

Unit	Lesson	Lesson Objectives
Human Body and Health		
Macromolecules		
Compare the structures and functions of carbohydrates, lipids, proteins, and nucleic acids.		
Identify the structures of the four macromolecules found in living organisms.		
Science Practice: Examine careers in science fields.		
Lab: Identifying Nutrients		
Describe nutrients found in common foods such as bread, meat, juice, oil, and milk.		
Identify carbohydrates, lipids, and proteins found in food samples by conducting chemical tests.		
Science Practice: Discuss how to apply safe practices during a lab and/or field investigation.		
Body Organization		
Analyze how organ systems function together to maintain homeostasis.		
Identify the levels of organization in the body.		
The Endocrine and Exocrine Systems		
Describe the role of hormones in maintaining homeostasis.		
Explain the functions of the endocrine and exocrine systems.		
Illustrate the different structures of the endocrine and exocrine systems.		
Science Practice: Conduct research using a variety of sources.		
Human Health		
Describe the germ theory of disease.		
Examine how people's genetic makeup or environmental conditions can contribute to their susceptibility to diseases.		
Explain how diseases are spread.		
Science Practice: Evaluate the impact of science and technology on society.		
Lab: Disease Spread		
Demonstrate how diseases are spread by human contact.		
Science Practice: Use a model to simulate a real-world situation.		
Medicine and the Immune System		
Analyze the body's response to vaccinations.		
Discuss the body's response to transplants.		
Explain how the body reacts to medicine.		
Science Practice: Use scientific evidence to support an argument.		
Relationship Between Life Functions and Energy Intake		
The Process of Photosynthesis		
Explain the importance of photosynthesis to living organisms.		
Summarize the process of photosynthesis.		
Write the chemical equation for photosynthesis.		
Science Practice: Give examples of how hypotheses lead to new experimental methods.		

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		Cellular Respiration <ul style="list-style-type: none">Compare and contrast aerobic and anaerobic cellular respiration.Describe how cellular respiration converts glucose to energy in the form of ATP.Explain the importance of cellular respiration to living organisms.Science Practice: Organize data using specific grouping methods.
		Energy Flows in Ecologic Networks (Ecosystems)
		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.
		Lab: Interdependence of Organisms <ul style="list-style-type: none">Describe the interdependent relationship between two organisms.Science Practice: Formulate explanations by using logic and evidence.
		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.
		Population Size and Structure <ul style="list-style-type: none">Describe the limiting factors that affect a population in a given environment.Differentiate between density-dependent and density-independent factors.Explain how birth rate, death rate, immigration, and emigration affect population size.Science Practice: Evaluate the impact of science and technology on society.
		Population Growth <ul style="list-style-type: none">Compare and contrast exponential and logistic growth models.Determine factors that influence a species' carrying capacity.Identify factors that affect population growth.Science Practice: Predict trends and outcomes based on a given set of data.
		Succession and Extinction <ul style="list-style-type: none">Assess the importance of biodiversity in an ecosystem.Identify and explain the stages of succession in an ecosystem.Identify factors that may disturb ecosystem stability.Science Practice: Locate data on a table and relate that data to a corresponding graph.

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		Human Impact on the Environment <ul style="list-style-type: none">Assess the impact of human-induced environmental changes on organisms, populations, and species.Identify examples of long-term human-induced environmental changes.Identify examples of short-term human-induced environmental changes.
		Organization of Life (Structure and Function of Life)
		Catalysts <ul style="list-style-type: none">Describe the “lock and key” mechanism of enzymes in chemical reactions.Explain how catalysts affect the energy of a chemical reaction.Relate changes in energy to the rate of a chemical reaction.Science Practice: Create a laboratory experiment to answer a specific question.
		Characteristics of Life <ul style="list-style-type: none">Compare and contrast living and nonliving objects.Describe the characteristics of living organisms.List the levels of organization within a living organism in hierarchical order.Science Practice: Examine how two different scientists could use different experimental designs and have the same outcome.
		Cell Theory <ul style="list-style-type: none">Compare and contrast the functions of different types of microscopes.Describe the components of cell theory.Examine the role of microscopes in discovering cells.Science Practice: Analyze how new technologies and experiments affect previous scientific explanations.
		The Function of Organelles <ul style="list-style-type: none">Describe the functions of each organelle.Identify the organelles of a cell.Science Practice: Construct charts, graphs, and tables to organize data.
		Photosynthesis and Cellular Respiration <ul style="list-style-type: none">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 <ul style="list-style-type: none">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.

