

BIOLOGY

UNIT	STRAND/ CONCEPT	P.O.	RESOURCES	ACTIVITIES	MATERIALS/ SUPPLIES	LINKAGES
ALL	Strand 1: Inquiry Process Concept 1: Observations, Questions & Hypotheses	PO 1. Evaluate scientific information for relevance to a given problem. PO 2. Develop questions from observations that transition into testable hypotheses. PO 3. Formulate a testable hypothesis. PO 4. Predict the probable outcome of an investigation based on the hypothesis using statistical evidence, probability, and modeling (not guessing or inferring).				

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<p>ALL</p>	<p>Strand 1: Inquiry Process Concept 2: Scientific Testing (Investigating and Modeling)</p>	<p>PO 1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry.</p> <p>PO 2. Identify the resources needed to conduct an investigation.</p> <p>PO 3. Design an appropriate protocol (written plan of action) for testing a hypothesis.</p> <ul style="list-style-type: none"> • Identify dependent and independent variables in a controlled investigation. • Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes). • Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts, computers/ calculators). <p>PO 4. Conduct a scientific investigation that is based on a research design.</p> <p>PO 5. Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.</p>				

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ALL	Strand 1: Inquiry Process Concept 3: Analysis, Conclusions, and Refinement	<p>PO 1. Interpret data that show a variety of possible relationships between variables, including:</p> <ul style="list-style-type: none"> • positive relationship • negative relationship • no relationship <p>PO 2. Evaluate whether investigational data support or do not support the proposed hypothesis.</p> <p>PO 3. Critique reports of scientific studies (e.g. published papers, student reports).</p> <p>PO 4. Evaluate the design of an investigation to identify possible sources of procedural error, including:</p> <ul style="list-style-type: none"> • sample size • trials • controls • analyses <p>PO 5. Design models (conceptual or physical) of the following to represent "real world" scenarios:</p> <ul style="list-style-type: none"> • carbon cycle • water cycle • phase change • collisions <p>PO 7. Propose further investigations based on the findings of a conducted investigation.</p>				

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ALL	Strand 1: Inquiry Process Concept 4: Communication	PO 1. For a specific investigation, choose an appropriate method for communicating the results. PO 2. Produce graphs of data that communicate data. PO 3. Communicate results clearly and logically. PO 4. Support conclusions with logical scientific arguments.				
ALL	Strand 2: History and Nature of Science Concept 1: History of Science as a Human Endeavor	PO 1. Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide. PO 2. Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations. PO 3. Evaluate the contributions of early cultures to scientific knowledge and technological inventions. PO 4. Analyze how specific changes in science have affected society. PO 5. Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.				

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ALL	Strand 2: History and Nature of Science Concept 2: Nature of Scientific Knowledge	PO 1. Specify the requirements of a valid, scientific explanation (theory), including that it be: <ul style="list-style-type: none"> • logical • subject to peer review • public • respectful of rules of evidence PO 2. Explain the process by which accepted ideas are challenged or extended by scientific innovation. PO 3. Distinguish between pure and applied science. PO 4. Describe how scientists continue to investigate and critically analyze aspects of theories.				
ALL	Strand 3: Science in Personal and Social Perspectives Concept 2: Science and Technology in Society	PO 2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology. PO 3. Support a position on a science or technology issue.				

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CELL BIOLOGY	Strand 4: Life Science Concept 1: The Cell	PO 1. Describe the role of energy in cellular growth, development, and repair. PO 2. Compare the form and function of prokaryotic and eukaryotic cells and their cellular components. PO 3. Explain the importance of water to cells. PO 4. Analyze transport of materials (e.g., water, ions, macromolecules) into and out of cells: <ul style="list-style-type: none"> • passive transport • active transport PO 5. Describe the purpose and process of cellular reproduction.				
CELL BIOLOGY	Strand 4: Life Science Concept 5: Matter, Energy, and Organization in Living Systems (Including Human Systems)	PO 1. Compare the processes of photosynthesis and cellular respiration in terms of energy flow, reactants, and products. PO 2. Describe the role of organic and inorganic chemicals (e.g., carbohydrates, proteins, lipids, nucleic acids, water, ATP) important to living things.				

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CELL BIOLOGY	Strand 5: Physical Science Concept 4: Chemical Reactions	PO 11. Predict the effect of various factors (e.g., temperature, concentration, pressure, catalyst) on the equilibrium state and on the rates of chemical reaction.				
GENETICS	Strand 4: Life Science Concept 2: Molecular Basis of Heredity	<p>PO 1. Analyze the relationships among nucleic acids (DNA, RNA), genes, and chromosomes.</p> <p>PO 2. Describe the molecular basis of heredity, in viruses and living things, including DNA replication and protein synthesis.</p> <p>PO 3. Explain how genotypic variation occurs and results in phenotypic diversity.</p> <p>PO 4. Describe how meiosis and fertilization maintain genetic variation.</p>				

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EVOLUTION	Strand 4: Life Science Concept 4: Biological Evolution	<p>PO 1. Identify the following components of natural selection, which can lead to speciation:</p> <ul style="list-style-type: none"> • potential for a species to increase its numbers • genetic variability and inheritance of offspring due to mutation and recombination of genes • finite supply of resources required for life • selection by the environment of those offspring that are able to survive and produce offspring <p>PO 2. Explain how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment.</p> <p>PO 3. Describe how the continuing operation of natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species.</p> <p>PO 4. Predict how a change in an environmental factor (e.g., rainfall, habitat loss, non-native species) can affect the number and diversity of species in an ecosystem.</p> <p>PO 5. Analyze how patterns in the fossil record, nuclear chemistry, geology, molecular biology, and geographical</p>				

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ECOLOGY	Strand 4: Life Science Concept 5: Matter, Energy, and Organization in Living Systems (Including Human Systems)	PO 3. Diagram the following biogeochemical cycles in an ecosystem: <ul style="list-style-type: none"> • water • carbon • nitrogen PO 4. Diagram the energy flow in an ecosystem through a food chain. PO 5. Describe the levels of organization of living things from cells, through tissues, organs, organ systems, organisms, populations, and communities to ecosystems.				

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ECOLOGY	Strand 4: Life Science Concept 3: Interdependence of Organisms	PO 1. Identify the interrelationships among organisms within populations, communities, ecosystems, and biomes. PO 2. Describe how organisms are influenced by a particular combination of biotic (living) and abiotic (nonliving) factors in an environment. PO 3. Assess how the size and the rate of growth of a population are determined by birth rate, death rate, immigration, emigration, and carrying capacity of the environment.				
ECOLOGY	Strand 3: Science in Personal and Social Perspectives Concept 3: Human Population Characteristics	PO 1. Analyze social factors that limit the growth of a human population, including: <ul style="list-style-type: none"> • affluence • education • access to health care • cultural influences PO 2. Describe biotic (living) and abiotic (nonliving) factors that affect human populations. PO 3. Predict the effect of a change in a specific factor on a human population.				

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