

Unit	Lesson	Lesson Objectives
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Interpretation of Data (IOD): Part 1**Genetic Code**

- Describe the relationship between DNA, genes, and chromosomes.
- Describe the role of DNA replication in transmitting genetic information.
- Summarize the experiments that led to the discovery of the genetic code.
- Science Practice: Evaluate the impact of science and technology on society.

The Function of Organelles

- Describe the functions of each organelle.
- Identify the organelles of a cell.
- Science Practice: Construct charts, graphs, and tables to organize data.

Cell Homeostasis

- Describe the importance of homeostasis to living organisms.
- Differentiate between diffusion, osmosis, passive transport, and active transport.
- Explain how cells maintain homeostasis.
- Science Practice: Generate procedures to utilize charts, graphs, and tables to show data.

Protein Synthesis

- Explain the relationship between transcription and gene expression.
- Explain the relationship between translation and gene expression.
- Science Practice: Give examples of how hypotheses lead to new experimental methods.

Photosynthesis and Cellular Respiration

- Compare and contrast the processes of photosynthesis and cellular respiration.
- Illustrate and describe the energy conversions that occur during photosynthesis and respiration.
- Science Practice: Evaluate data to formulate a conclusion.

Mitosis

- Describe the steps of mitosis.
- Explain the importance of mitosis to living organisms.
- Science Practice: Analyze how new technologies and experiments affect previous scientific explanations.

Asexual and Sexual Reproduction

- Compare and contrast sexual and asexual reproduction.
- Differentiate between mitosis and meiosis.
- Relate the processes of mitosis and meiosis to reproduction.
- Science Practice: Outline how to formulate scientific questions using reproduction as a model.

Body Organization

- Analyze how organ systems function together to maintain homeostasis.
- Identify the levels of organization in the body.

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		Methods of Classification <ul style="list-style-type: none">Describe how organisms are classified.Explain reasons why systems of classification may change.Explain the purpose of biological taxonomy.Science Practice: Organize data using specific grouping methods.
		Organizational Hierarchy <ul style="list-style-type: none">Describe how organisms, populations, communities, ecosystems, and biomes are related.Describe the hierarchy of organisms, populations, communities, ecosystems, and biomes.Science Practice: Examine the economic, societal, and environmental impacts of a real-world example.
		The Cycles of Matter <ul style="list-style-type: none">Demonstrate the importance of water, carbon, nitrogen, and phosphorus in ecosystems.Describe how water, carbon, nitrogen, and phosphorus are cycled through ecosystems.Science Practice: Compare the economic, human, and environmental losses to the benefits of a specific scientific example.
		The Importance of Water <ul style="list-style-type: none">Describe the steps of the water cycle.Identify the unique chemical and physical properties of water.Interpret the importance of water to living organisms.Science Practice: Predict trends and outcomes based on a given set of data.
		Populations and the Environment <ul style="list-style-type: none">Compare and contrast positive and negative interactions between organisms and their environment.Demonstrate how an organism's habitat determines its niche.Determine biotic and abiotic factors within an ecosystem.Science Practice: Distinguish between and give examples of observation and inference.
		Social Behavior <ul style="list-style-type: none">Describe examples of social behavior.Examine social behavior and its benefits.
		Relationships Among Organisms <ul style="list-style-type: none">Describe the five major types of interactions between organisms.Examine how symbiotic relationships can create dependency among species.Explain how invasive species affect the environment they occupy.Science Practice: Describe various ways evidence can be interpreted or explained.
		Energy Flow in Ecosystems <ul style="list-style-type: none">Distinguish between producers, consumers, and decomposers.Explain the energy flow in a food web.Illustrate the flow of energy through an ecosystem.Science Practice: Locate data on a table and relate that data to a corresponding graph.

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Interpretation of Data (IOD): Part 2**The Structure of the Atom**

Describe the structure of atoms, and discriminate between the relative sizes and electrical charges of protons, neutrons, and electrons.

Explain that protons and neutrons have substructures and consist of particles called quarks.

Explain the relationship between the number of neutrons in an atom of an element, its mass number, and its isotopes.

Identify an element based on the number of protons in an atom.

Science Practice: Use math to calculate the average atomic mass of an element from its isotopic composition.

States of Matter

Describe the arrangement and motion of atoms in the different states of matter.

Discriminate the characteristics of solids, liquids, and gases.

Elements, Compounds, and Mixtures

Describe compounds as pure substances.

Describe elements as pure substances.

Describe mixtures.

Science Practice: Classify matter as pure substances or mixtures by studying their properties.