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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.

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.

Cell Differentiation and Specialization

- Analyze the effect of changing external conditions on specialized cells.
- Describe specialized cells found within living organisms.
- Explain the role of differentiation in the creation of specialized cells.
- Science Practice: Examine how two different scientists could use different experimental designs and have the same outcome.

Molecular Basis for Heredity**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.

Chromosomes

- Create and label a diagram of homologous chromosome pairs with heterozygous alleles.
- Explain how a karyotype can be used to identify genetic defects.
- Illustrate the structure of a chromosome and its relationship to DNA.
- Science Practice: Apply the components of a scientific report.

DNA Mutations

- Analyze the effect of harmful environmental factors on DNA.
- Describe common types of DNA mutations.
- Explain the effects of DNA mutations on the characteristics of living organisms.
- Science Practice: Discriminate scientific claims that are socially accepted but not scientifically based.

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.

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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.

Non-Mendelian Inheritance

- Analyze examples of polygenic traits.
- Differentiate between incomplete dominance and codominance.
- Explain how blood type is determined.
- Science Practice: Assess how science and society impact each other.

Sex-linked Inheritance

- Analyze a pedigree to determine sex-linked traits.
- Summarize the process of sex-linked inheritance.
- Science Practice: Give examples of how research affects science, society, and the environment.

Acquired and Inherited Traits

- Discuss the influence of genetics and the environment on heredity.
- Distinguish between inherited and acquired traits.
- Science Practice: Assess how science and society impact each other.

Evolution

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.

Factors Affecting Genetic Variation

- Describe genetic drift and gene flow as mechanisms of evolution.
- Give examples of how environmental factors affect genetic variation and influence natural selection.
- Science Practice: Predict trends and outcomes based on a given set of data.

Factors Affecting Biological Diversity

- Examine how directional, disruptive, and stabilizing selection affect biological diversity.
- Explain how new or varied species originate via natural selection.
- Science Practice: Judge claims made by scientific explanations, data, or arguments.

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		Biological Evidence and the Fossil Record <ul style="list-style-type: none">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.
		Evolutionary Relationships <ul style="list-style-type: none">Analyze the relationships among organisms based on a variety of shared characteristics.Explain how understanding evolutionary history impacts classification of organisms.Interpret evolutionary relationships among organisms on a cladogram.Science Practice: Describe various ways evidence can be interpreted or explained.
		Conservation, Transformation, and Flow of Energy
		Introduction to Energy <ul style="list-style-type: none">Define energy.Explain how energy and work are related.Identify and describe the different forms of energy.
		Energy Transformations <ul style="list-style-type: none">Explain how energy changes form.Identify examples of energy transformations.Summarize the law of conservation of energy.
		Temperature and Thermal Energy <ul style="list-style-type: none">Describe how temperature is measured.Convert temperature readings between different temperature scales.Describe how thermal energy relates to temperature.Explain how temperature relates to kinetic energy.
		Heat <ul style="list-style-type: none">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.
		Conduction <ul style="list-style-type: none">Distinguish between insulators and conductors.Explain how molecular movement transfers thermal energy by conduction.Identify situations in which conduction occurs.
		Convection <ul style="list-style-type: none">Describe the motion of liquids and gases due to convection.Explain how fluid movement transfers thermal energy by convection.Identify situations in which convection occurs.

