

**Biology**  
Performance Level Descriptors

| Performance Level | Descriptors for Inquiry Content Strand<br><b>Strand 1: Inquiry</b>   |
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| Advanced          | <p>1c. Evaluate a question or hypothesis to develop an experimental design for a scientific investigation.</p> <p>1d. Justify a prediction based upon the analysis of a graph or data.</p>   |
| Proficient        | <p>1a. Conduct a scientific investigation with accuracy and precision demonstrating safe procedures and proper use and care of laboratory equipment.</p> <p>1b. Formulate questions that can be answered through research and experimental design.</p> <p>1c. Apply the components of scientific processes and methods in classroom and laboratory investigations.</p> <p>1d. Analyze graphs.</p> <p>1e. Analyze procedures, data, and conclusions to determine the scientific validity of research.</p> <p>1f. Recognize and analyze alternative explanations for experimental results and to make predictions based on observations and prior knowledge.</p> <p>1g. Defend a scientific argument in oral, written, and graphic form.</p> |
| Basic             | <p>1a. Identify and recognize the following in a scientific investigation: safe procedures (safety rules, chemical use and symbols), proper use and care of laboratory equipment (goggles, aprons, compound light microscope, slides, balance, beaker, thermometers, graduated cylinders and rulers).</p> <p>1c. Recognize the components of scientific processes and methods in classroom and laboratory investigations (e.g. hypothesis, experimental design, observations, data analyses, interpretations, theory development).</p> <p>1d. Construct a graph.</p> <p>1g. Communicate conclusions based on experiments in oral, written, and graphic form using appropriate terminology.</p>   |

| Performance Level | Descriptors for Physical Science Content Strand<br><b>Strand 2: Physical Science</b>  |
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| Advanced          | 2e. Predict the effect of pH, temperature, and concentration on enzymatic reaction rates.<br>2f. Explain how energy from ATP is made available for specific processes in an organism, such as in the sodium-potassium pump.   |
| Proficient        | 2a. Explain and compare the types of bonds between atoms based on the subatomic particles and their arrangement; connect the importance of ions to biological process.<br>2b. Utilize the properties of water to defend water as an essential component of living systems.<br>2c. Classify solutions as acidic, basic or neutral and relate the significance of an organism's pH to its survival.<br>2d. Compare and contrast the four major organic macromolecules in terms of structure, and function in living organisms.<br>2e. Explain the role enzymes play in regulating biochemical reactions.<br>2f. Describe the structure and function of ATP and its role in making energy available to the cell.<br>2g. Analyze and connect the roles of reactants and products in the biochemical process of photosynthesis and cellular respiration. |
| Basic             | 2a. Identify types of bond formation (e.g. covalent, ionic, hydrogen, etc.)<br>2b. Identify the unique properties of water.<br>2d. Identify examples of carbohydrates, proteins, lipids, and nucleic acids.   |

| Performance Level | Descriptors for Life Science Content Strand<br><b>Strand 3: Life Science</b>  |
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| Advanced          | <p>3a. Evaluate the relationship between the adaptations of organisms to the biome in which they live.</p> <p>3c. Predict possible adaptations and impacts that will occur when an organism is introduced in a new environment.</p> <p>4d. Analyze how plant structures and cellular functions are related to survival of plants.</p> <p>5b. Predict the results of a given parental dihybrid cross.</p> <p>5c. Analyze a pedigree to determine unknown traits and genotypes in past or future generations.</p> <p>6a. Given an organism, predict its evolutionary relationship to other given species.</p>   |
| Proficient        | <p>3a. Compare and contrast plant and animal species, climate, and adaptations of organisms found in the world's major biomes.</p> <p>3b. Provide examples that demonstrate the interdependence of organisms and their environment (biotic and abiotic).</p> <p>3c. Evaluate the significance of natural events and human activities on the biosphere.</p> <p>4a. Differentiate among types of cells and describe the functions and structures of major cell organelles including cell parts for mobility.</p> <p>4b. Differentiate between the types of cellular reproduction and the results of each type.</p> <p>4c. Differentiate among the organizational levels of organisms.</p> <p>4d. Explain and describe how vascular and nonvascular plant structures and cellular functions are related to the survival of plants.</p> <p>5a. Analyze and explain the molecular basis of heredity and the inheritance of traits to successive generations using the Central Dogma of Molecular Biology.</p> <p>5b. Utilize Mendel's laws and Punnett squares to evaluate results and predict percentage outcomes of monohybrid crosses involving complete dominance, incomplete dominance, codominance, sex-linked, and multiple alleles.</p> <p>5c. Examine inheritance patterns using current technology.</p> <p>5d. Describe the characteristics and implications of both chromosomal and gene mutations.</p> <p>6a. Draw conclusions about how organisms are classified into hierarchy of groups and sub groups based on similarities that reflect their evolutionary relationships (including body plans and methods of reproduction).</p> <p>6b. Critique data used by scientists (e.g. Redi, Needham, Spallanzani, and Pasteur) to explain evolutionary processes and patterns.</p> <p>6c. Analyze research in relation to the contributions of scientists whose work led to the development of the theory of evolution.</p> <p>6d. Analyze and explain the role of natural selection in speciation and applications of speciation.</p> <p>6e. Differentiate among chemical evolution, organic evolution, and the evolutionary steps along the way to aerobic heterotrophs and photosynthetic autotrophs.</p> |

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| Basic | <ul style="list-style-type: none"><li>3a. Identify the major biomes and their characteristics.</li><li>4a. Identify the function of basic cell organelles.</li><li>5a. Label the structure of DNA and explain the differences between DNA and RNA.</li><li>5d. Identify types of chromosomal and gene mutations.</li><li>6a. List the taxonomic levels from broadest to specific and place organisms into the correct kingdom based on characteristics.</li><li>6c. Summarize the contributions of scientists whose work led to the development of the theory of evolution.</li><li>6d. Identify examples that demonstrate the role that natural selection, speciation, diversity, adaptation, and extinction play a role in evolution.</li></ul> |
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