

Science Curriculum Parent Guide

School: High School

Grade: 9

INTRODUCTORY PHYSICS

Course Description:

Upon completion of this course in Introductory Physics students will have acquired an understanding of the evidence that underlies more complex concepts of physics, including forces and vectors, and transformations of energy. Graphical representations and the gradual introduction of functions introduce students to well-defined laws and principles of physics. A two-period per cycle Technology/Engineering program will be incorporated to allow students to apply the knowledge gained in the classroom and laboratory to solve practical problems through the development or use of technologies, which is the goal of engineering. Also included, will be a one period per cycle double laboratory period for investigation, experimentation, and problem solving which are central to the study of physics.

Units	Concepts
Motion and Forces	Students will: Understand and apply Newton's laws of motion; Distinguish between vector quantities and scalar quantities; Distinguish between, and solve problems involving, velocity, speed, and constant acceleration; Create and interpret graphs and diagrams for motion and forces.
Conservation of Energy and Momentum	Students will: Understand and apply the law of conservations of energy and the law of conservation of momentum; Describe the relationship among, kinetic energy, potential energy, work, and power.
Heat and Heat Transfer	Students will: Relate thermal energy to molecular motion; Explain the relationship among temperature change in a substance, the mass of the substance, and the specific heat.
Waves	Students will: Differentiate between wave motion and the motion of objects; Recognize the measurable properties of waves and explain their relationships; Distinguish between, transverse, longitudinal, mechanical, and electromagnetic waves.
Electromagnetism	Students will: Recognize the characteristics of static charge and explain how it is generated; Develop a quantitative and qualitative understanding of current, voltage, and resistance and the connection between them.
Electromagnetic Radiation	Students will: Describe the electromagnetic spectrum in terms of wavelength and energy and be able to identify specific regions; Explain the useful applications of the various wavelengths in the electromagnetic spectrum.

Suggestions for Parental Involvement

1. Parents should request to see their child's homework on a regular basis and make sure it is done neatly and to completion.
2. Parents should be aware of the quarterly progress reports carried home by all students and ask to see these in a timely manner.
3. Parents should examine each report card distributed throughout the year and in this way, help to prevent possible failures for the year.
4. Parents may purchase Conceptual physics for Parents and Teachers, Volume I Mechanics. As the title suggests, this book is, in part, geared towards parents who are not comfortable with some of the basic concepts of physics but would like to be involved with their child's physics education. The book can be purchased online at www.arborsci.com or by phone at (800) 367-6695.

School: _____ High _____

Grade: __10__ BIOLOGY

Course Description:

In Biology, students will study the molecular basis of life by looking at the processes occurring in cells. In particular, the students will learn that the DNA molecule dictates all physical traits and that they inherit their parents' DNA and therefore their physical traits. They will learn that genetic variation is inherited and the unit of inheritance is the gene. It is the inherited traits that provide the variation on which natural and manipulated selection act. It is changes in the DNA over time (mutations) that lead to diversity and the appearance of new traits that can give an organism a selective advantage, allowing it to become more competitive in a given environment, survive better, or adapt to changes in the environment (basis of natural selection). The theory of organic evolution is fundamental to understanding modern biology. It provides a framework for explaining why there are so many different kinds of organisms on earth; why organisms of distantly related species share biochemical, anatomical, and functional characteristics; why species become extinct; and how different kinds of organisms are related to one another. The students will be enrolled in a two-period per cycle computer module to assist them with the completion of laboratory reports and the analysis of experimental data. A grade will be incorporated into their biology grade and weighted as ten percent of the total.

Unit	Concepts
The Chemistry of Life	The student will be able to: Explain the significance of carbon as one of the six most common elements in organic molecules and recognize the role of the other elements (H,N,O,P,S); Describe the composition and functions of carbohydrates, lipids, proteins, and nucleic acids; Explain the role of enzymes in biochemical reactions.
Structure and Function of Cells	The students will be able to:

	<p>Relate cell parts/organelles to their functions; Differentiate between primitive cells i.e. bacteria and more advanced cells in terms of general structure and degree of complexity; Distinguish between plant and animal cells; Explain the role of cell membranes; Identify and describe the process of photosynthesis and recognize that the end product is the primary source of energy and nutrients for most living things; Compare and contrast the processes of photosynthesis and cellular respiration; Describe and compare the processes of mitosis and meiosis, and their role in the cell cycle.</p>
Genetics	<p>The student will be able to: Describe the structure and function of DNA, and distinguish among replication, transcription, and translation; Explain how mutations in the DNA sequence of a gene may be silent or result in a change in the traits of the organism and in its offspring; Differentiate between dominant, recessive, co-dominant, polygenic and sex-linked traits; State Mendel's laws of segregation and independent assortment; Use a Punnett Square to demonstrate genetic crosses; Explain how zygotes are produced in the fertilization process.</p>
Evolution and Biodiversity	<p>The student will be able to: Explain how the fossil record, comparative anatomy, and other evidence support the theory of evolution; Illustrate how genetic variation is preserved or eliminated from a population through Darwinian natural selection; Describe how the taxonomic system classifies living things into domains and kingdoms.</p>
Ecology	<p>The student will be able to: Explain how living and non-living factors cycle in an ecosystem; Use a food web to identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through trophic levels.</p>

Suggestions for Parental Involvement

Parents should request to see their child's homework on a regular basis- and make sure it is done neatly and to completion.
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 Parents should examine each report card distributed throughout the year and in this way, help to prevent possible failures for the year.