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		Radiation <ul style="list-style-type: none">Describe the role of color and texture in absorbers and reflectors.Explain how electromagnetic waves transfer energy by radiation.Identify situations in which radiation occurs.
		Introduction to Chemical Reactions <ul style="list-style-type: none">Describe the evidence that shows that a chemical reaction has occurred.Explain the difference between an endothermic and an exothermic reaction.Recognize that a chemical reaction is a chemical change.
		Earth's Energy Budget <ul style="list-style-type: none">Analyze and describe Earth's energy budget.Describe what happens to incoming solar radiation when it reaches Earth.Explain the greenhouse effect.Identify factors that affect the absorption and reflection of incoming solar radiation.
		Nuclear Energy <ul style="list-style-type: none">Describe nuclear energy.Identify the potential problems associated with using nuclear energy.Summarize the practical applications of nuclear energy.
		Introduction to Waves <ul style="list-style-type: none">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 <ul style="list-style-type: none">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.
		The Electromagnetic Spectrum <ul style="list-style-type: none">Describe the different parts of the electromagnetic spectrum.Distinguish how electromagnetic waves differ from one another.Identify how different types of electromagnetic waves are used.
		Special Applications of Nuclear and Wave Phenomena <ul style="list-style-type: none">Describe the role of wave characteristics and behaviors in medical and industrial applications.Identify examples of applications of atomic and nuclear phenomena such as radiation therapy and diagnostics.

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Work, Motion, and Forces		
Speed and Velocity		
Differentiate between speed and velocity.		
Interpret graphs of distance versus time.		
Solve problems involving distance, time, speed, and/or velocity.		
Acceleration		
Describe the concept of acceleration.		
Interpret graphs of velocity versus time.		
Solve problems involving velocity, time, and acceleration.		
Introduction to Forces		
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		
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.		
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.		
Momentum		
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.		
Work and Power		
Calculate power.		
Calculate the work done on an object.		
Explain how force, work, and power are related.		
Identify when work is done.		

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Simple Machines

- Calculate the mechanical advantage of each type of simple machine.
- Describe the six different types of simple machines.
- Distinguish compound machines from simple machines.
- Identify simple machines found in the human body.

Chemical Properties and Reactions Related to Living Systems**Introduction to Matter**

- Describe how to measure mass and volume.
- Differentiate between mass and weight.
- Explain what makes up matter.

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.

States of Matter

- Describe the arrangement and motion of atoms in the different states of matter.
- Discriminate the characteristics of solids, liquids, and gases.

Changes of State

- Describe what happens during the different changes of state.
- Explain how energy is related to changes of state.

Physical Properties

- Describe and give examples of physical properties of matter.
- Explain how and why matter is conserved during a physical change.
- Explain what happens during a physical change.
- Identify examples of physical changes.

Chemical Properties

- Describe and give examples of chemical properties of matter.
- Differentiate between physical and chemical changes.
- Explain what happens during a chemical change.
- Identify examples of chemical changes.

Balancing Chemical Equations

- Demonstrate how to balance a chemical equation.
- Explain what it means for a chemical equation to be balanced.
- Relate balanced chemical equations to the law of conservation of mass.

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Types of Chemical Reactions

- Distinguish among the types of chemical reactions.
- Predict the product of each type of chemical reaction.

Limiting Reactant and Percent Yield

- Calculate the percent yield of a reaction.
- Identify the limiting and excess reactants for a given reaction.
- Use the limiting reactant to predict the theoretical yield of a reaction.
- Science Practice: Use mathematical procedures, including dimensional analysis and significant figures, when solving limiting reactant and percent yield stoichiometry problems.

Mixtures and Solutions

- Describe heterogeneous mixtures, including suspensions and colloids.
- Describe homogeneous mixtures, such as solutions.
- Identify nonaqueous solutions.
- Identify the components of a solution.
- Science Practice: Build vocabulary by properly using the terms mixture, solution, solute, and solvent.

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.

Interactions Between Earth's Systems and Living Things**The Cycles of Matter**

- 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.