Nomenclature of Ionic Compounds

Name ionic compounds using the International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules.

Predict formulas of stable ionic compounds by balancing charges.

Write chemical formulas of ionic compounds and common polyatomic ions.

Science Practice: Develop vocabulary by using IUPAC rules for naming ionic compounds.

Nomenclature of Covalent Compounds

Use the International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules to write the names of covalent compounds.

Use IUPAC nomenclature rules to name and write the chemical formulas of acids and bases.

Write formulas for covalent compounds and interpret those formulas in terms of composition and structure.

Science Practice: Develop vocabulary by using IUPAC rules for naming covalent compounds.

Introduction to Motion

Describe the position of an object.

Distinguish between distance and displacement.

Explain how an object's motion is relative to a reference point or frame.

Speed and Velocity

Differentiate between speed and velocity.

Interpret graphs of distance versus time.

Solve problems involving distance, time, speed, and/or velocity.

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		Acceleration <ul style="list-style-type: none">Describe the concept of acceleration.Interpret graphs of velocity versus time.Solve problems involving velocity, time, and acceleration.
		Momentum <ul style="list-style-type: none">Apply Newton's third law of motion to understand what happens to momentum when two objects collide.Define and calculate momentum.Explain how momentum is conserved.Use mathematical representations to show that the total momentum of a system of objects is conserved when there is no net force on the system.
		Work and Power <ul style="list-style-type: none">Calculate power.Calculate the work done on an object.Explain how force, work, and power are related.Identify when work is done.
		Magnets and Magnetism <ul style="list-style-type: none">Describe Earth's magnetic field.Describe the properties of magnets.Determine how magnetic poles interact with each other.Illustrate the magnetic field around a magnet.
		Electric Circuits <ul style="list-style-type: none">Interpret the electric symbols for the parts of a circuit.Contrast series and parallel circuits.Explain how a circuit functions.Identify open and closed circuits.
		Rocks and the Rock Cycle <ul style="list-style-type: none">Describe the properties used to identify rocks.Identify the three main groups of rocks.Identify the ways in which rocks change as they move through the rock cycle.
		Minerals <ul style="list-style-type: none">Describe the properties used to identify minerals.Explain how minerals are formed.Identify uses of minerals.

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		Earthquakes <ul style="list-style-type: none">Describe methods used to measure earthquakes.Describe the causes of an earthquake.Explain how geologists locate the epicenter of an earthquake.Explain how the energy of an earthquake travels.
		Groundwater <ul style="list-style-type: none">Differentiate major groundwater zones, including the saturated and unsaturated zones and the water table.Explain how groundwater is obtained.Explain how water moves underground.
		Water and Wind Erosion <ul style="list-style-type: none">Describe the effects of wind erosion and deposition.Explain how glaciers and waves cause erosion and deposition.Identify causes of groundwater erosion.Identify features that are formed by water erosion and deposition.
		Structure and Composition of the Atmosphere <ul style="list-style-type: none">Describe the composition of Earth's atmosphere.Describe the importance of the atmosphere to living things.Distinguish the four main layers of the atmosphere.Explain how altitude affects air pressure and density.Identify properties of air, including pressure and density.
		Atmospheric Moisture and Precipitation <ul style="list-style-type: none">Describe humidity and how it is measured.Distinguish the three main types of clouds.Explain how clouds form.Identify common types of precipitation.
		Stars <ul style="list-style-type: none">Explain how a star forms.Explain how stars are classified.Explain what happens as a star runs out of fuel.Identify the physical properties of stars.

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Scientific Investigation (SIN)**Scientific Methods**

Describe how scientists perform experiments and gather data.

Describe the function of models in science, and recognize the usefulness and limitations of models as representations.

Explain the importance of controlled tests in scientific investigations.

Show how scientists communicate, share information, and support the importance of peer review.

Science Practice: Write a procedure for a controlled investigation to answer a question.

Hypotheses, Laws, and Theories

Differentiate scientific hypotheses, theories, and laws.

Give examples of how hypotheses lead to new experimentation.

Identify the role of consensus and retesting in the development of theories.

Science Practice: Create a chart comparing hypotheses, theories, and laws.

Tools, Technology, and Measurement

Select and use appropriate technology such as computers and graphing calculators to gather, analyze, interpret, and display data.

Select and use appropriate tools to perform tests and collect data.

Use the SI system of measurement to convert between standard and metric, and metric and metric, and to recognize approximate representations of measurement.

Science Practice: Use technology to display data in tables and graphs, and use the graphical representations to interpret the data.

