and the uses of polarizing filters.
Distinguish between conductors and insulators.
Recognize the presence of a charge using an electroscope.
Explain lightning and evaluate the pros and cons of lightning induced forest fires.
Conceptually and mathematically relate potential difference, resistance, and current.
Identify the key difference between parallel and series circuits.
Explain and calculate electric power and electric energy.
Discuss the origin and characteristics of the three main types of fossil fuels.
Describe the need and methods for energy conservation.
Outline the pros and cons of nuclear reactors.
Assess the advantages of breeder reactors.
Analyze the need for alternative energy sources and discuss pros and cons of alternate options.

**Term Academic Vocabulary**

radiation, electromagnetic spectrum, photons, radio waves, modulation, microwaves, infrared radiation, visible radiation, ultraviolet radiation, x rays, gamma rays, opaque materials, transparent materials, translucent materials, incandescent light, fluorescent light, reflection, refraction, diffraction, diffraction grating, plane mirror, virtual image, concave mirror, focal point, focal length, real image, convex mirror, convex lens, concave lens, refracting telescope, reflecting telescope, microscope, wide angle lens, telephoto lens, polarized light, lasers, coherent light, incoherent light, total internal reflection, optical fibers, static electricity, electric field, conductor, insulator, electroscope, lightning rod, potential difference, circuit, current, dry cell, wet cell, resistance, Ohm's law, series circuit, parallel circuit, electrical power, kilowatt-hour, petroleum, fractional distillation, nonrenewable resources, nuclear reactor, nuclear wastes, breeder reactor, photovoltaic cell, hydroelectricity, tidal energy, geothermal energy