



COVINGTON LATIN SCHOOL

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PREP 8 PHYSICAL SCIENCE

Textbook:

Physical Science, Robert Marshall and Donald Jacobs, AGS Publishing, 2004

Prerequisites:

Acceptance into the Preparatory Year at Covington Latin School

Course Description:

The course will lead students through introductions into the basic concepts of Chemistry and Physics, in a study of matter and energy. After learning of the Scientific Method, investigations into the phenomena of chemistry and physics make use to develop laboratory skills. Lecture format, video presentations and hands-on laboratory work will be used to achieve these skills. While the basic concepts of these areas will be stressed, further applications to everyday life will be addressed.

Course Goals:

- Examine the scientific method to investigate the concepts of physical science.
- Develop scientific skills to solve problems and answer questions.
- Discover how important physical science is to everyday life.

Course Objectives:

- Understand the differences between the Sciences and what each entails.
- Become knowledgeable of the different Systems of Measurement.
- Discover how Mathematics supports of Laws of Science.
- Become proficient in obtaining data in scientific investigations for various quantities such as length, mass, time, force, density, ph.
- Understanding the different classifications of matter.
- To examine the various ways matter reacts.
- Examine Motion, different forms, causes.
- Study the Laws of motion, momentum.
- Understand the different forms of energy.
- Examine the difference between heat and Temperature
- Uncover the characteristics of Waves (Light and Sound)
- Discover the relation between Electricity and Magnetism and how they affect the world around us.

Course Sequence:

1st Quarter

FIRST QUARTER

- I. Introduction to Science
 - A. Short history of science.

- B. The scientific Method
- C. Types of Physical Sciences
 - i. Physics
 - ii Chemistry
- D. Measurement
 - i. Why?
 - ii. Systems
 - a. Metric (SI) (MKS)
 - b. British engineering
- E. Prefixes
- F. Area
- G. Volume
- II Properties of Matter
 - A. Physical vrs Chemical
 - B. Mass vrs Weight
 - C. Mass of a Liquid
 - D. Volume of Liquid
 - E. Volume of Solids
 - F. Density
- III Structure of Matter
 - A. Molecules
 - B. Five States of Matter
 - i. Bose-Einstein Participates
 - ii. Solid
 - iii. Liquid
 - iv. Gas
 - v. Plasma
 - vi. Temperature and Pressure
 - C. Pure Substances
 - i. Elements
 - ii. Compounds
 - D. Mixtures
 - E. Models of Atoms
 - F. Identifying Elements

SECOND QUARTER

- IV. Classifying Elements
 - A. Symbols
 - B. Using Periodic Table
 - i. Arrangement of Elements
 - ii. Information contained
 - iii. Isotopes
 - iv. Atomic Mass
 - v. Columns
 - C. Metals, Nonmetals and Noble gases
 - i. Metals
 - a. Properties
 - b. Alloys

- ii. Nonmetals
- iii. Noble Gases

V. Compounds

- A. Chemical and Physical Changes
- B. Characteristics of Compounds
- C. Formation of Compounds
 - i. Electron arrangement
 - ii. Filling energy levels
 - iii. How atoms combine
 - iv. Attraction between atoms.
- D. Chemical Formulas
 - i. Components' Symbols
 - ii. Subscripts
 - iii. Radicals
- E. Naming Compounds
 - i. Containing two elements (Binary)
 - ii. More than two elements
- F. Acids and Bases
 - i. Properties of Acids
 - ii. Properties of Bases
 - iii. Testing for Acids and Bases

VI. How Matter Changes

- A. What is a reaction vrs Physical Change
 - i. Solutions
 - ii. Types of solutions
- B. Chemical Equations showing Reactions
 - i. Reactants
 - ii. Products
 - iii. Conservation of Matter
 - iv. Balancing Equations
- C. Types of Reactions
 - i. Synthesis
 - ii. Decomposition
 - iii. Single Replacements
 - iv. Double Replacements

Third Quarter

VII. Motion

- A. What are Motion and Speed
 - i. Distance – Position – Displacement
 - ii. Elapsed time
 - iii. Speed – Velocity
 - iv. Using a Graph to Describe Motion
 - v. Varying Speed
- B. Acceleration – Deceleration
- C. Newton's Laws of Motion

- i. First – Law of Inertia
 - ii. Second - Force = Mass x Acceleration
 - iii. Third – Action/Reaction (Two Forces on two different bodies)
- D. Law of Universal Gravitation
- E. Momentum
 - i. Momentum (p) = Mass x velocity
 - ii. Conservation of Momentum
 - iii. Impulse = Change in Momentum

VIII. Work and Machines

- A. What is Work
 - i. Scientific Meaning
 - ii. Measuring Work (Force x Distance)
- B. Power (Work/Time)
- B. Energy – Ability to do Work
 - i. Potential and Kinetic
 - ii. Forms of energy
 - iii. Conservation of Energy
- C. Simple Machines
 - i. Levers
 - a. Classes
 - b. Work and Efficiency
 - c. Mechanical Advantage
 - d. Effort and Resistance
 - ii. The Pulley
 - iii. Inclined Plane
 - iv. The Screw
 - v. The wedge
 - vi. The wheel and axle

IX. Heat

- A. What is heat
 - i. Heat vrs temperature
 - ii. Units
 - iii. Sources
- B. How Heat affects matter
 - i. Change of state
 - ii. Expansion
- C. Temperature
 - i. thermometers
 - ii. Scales
 - iii. Conversion
 - iv. Freezing and Melting point
 - v. Boiling point
 - vi. Changing freezing and melting
- D. Measuring Heat
- E. How Heat Travels
 - i. Conduction
 - ii. Radiation
 - iii. Convection

Fourth Quarter

- X. Waves
 - A. Types of Waves
 - i. Transversals
 - ii. Longitudinal
 - B. General Properties of All Waves
 - C. Sound Waves
 - i. Production
- XI. Electricity
 - A. Static Electricity
 - B. Current electricity
 - i. Closed Circuit
 - ii. Open circuit
 - iii. Schematic Diagrams
 - C. Conductors and Insulators
 - D. Resistance
 - E. Sources of Electric Current
 - F. AC and Dc Currents
 - G. Ohm's Law
 - H. Series Circuits
 - I. Parallel Circuits
 - J. Protection Devices
- XII. Magnets and Electromagnetism
 - A. What are Magnets and Types
 - B. Magnetic Poles
 - C. Magnetic Field (Compared to Gravity and Electric Fields)
 - D. Earth as A Magnet
 - E. Magnetic Theory
 - F. Making Magnets/Demagnetizing
 - G. Relationship between Magnetism and Electricity
 - i. Magnetic field around current carrying wire
 - ii. Electro magnets
 - H. Motor Principle
 - I. Generator Principle
 - J. Applications

Evaluation:

Compiled through Work Packets, quizzes, chapter tests, lab reports.

Class Times:

Classes meet four times a week with one class being two periods long to ensure sufficient time for lab work.

Supplemental Materials:

- Conceptual Physics, VHS Tapes by Hewitt
- Variious Streaming downloads directly from internet.
- Sodium, and Family; VHS on the volatile nature of the First Family