Using Math to Analyze Data

Create graphs and compare data points graphically.

Explain the difference and relationship between accuracy and precision.

Use mathematical error analysis to analyze data points.

Science Practice: Make measurements with accuracy and precision.

Introduction to Genetics

Describe the role of nucleic acids in transmitting genetic information.

Explain the importance of Gregor Mendel to the field of genetics.

Science Practice: Give examples of how hypotheses lead to new experimental methods.

Probability of Inheritance

Determine genotype and phenotype probabilities from Punnett squares.

Predict possible allele combinations of offspring based on the genetics of the parent.

Use Punnett squares to create monohybrid and dihybrid crosses.

Science Practice: Explain how changing the variables, methods, and timing impacts scientific investigation.

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The Modern Atomic Theory

Describe the experimental basis for Einstein's explanation of the photoelectric effect.

Describe the modern (electron cloud) model of the atom.

Explain Bohr's model of the atom and how it accounts for the existence of spectral lines.

Science Practice: Compare Dalton's atomic model with the current quantum model of the atom.

Changes in Matter

Differentiate between extensive and intensive properties of matter, and give examples of each.

Differentiate between physical changes and chemical changes of matter.

Differentiate between physical properties and chemical properties of matter.

Science Practice: Identify substances based on their chemical and physical properties.

Lab: Ionic and Covalent Bonds

Design and conduct an experiment to test the properties of substances.

Draw conclusions about the type of bond in a substance based on the tested properties of that substance.

Science Practice: Compare your conclusions about the identity of the bonds in substances to published information about those substances.

Solutions and Solubility

Define solubility and differentiate between saturated, supersaturated, and unsaturated solutions.

Describe the dissolving process on the molecular level.

Identify factors affecting the rate at which a substance dissolves.

Investigate factors that influence solubility.

Science Practice: Interpret, analyze, and make inferences from solubility graphs.

Heat

Distinguish between heat and thermal energy.

Explain why some substances change temperature more easily than others.

Predict how thermal energy flows between objects at different temperatures.

Introduction to Waves

Compare and contrast transverse waves and longitudinal waves.

Define waves and explain how they carry energy.

Distinguish between mechanical waves and electromagnetic waves.

Properties of Waves

Calculate the speed of a transverse wave.

Describe how a wave's amplitude is related to the energy the wave carries.

Describe the relationship between the frequency and wavelength of a wave.

Explain why waves travel at different speeds.

Use mathematical representations to show relationships among the frequency, wavelength, and speed of waves traveling in various media.

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Lab: Plate Boundaries and Movement

- Compare and contrast the plate movements that cause earthquakes and volcanic eruptions.
- Describe the role of mantle convection in plate movement.
- Differentiate between the major types of plate boundaries.
- Examine how plate movements cause changes in Earth's surface.

Evaluation of Models, Inferences, and Experimental Results (EMI): Part 1

Meiosis

- Describe the roles of crossing over and independent assortment in meiosis.
- Explain the importance of meiosis to living organisms.
- Illustrate the steps of meiosis.
- Science Practice: Examine how a scientist's creativity can lead to scientific discovery.

Laws of Inheritance

- Apply the law of independent assortment.
- Describe how the principle of dominance applies to genes.
- Summarize the law of segregation.
- Science Practice: Differentiate scientific hypotheses, theories, and laws.

Darwin's Theory

- Explain how natural selection acts as a mechanism of evolution.
- Summarize the main points of Darwin's theory.
- Summarize the major concepts of natural selection.
- Science Practice: Describe how scientific investigations lead to new scientific questions.

Lab: Natural Selection

- Identify natural selection as a mechanism for the evolution of a population.
- Science Practice: Decide whether specific questions can be answered using scientific investigation.

Biological Evidence and the Fossil Record

- Assess the comparative anatomies among organisms.
- Describe how the fossil record shows common ancestry between organisms.
- Distinguish scientific evidence that supports the theory of evolution.
- Science Practice: Explain the role of scientific argumentation in evaluating the validity of data, claims, hypotheses, and observations.

Diversity of Life

- Compare and contrast the physical characteristics of different animals.
- Compare and contrast the physical characteristics of different plants.
- Identify why the life cycles of different organisms vary.

