

## High School Science

### Acid and Base Concentrations (pH and pOH)

**Lesson Objective:** The student will determine acid and base concentrations.

**Subobjective 1:** The student will use the pH scale to characterize acid base solutions and calculate pH from hydrogen-ion concentration.

**Subobjective 2:** The student will calculate pH, pOH, hydrogen ion concentration, and hydroxide ion concentration.

**Subobjective 3:** The student will identify how buffers stabilize pH in acid base reactions.

**Subobjective 4:** The student will identify the pH scale as a log-based scale and the relationship between changes in pH and hydrogen ion concentration.

**Subobjective 5:** The student will use titration to determine acid or base concentration.

### Atomic Structure

**Lesson Objective:** The student will identify the nucleus of an atom and its components.

**Subobjective 1:** The student will locate and describe the nucleus of the atom.

**Subobjective 2:** The student will locate and label the subatomic particles inside and around the nucleus.

**Subobjective 3:** The student will describe protons as positively charged subatomic particles found inside the nucleus.

**Subobjective 4:** The student will describe neutrons as neutral subatomic particles found inside the nucleus.

**Subobjective 5:** The student will describe electrons as negatively charged subatomic particles that are found in a cloud outside of the nucleus.

**Subobjective 6:** The student will determine the number of protons, neutrons and electrons in a given atom.

### Balancing Chemical Equations

**Lesson Objective:** The student will identify and write balanced chemical equations.

**Subobjective 1:** The student will explain the five types of chemical reactions and identify examples of each.

**Subobjective 2:** The student will list the steps to balancing a chemical equation.

**Subobjective 3:** The student will balance unbalanced equations.

## Cell Division and Reproduction

**Lesson Objective:** The student will describe eukaryotic cell division.

**Subobjective 1:** The student will describe the Cell Cycle.

**Subobjective 2:** The student will describe Mitosis.

**Subobjective 3:** The student will describe Meiosis.

## Cell Structure and Function

**Lesson Objective:** The student will identify the evolutionary significance of prokaryotic cells to eukaryotic cells.

**Subobjective 1:** The student will analyze the relationship of cell structure to function at a subcellular level.

**Subobjective 2:** The student will identify the functions of cell membranes.

## Co-evolution and Symbiotic Relationships

**Lesson Objective:** The student will demonstrate understanding of the concepts of co-evolution and symbiotic relationships.

**Subobjective 1:** The student will describe co-evolution.

**Subobjective 2:** The student will predict how co-evolution can affect interactions between species.

**Subobjective 3:** The student will identify the distinguishing features of symbiotic relationships.

## Consciousness

**Lesson Objective:** The student will explore the conscious mind.

**Subobjective 1:** The student will analyze the importance and stages of sleep.

**Subobjective 2:** The student will explore dreams and dream theories.

**Subobjective 3:** The student will discover the history and various uses of hypnosis.

## DNA and RNA

**Lesson Objective:** The student will compare and contrast the structure and function of DNA and RNA.

**Subobjective 1:** The student will describe the Watson-Crick double helix model of DNA.

**Subobjective 2:** The student will model the components of a DNA nucleotide and an RNA nucleotide.

## Ecosystem Relationships

**Lesson Objective:** The student will explore relationships among populations within an ecosystem.

**Subobjective 1:** The student will investigate the order of populations within an ecosystem.

**Subobjective 2:** The student will identify the components of an energy pyramid.

**Subobjective 3:** The student will create food webs for various habitats.

## Electrons and their Configurations

**Lesson Objective:** The student will demonstrate knowledge of electron placement and energy levels for the first twenty elements of the Periodic Table.

**Subobjective 1:** The student will locate important characteristics of an element in the Periodic Table.

**Subobjective 2:** The student will demonstrate knowledge of new vocabulary terms for electron placement of an atom.

**Subobjective 3:** The student will identify the electron layers and number of electrons in the first twenty elements of the Periodic Table.

## Empirical and Molecular Formulas

**Lesson Objective:** The student will explain how empirical and molecular formulas differ and are related.

**Subobjective 1:** The student will solve for an empirical and molecular formula given percentages or masses of elements in an unknown compound.

**Subobjective 2:** The student will solve for empirical and molecular formulas from combustion of a hydrocarbon to produce given amounts of carbon dioxide and water.

## Homeostasis

**Lesson Objective:** The student will understand the process of feedback and why homeostasis is important to maintaining health.

**Subobjective 1:** The student will identify the difference between negative and positive feedback.

**Subobjective 2:** The student will describe how the internal control systems keep the body in balance.

## Loss of Biodiversity

**Lesson Objective:** The student will identify the causes and effects of the decreasing amount of biodiversity on Earth.

**Subobjective 1:** The student will describe the four main reasons for a loss of biodiversity.

**Subobjective 2:** The student will explain the effects of invasive species on different environments.

**Subobjective 3:** The student will list the steps they can take to help minimize biodiversity loss.

## Microscopes

**Lesson Objective:** The student will identify the different parts of a microscope.

**Subobjective 1:** The student will explore how to use a microscope properly.

**Subobjective 2:** The student will explore different ways and reasons why he/she would use a microscope.

## Natural Ecosystem Change

**Lesson Objective:** The student will examine natural climate change and its impacts.

**Subobjective 1:** The student will describe the effects of climate change on species movement.

**Subobjective 2:** The student will identify the steps of ecological succession.

## Orbital Motion

**Lesson Objective:** The student will describe the mechanics of circular orbits through equations and graphs.

**Subobjective 1:** The student will describe how the centripetal force needed for all orbital motion can be a result of gravity.