Environmental Changes

- Identify examples of short-term and long-term environmental changes.
- Identify the impacts of short-term and long-term environmental changes on organisms and ecosystems.
- Predict how environmental changes will affect organisms and ecosystems.

Energy on Earth

- Distinguish between renewable and nonrenewable resources.
- Identify advantages and disadvantages of various energy sources.
- Identify renewable and nonrenewable resources.

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Land Resources

- Describe land as a natural resource.
- Explain how land resources are managed.

Water Resources

- Describe the importance of water.
- Explain how Earth's water is distributed and used.
- Explain how water resources are managed.

Human Impact on Resources

- Compare the costs and benefits of conservation policies.
- Identify the negative impacts that human activity has had on Earth's resources.
- Identify the positive impacts that human activity has had on Earth's resources.

Earth and Its System Components and Interactions

Earth's Interior

- Compare and contrast the three main layers of Earth.
- Explain how geologists learn about Earth's interior.

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.

Forces in Earth's Crust

- Explain how stress in the crust affects Earth's surface.
- Explain why faults form in particular areas.
- Identify land features that result from plate movement.

Earthquakes

- 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.

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>Weathering and Soil</p> <ul style="list-style-type: none"> 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. <p>Erosion and Deposition</p> <ul style="list-style-type: none"> Describe erosion and deposition. Differentiate types of mass movement. <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>Ocean Circulation</p> <ul style="list-style-type: none"> Describe changes that affect ocean circulation. Describe tides as a source of energy. Identify causes of waves, currents, and tides. <p>Aquatic Ecosystems</p> <ul style="list-style-type: none"> Characterize Earth's major aquatic ecosystems. Identify adaptations that enable organisms to survive in aquatic ecosystems. <p>Structure and Composition of the Atmosphere</p> <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. <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>Atmospheric Moisture and Precipitation</p> <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.

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		<p>Storms</p> <ul style="list-style-type: none"> Describe the effects of various storms on humans and the environment. Explain how various storms form. Identify measures that can be taken to stay safe in a storm. <p>Factors That Affect Climate</p> <ul style="list-style-type: none"> Explain how various factors affect weather and climate. Explain what causes seasons. <p>Climate Change</p> <ul style="list-style-type: none"> Explain how human, biologic, and geologic activities can influence climate. Identify events that can cause short-term and global climate change.
		<p>Structures and Organization of the Cosmos</p> <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. <p>Star Systems and Galaxies</p> <ul style="list-style-type: none"> Describe star systems. Distinguish the major types of galaxies. <p>Stars</p> <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. <p>The Sun</p> <ul style="list-style-type: none"> Describe the structure, composition, and physical properties of the Sun. Discuss the different types of solar activity and explain how each activity affects Earth. Explain how the Sun generates energy. Science Practice: Describe units used by astronomers to measure the distance between the Sun and Earth. <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>Planets</p> <ul style="list-style-type: none"> Identify characteristics shared by the inner planets. Identify characteristics shared by the outer planets. Identify each planet in the solar system.

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		<p>The Earth-Sun-Moon System</p> <ul style="list-style-type: none">Describe solar and lunar eclipses.Explain how Earth moves in space.Explain what causes the phases of the moon.Explain what causes tides. <p>Other Objects in the Solar System</p> <ul style="list-style-type: none">Describe the characteristics of dwarf planets.Distinguish between comets, asteroids, and meteoroids.Explain the difference between meteoroids, meteors, and meteorites.Science Practice: Examine how life may be affected when cosmic objects impact Earth. <p>Fossils</p> <ul style="list-style-type: none">Differentiate types of fossils.Explain how fossils form.Explain how fossils show Earth's changes over time. <p>Relative Dating</p> <ul style="list-style-type: none">Describe the law of superposition.Explain how fossils are used to date rocks.Explain how geologists determine the relative age of rocks. <p>Absolute Dating</p> <ul style="list-style-type: none">Explain how geologists determine the absolute age of rocks.Explain what happens during radioactive decay.