

Title 7: Education K-12
 Part 17: Student Level Descriptors MS Science Curriculum

Biology
 Performance Level Descriptors

Performance Level	Strand 1: Inquiry Competency 1: Inquiry
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	Strand 2: Physical Science Competency 2: Biochemical Basis of Life
Advanced	2e. Predict the effect of pH, temperature, and concentration on enzymatic reaction rates. 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. 2b. Utilize the properties of water to defend water as an essential component of living systems. 2c. Classify solutions as acidic, basic or neutral and relate the significance of an organism's pH to its survival. 2d. Compare and contrast the four major organic macromolecules in terms of structure, and function in living organisms. 2e. Explain the role enzymes play in regulating biochemical reactions. 2f. Describe the structure and function of ATP and its role in making energy available to the cell. 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.) 2b. Identify the unique properties of water. 2d. Identify examples of carbohydrates, proteins, lipids, and nucleic acids.

Performance Level	<p style="text-align: center;">Strand 3: Life Science</p> <p style="text-align: center;">Competency 3: Living Organisms and Their Environment</p> <p style="text-align: center;">Competency 4: Biological Organization</p> <p style="text-align: center;">Competency 5: Heredity</p> <p style="text-align: center;">Competency 6: Diversity and Biological Change</p>
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>

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