

# SCIENCE STANDARDS

6. Understand coupled reaction processes and describe the role of ATP in energy coupling and transfer.

## C. Evolution and populations

1. Know multiple categories of evidence for evolutionary change and how this evidence is used to infer evolutionary relationships among organisms.
2. Recognize variations in population sizes, including extinction, and describe mechanisms and conditions that produce these variations.

## D. Molecular genetics and heredity

1. Understand Mendel's laws of inheritance.
2. Know modifications to Mendel's laws.
3. Understand the molecular structures and functions of nucleic acids.
4. Understand simple principles of population genetics and describe characteristics of a Hardy-Weinberg population.
5. Describe the major features of meiosis and relate this process to Mendel's laws of inheritance.

## E. Classification and taxonomy

1. Know ways in which living things can be classified based on each organism's internal and external structure, development, and relatedness of DNA sequences.

## F. Systems and homeostasis

1. Know that organisms possess various structures and processes (feedback loops) that maintain steady internal conditions.
2. Describe, compare, and contrast structures and processes that allow gas exchange, nutrient uptake and processing, waste excretion, nervous and hormonal regulation, and reproduction in plants, animals, and fungi; give examples of each.

## G. Ecology

1. Identify Earth's major biomes, giving their locations, typical climate conditions, and characteristic organisms.
2. Know patterns of energy flow and material cycling in Earth's ecosystems.

3. Understand typical forms of organismal behavior.
4. Know the process of succession.

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## VII. Chemistry

### A. Matter and its properties

1. Know that physical and chemical properties can be used to describe and classify matter.
2. Recognize and classify pure substances (elements, compounds) and mixtures.

### B. Atomic structure

1. Summarize the development of atomic theory. Understand that models of the atom are used to help understand the properties of elements and compounds.

### C. Periodic table

1. Know the organization of the periodic table.
2. Recognize the trends in physical and chemical properties as one moves across a period or vertically through a group.

### D. Chemical bonding

1. Characterize ionic bonds, metallic bonds, and covalent bonds. Describe the properties of metals and ionic and covalent compounds.

### E. Chemical reactions

1. Classify chemical reactions by type. Describe the evidence that a chemical reaction has occurred.
2. Describe the properties of acids and bases, and identify the products of a neutralization reaction.
3. Understand oxidation-reduction reactions.
4. Understand chemical equilibrium.
5. Understand energy changes in chemical reactions.
6. Understand chemical kinetics.

### F. Chemical nomenclature

1. Know formulas for ionic compounds.
2. Know formulas for molecular compounds.

**G. The mole and stoichiometry**

1. Understand the mole concept.
2. Understand molar relationships in reactions, stoichiometric calculations, and percent yield.

**H. Thermochemistry**

1. Understand the Law of Conservation of Energy and processes of heat transfer.
2. Understand energy changes and chemical reactions.

**I. Properties and behavior of gases, liquids, and solids**

1. Understand the behavior of matter in its various states: solid, liquid, and gas.
2. Understand properties of solutions.
3. Understand principles of ideal gas behavior and kinetic molecular theory.
4. Apply the concept of partial pressures in a mixture of gases.
5. Know properties of liquids and solids.
6. Understand the effect of vapor pressure on changes in state; explain heating curves and phase diagrams.
7. Describe intermolecular forces.

**J. Basic structure and function of biological molecules: proteins, carbohydrates, lipids, and nucleic acids**

1. Understand the major categories of biological molecules: proteins, carbohydrates, lipids, and nucleic acids.

**K. Nuclear chemistry**

1. Understand radioactive decay.

4. Understand the concept of density.

5. Understand the concepts of gravitational force and weight.

**B. Vectors**

1. Understand how vectors are used to represent physical quantities.
2. Demonstrate knowledge of vector mathematics using a graphical representation.
3. Demonstrate knowledge of vector mathematics using a numerical representation.

**C. Forces and motion**

1. Understand the fundamental concepts of kinematics.
2. Understand forces and Newton's Laws.
3. Understand the concept of momentum.

**D. Mechanical energy**

1. Understand potential and kinetic energy.
2. Understand conservation of energy.
3. Understand the relationship of work and mechanical energy.

**E. Rotating systems**

1. Understand rotational kinematics.
2. Understand the concept of torque.
3. Apply the concept of static equilibrium.
4. Understand angular momentum.

**F. Fluids**

1. Understand pressure in a fluid and its applications.
2. Understand Pascal's Principle.
3. Understand buoyancy.
4. Understand Bernoulli's principle.

**G. Oscillations and waves**

1. Understand basic oscillatory motion and simple harmonic motion.
2. Understand the difference between transverse and longitudinal waves.
3. Understand wave terminology: wavelength, period, frequency, and amplitude.

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**VIII. Physics****A. Matter**

1. Demonstrate familiarity with length scales from sub-atomic particles through macroscopic objects.
2. Understand states of matter and their characteristics.
3. Understand the concepts of mass and inertia.