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		Plant Structures <ul style="list-style-type: none">Describe the interactions among plant systems that allow transport, reproduction, and response.Identify the three types of plant tissue.Relate the structures of major plant organs and tissues to their functions.Science Practice: Give examples of how research affects science, society, and the environment.
		The History and Arrangement of the Periodic Table <ul style="list-style-type: none">Describe the arrangement of the periodic table and relate the properties of atoms to their position in the periodic table.Outline the historical development of the periodic table.Use the periodic table to classify elements.Science Practice: Predict the properties of elements based on their position on the periodic table.
		Types of Chemical Bonds <ul style="list-style-type: none">Compare and contrast ionic, metallic, and covalent bonds.Relate electronegativity and ionization energy to bond formation.Science Practice: Create a chart to compare and contrast ionic, metallic, and covalent bonds.
		Types of Reactions <ul style="list-style-type: none">Classify a reaction as synthesis, decomposition, single replacement, double replacement, or combustion.Identify and characterize the types of reactions, including synthesis, decomposition, combustion, single replacement, and double replacement.Use the activity series to determine whether a single replacement reaction will occur.Science Practice: Predict the products of a reaction using the activity series.
		Writing and Balancing Chemical Equations <ul style="list-style-type: none">Describe chemical reactions by writing word equations and formula equations.Use the law of conservation of mass to balance chemical equations.Science Practice: Identify and use special symbols properly in chemical equations.
		Introduction to Forces <ul style="list-style-type: none">Describe the concept of force.Distinguish between balanced and unbalanced forces and their effect on motion.Explain how to determine the net force on an object.
		Gravity <ul style="list-style-type: none">Describe how gravity affects projectile motion.Describe Newton's law of universal gravitation.Explain the concept of free fall.Identify and describe the factors that affect the gravitational force between two objects.

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Newton's Laws of Motion

- Describe Newton's first law of motion and how it relates to inertia.
- Explain Newton's third law of motion and how it relates to action and reaction forces.
- Identify applications of Newton's three laws of motion.
- Use Newton's second law of motion to calculate force, mass, and acceleration.

Potential and Kinetic Energy

- Calculate the kinetic energy in a system.
- Calculate the potential energy in a system.
- Distinguish between potential and kinetic energy.
- Explain how energy is transferred in a moving system.

Sound Waves

- Describe how sound waves are produced and how they travel.
- Explain how different materials and different temperatures affect the speed of sound waves.
- Identify the features of a sound wave.

Properties of Light

- Describe the wave and particle models of light.
- Explain what happens when light interacts with objects.
- Recognize what determines the color of an object.

Evaluation of Models, Inferences, and Experimental Results (EMI): Part 2

Weathering and Soil

- Classify different types of soil.
- Describe the characteristics of soil.
- Distinguish between mechanical and chemical weathering.
- Explain how soil is formed.
- Identify factors that affect the rate of weathering.

Plate Tectonics

- Distinguish the three types of plate boundaries.
- Explain the theory of plate tectonics.
- Identify the major tectonic plates.
- Relate plate tectonics to the formation of landforms.

Volcanoes

- Describe the three stages of volcanic activity.
- Distinguish the two types of volcanic eruption.
- Explain how volcanoes create various landforms.
- Explain what happens when a volcano erupts.
- Identify the reasons why Earth's volcanic regions are located in certain areas.

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		<p>Erosion and Deposition</p> <ul style="list-style-type: none"> Describe erosion and deposition. Differentiate types of mass movement. <p>Surface Water</p> <ul style="list-style-type: none"> Distinguish the three types of wetlands. Identify sources of fresh water. Identify the characteristics of ponds and lakes. Identify the components of a river system. <p>Ocean Water</p> <ul style="list-style-type: none"> Describe the composition of ocean water. Distinguish the three main sections of the ocean's floor. Distinguish the three ocean zones. Locate Earth's five oceans. <p>Winds</p> <ul style="list-style-type: none"> Differentiate between local and global winds. Examine the processes that cause wind. Locate the major global wind belts. <p>Air Masses and Fronts</p> <ul style="list-style-type: none"> Differentiate the four main types of fronts. Explain how air masses move. Identify the major types of air masses. <p>Energy on Earth</p> <ul style="list-style-type: none"> Distinguish between renewable and nonrenewable resources. Identify advantages and disadvantages of various energy sources. Identify renewable and nonrenewable resources. <p>Star Systems and Galaxies</p> <ul style="list-style-type: none"> Describe star systems. Distinguish the major types of galaxies. <p>The Solar System</p> <ul style="list-style-type: none"> Compare the geocentric and heliocentric models of the solar system. Explain how Copernicus, Galileo, and Kepler contributed to the acceptance of the heliocentric model. Identify objects that make up the solar system. <p>The Expanding Universe</p> <ul style="list-style-type: none"> Describe the big bang theory. Describe what astronomers predict about the future of the universe. Explain how the solar system formed.