School: High School

Grade: 11

CHEMISTRY

Course Description:

Units**Concepts**

Properties of Matter	The student will be able to: Identify and explain some of the physical properties that are used to classify matter; Explain the difference between mixtures and pure substances; Describe the four states of matter in terms of energy, particle motion, and phase transitions..
Atomic Structure	The student will be able to: Interpret Dalton's atomic theory in terms of the Laws of Conservation of Mass, Constant Composition, and Multiple Proportions; Identify the major components of the nuclear atom and explain how they interact; Compare nuclear fission and nuclear fusion and mass defect; Describe the process of radioactive decay as the spontaneous breakdown of certain unstable elements into new elements; Explain the difference between stable and unstable isotopes.
Periodicity	The student will be able to: Explain the relationship of an element's position on the periodic table to its atomic number and mass; Use the periodic table to identify metals, nonmetals, metalloids, families, periods, valence electrons, and reactivity with other elements in the table'; Relate the position of an element on the periodic table to its electron configuration; Identify trends on the periodic table.
Chemical Bonding	The student will be able to: Explain how atoms combine to form compounds through both ionic and covalent bonding; Draw Lewis dot structures for simple molecules; Predict chemical formulas based on the number of valence electrons; Name and write the chemical formulas for simple ionic and molecular compounds.
Chemical Reactions and Stoichiometry	The student will be able to: Balance chemical equations by applying the law of conservation of mass; Recognize synthesis, decomposition, single displacement, double displacement, and neutralization reactions; Understand the mole concept in terms of particles, mass and gaseous volume.
Gases and Kinetic Molecular Theory	The student will be able to: Using the Kinetic Molecular Theory, explain the relationships between pressure and volume (Boyle's Law), volume and temperature (Charles' Law), and the number of particles in a gas sample (Avogadro's Hypothesis); Explain the relationship between temperature and average kinetic energy.
Solutions	The student will be able to: Describe the process by which solute dissolve in solvents; Identify and explain the factors that affect the rate of dissolving.
Acids and Bases	The student will be able to: Define Arrhnius' theory of acids and bases in terms of the presence of hydronium and hydroxide ions, and Bronsted's theory of acids and bases in terms of proton donor and acceptor, and relate their concentrations to the pH scale.

Equilibrium and Kinetics	The student will be able to: Identify the factors that affect the rate of a chemical reaction and the factors that can cause a shift in equilibrium.
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Suggestions for Parental Involvement

1. Parents should be aware that homework is assigned daily. This may take the form of a written assignment or problem set, a lab report, a reading assignment and/or research for an upcoming project.
2. Parents should inquire if midterm progress reports have been distributed and check for areas of concern. Please communicate with your child's teacher at your earliest convenience in order to avoid problems compounding themselves.
3. The study of Chemistry involves principles and concepts that build on one another. Because of the cumulative nature of this subject extra help should be sought out early on rather than later.

School: High Grade: 12 Subject: PHYSICS

Course Description:

The Physics Curriculum is concerned with describing the relationship between matter and energy. Through numerous demonstrations, experiments, class discussions and problem solving, students will develop and understanding of the forces that affect our lives. The physics of motion, energy, electricity, magnetism, sound and light will be explored. This course emphasizes problem solving techniques, logical thinking, and development of laboratory skills. In addition to regular assignments, students will be required to do several independent research and technology projects. Computers and a variety of sensing devices will be used to gather and analyze data, develop and communicate conclusions.

Units

Concepts

Vector Mathematics	The student will be able to: Understand and apply Newton's laws of motion; Distinguish between vector quantities and scalar quantities; Distinguish between, and solve problems involving, velocity, speed, and constant acceleration; Create and interpret graphs and diagrams for motion and forces.
Kinematics, Dynamics and Statics	The student will be able to: Understand and apply the law of conservations of energy and the law of conservation of momentu; Describe the relationship among, kinetic energy, potential energy, work, and power.
Universal Gravitation	The student will be able to: Relate thermal energy to molecular motion; Explain the relationship among temperature change in a substance, the mass of the substance, and the specific heat.
Momentum and Energy	The student will be able to: Differentiate between wave motion and the motion of objects; Recognize the measurable properties of waves and explain their relationships;

	Distinguish between, transverse, longitudinal, mechanical, and electromagnetic waves.
Electricity and Magnetism	The student will be able to: Recognize the characteristics of static charge and explain how it is generated; Develop a quantitative and qualitative understanding of current, voltage, and resistance and the connection between them.
Optics and Acoustics	The student will be able to: Describe the electromagnetic spectrum in terms of wavelength and energy and be able to identify specific regions; Explain the useful applications of the various wavelengths in the electromagnetic spectrum.
Technology/Engineering	This unit pursues engineering questions and technological solutions that emphasize research and problem solving; Students will understand and apply the five elements of a technology system (goal, inputs, processes, outputs, and feedback).

Suggestions for Parental Involvement

Show interest in what your student is doing in school.

Examine Progress Reports and Report Cards for indicators or evidence of a problem.

Talk to your child's teacher to discuss how the teacher, student and parent can cooperate in formulating a successful educational plan for your child.