**Subobjective 2:** The student will derive Kepler's Third Law.

**Subobjective 3:** The student will derive expressions for the kinetic energy, potential energy, and total energy of an orbiting satellite.

**Subobjective 4:** The student will sketch graphs showing the variation with orbital radius of the kinetic energy, gravitational potential energy, and total energy of a satellite.

## Periodic Table

**Lesson Objective:** The student will examine the basic concepts of chemistry including the Periodic Table, atoms, molar mass and valence electrons.

**Subobjective 1:** The student will analyze the organization of the Periodic Table.

**Subobjective 2:** The student will distinguish between atoms, ions, and isotopes.

**Subobjective 3:** The student will calculate the molar mass of compounds based on the average atomic mass.

**Subobjective 4:** The student will model valence electrons using electron dot structures and explain the role of valence electrons in chemical bonding.

## Photosynthesis and Respiration

**Lesson Objective:** The student will identify the processes a plant goes through in photosynthesis and cellular respiration and their importance.

**Subobjective 1:** The student will identify the elements that plants absorb and the products of photosynthesis.

**Subobjective 2:** The student will identify the basic parts of a plant cell.

**Subobjective 3:** The student will explain the basic process of photosynthesis.

**Subobjective 4:** The student will explain the basic process of cellular respiration.

## Photosynthetic Conversion of Light

**Lesson Objective:** The student will describe the process of photosynthesis.

**Subobjective 1:** The student will describe light-independent reactions.

## Plant Kingdom

**Lesson Objective:** The student will investigate the Plant Kingdom.

**Subobjective 1:** The student will describe the Plant Kingdom and characteristics of plants.

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**Subobjective 2:** The student will distinguish between flowering and non-flowering plants.

**Subobjective 3:** The student will describe the parts and reproduction of flowering plants.

## Precipitation Reactions

**Lesson Objective:** The student will identify solubility rules and write the balanced net ionic equation for a precipitation reaction.

**Subobjective 1:** The student will identify solubility rules and know how to predict if a precipitate will form from mixing aqueous solutions.

**Subobjective 2:** The student will write the balanced molecular equation, complete ionic equation, and net ionic equation for a precipitation reaction.

## Prokaryotic and Eukaryotic Cells

**Lesson Objective:** The student will differentiate between prokaryotic and eukaryotic cells.

**Subobjective 1:** The student will identify prokaryotic cells and their characteristics.

**Subobjective 2:** The student will identify eukaryotic cells and their characteristics.

**Subobjective 3:** The student will compare and contrast prokaryotic and eukaryotic cells.

## Science, Technology, and Real World Applications

**Lesson Objective:** The student will evaluate and research aspects of real world applications for science, ethics, and technology.

**Subobjective 1:** The student will make connections between pure science and science applied to the real world.

**Subobjective 2:** The student will compare and contrast biological concepts in pure science and applied science.

**Subobjective 3:** The student will discuss why scientists should work within ethical parameters.

**Subobjective 4:** The student will evaluate long-range plans concerning resource use and by-product disposal for environmental, economic, and political impact.

**Subobjective 5:** The student will explain how the cyclical relationships between science and technology result in reciprocal advancements in the two fields.

**Subobjective 6:** The student will research and evaluate science careers.

## SI Units and System

**Lesson Objective:** The student will describe the International System of Units.

**Subobjective 1:** The student will state values in scientific notation and use correct prefixes from the order of magnitude.

**Subobjective 2:** The student will distinguish between fundamental and derived units in the SI system.

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**Subobjective 3:** The student will identify other units of measurement compatible with the SI system and state the units in the accepted SI format.

**Subobjective 4:** The student will convert between different units of quantities.

## Solid Waste

**Lesson Objective:** The student will explain the disposal and reduction methods of solid waste.

**Subobjective 1:** The student will compare and contrast municipal and total solid waste.

**Subobjective 2:** The student will explain the three main methods of solid waste disposal.

**Subobjective 3:** The student will list techniques for reducing solid waste.

## Speed, Velocity, and Motion

**Lesson Objective:** The student will describe the various measurements of motion and how they are calculated and represented.

**Subobjective 1:** The student will describe motion relative to a reference point.

**Subobjective 2:** The student will compare and contrast speed and velocity.

**Subobjective 3:** The student will define, calculate, and graph speed, velocity, and acceleration.

## The Atmosphere

**Lesson Objective:** The student will analyze the different layers of the atmosphere and the different factors that affect the atmosphere.

**Subobjective 1:** The student will describe the differences between climate and weather.

**Subobjective 2:** The student will define atmospheric circulation, Coriolis Effect, atmospheric-ocean interactions and ENSO.

## Viewing Cells

**Lesson Objective:** The student will apply early research to analyze the components of the Cell Theory.

**Subobjective 1:** The student will identify scientists crucial in the formation of the Cell Theory.

**Subobjective 2:** The student will examine early and modern microscopes.

**Subobjective 3:** The student will identify the components of the Cell Theory.

## Water Pollution

**Lesson Objective:** The student will identify the types, sources, and causes and effects of water pollution.

**Subobjective 1:** The student will identify cultural eutrophication and pollution.

**Subobjective 3:** The student will determine how to maintain water quality and purification practices.

**Subobjective 5:** The student will identify sewage treatment/septic systems.

**Subobjective 6:** The student will explain the Clean Water Act and other relevant laws.

## **Weathering and Erosion**

**Lesson Objective:** The student will describe the processes of degradation by weathering and erosion.

**Subobjective 1:** The student will explain the difference between chemical and mechanical weathering.

**Subobjective 2:** The student will describe the processes and agents involved in erosion.