

HiSET Preparation - Science Part 2

Course Overview

The HiSET Preparation Courses were developed by aligning Plato Courseware with the strands and topics that are assessed on the 2014 HiSET Test. Each unit aligns to one or more strands within the 2014 HiSET Test and the modules within each unit target the essential concepts of the Next Generation Science Standards as assessed on the HiSET Test for Science. This course focuses on the key concepts of Physical Science. This course also provides an understanding of the scientific reasoning skills needed for performing scientific inquiry and experiments.

Course Goals

By the end of this course, you will:

- Understand what matter is and the types of matter
- Explore the structure of an atom, atomic mass, and isotopes
- Explore the periodic table and its applications
- Understand bonding between atoms and explore compounds
- Demonstrate an understanding of the mole concept and the ability to carry out related calculations
- Explore different types of chemical reactions and solve related stoichiometry and percent yield problems
- Explore chemical reactions in terms of reaction rates, chemical equilibrium, and Le Chatelier's Principle
- Explore the role of energy in chemical and physical processes
- Understand the kinetic theory and gas laws, including applications
- Understand the dissolving process
- Explore nuclear forces, radioactive isotopes, and nuclear fission and fusion
- Explore the concepts of forces and motion
- Explore the concepts of electrostatics and electric fields, as well as Coulomb's law and its applications
- Explore properties and sources of energy and its applications, and demonstrate the ability to predict outcomes for given scenarios based on these concepts
- Understand the concept of waves, including types and behavior, and explore the transmission of sound waves and detection of sound
- Understand the concept of the electromagnetic spectrum

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Complete basic operations with presentation software, such as Microsoft PowerPoint or Google Docs presentation.
- Perform online research using various search engines and library databases.
- Communicate through email.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Course Materials

- notebook
- pencils or ink pens
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent

Course Structure

Unit 1 - 4: Physical Science: Matter and Its Interactions

Summary

Unit 1 begins by exploring the different types of matter and the properties of an element, compound, homogeneous and heterogeneous mixture. The unit also introduces students to the atom, its components and their locations, charges, and masses. Students will learn about the significant contributions that led to the modern atomic theory. The unit also explores isotopes and how to calculate average atomic mass from isotopic information. Unit 1 then moves on to explore the periodic table and its applications in identifying information about and properties of an element, writing electronic configuration and analyzing periodic trends. The latter part of the unit introduces students to the octet rule for atoms and how it results in various bonds between atoms. Students also explore rules for naming compounds and drawing Lewis structures. In the end of this unit, students learn about electro negativity and learn to differentiate between ionic, polar covalent, and nonpolar covalent bonds.

Unit 2 shows the application of the mole concept to calculate molar mass and to calculate particles, mass, volume, moles, and percent composition. The unit also covers lessons which explore the different types of chemical reactions, balancing chemical reactions, and predicting products for chemical reactions. Students also work through problems on mole ratios, stoichiometry, and percent yield.

Unit 3 explores the different forms of energy and how they relate to chemical reactions. This unit also covers the endothermic and exothermic processes. The unit also provides an understanding of the kinetic theory and the three states of matter. In the end of this unit, students study the basic gas laws and their applications, including solving related problems.

In unit 4, students will continue to explore chemical reactions. Students will explore reactions rates and the factors affecting these rates. This unit also covers lessons that provide an understanding of chemical equilibrium and Le Chatelier's principle. This unit also explores the dissolving process. Towards the end of the unit, students will learn about nuclear forces and learn how to calculate mass-energy equivalence. Students explore the naturally occurring radioactive isotopes and the ways that they decay. The unit concludes by describing nuclear fission and fusion.

Unit 5 & 6: Physical Science: Motion and Stability: Forces and Interactions

Summary

Unit 5 begins with exploring the applications of simple mathematical relationships to calculations related to speed, density, force, and volume. Students also practice assigning positions and reference directions. This unit also covers the concepts of forces and motion. Students also explore Newton's laws and their applications. At the end of the unit, students learn to predict the behavior of an object from the given information about balanced and unbalanced forces.

Unit 6 introduces students to the concept of electrostatics by describing the types of charges, attraction and repulsion of charges, polarization, and induced charges. It then moves on to the study and application of Coulomb's law to analyze electric forces. At the end of the unit, students learn about the electric field lines for one point charges, two point charges, and parallel plates, and how to calculate the electric field of a single point charge and of two point charges.

Unit 7: Physical Science: Energy

Summary

In this unit, students will study energy and its applications. This unit covers the different types of energy, everyday examples of different forms of energy, energy transfer, the law of conservation of energy, and related examples and scenarios. Students will also understand the difference between thermal energy, heat, and temperature. This unit explores the examples of electric charges, forces, and fields, conductors and insulators, static and current electricity, and the characteristics of electric currents. Unit 7 also includes lessons that cover magnetic poles, forces, and fields, electromagnets, superconductors, and electric motors based on examples of each. This unit concludes with students exploring examples of transverse and longitudinal waves and wave components.

Unit 8: Physical Science: Waves and Their Applications

Summary

This unit provides an understanding of what a wave is and explores mechanical and electromagnetic waves and transverse and longitudinal mechanical waves. Students will explore reflection and interference of both sound and light waves and the refraction and diffraction of light waves. This unit also covers sound waves in terms of their production and transmission and the detection of sound. Towards the end of the unit, students study the electromagnetic spectrum.