

MOSCOW SCHOOL DISTRICT
CURRICULUM GUIDE
Subject/Course: Biology
Grade 10

Students are expected to know content and apply skills from previous grades.

Standard 1: Nature of Science

Students exercise the basic tenets of scientific investigation, make accurate observations, exercise critical thinking skills, apply proper scientific instruments of investigation and measurement tools, and communicate results in problem solving. Students evaluate the validity of information by utilizing the tools of scientific thinking and investigation. Students summarize their findings by creating lab reports using technical writing including graphs, charts, and diagrams to communicate the results of investigations.

Cognitive Level (CL) codes:

- B: Memorize
- C: Perform procedures
- D: Demonstrate understanding
- E: Conjecture, generalize, prove
- F: Solve non-routine problems, make connections

<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of tenth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 1</i>
<p>Goal 1.1: Understand Systems, Order, and Organization</p>	<ul style="list-style-type: none"> ● 9-10.B.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a) CL: E Content Limit: Students should be able to identify the components of a system and how the components interact to allow the system to function. Suitable systems to test include the structure of an electric motor, the Earth-Moon system, the solar system, the respiratory system, and the cell as a system. ● 9-10.B.1.1.2 Apply the concepts of order and organization to a given system. (648.01a) CL: E Content Limit: Students should be able to identify the components of a system and the role each 	<ul style="list-style-type: none"> ● Feeling Nervous? Research project: research, analyze and describe 2 or more different failures in the organization or function of parts of the nervous system that result in specific disorders/problems ● Inside Out Project: pinpoint a carbon atom in the body and describe its levels of “embeddedness” in the human body (molecule, process, cell, tissue, organ, system, etc.) ● Cow Eye dissection 		<ul style="list-style-type: none"> ● alternative explanations ● hypothesis ● model ● observation ● system ● theory

	component has in the system's function.			
Goal 1.2: Understand Concepts and Processes of Evidence, Models, and Explanation	<ul style="list-style-type: none"> 9-10.B.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a) <p>CL: E Content Limit: When presented observations and data (including different cell types, genetic traits, or environmental changes over time), students will be able to select the most reasonable explanation from a list of possibilities.</p> <ul style="list-style-type: none"> 9-10.B.1.2.2 Develop models to explain concepts or systems. (648.02b) <p>Content Limit: Assessed in the classroom, not on the ISAT.</p> <ul style="list-style-type: none"> 9-10.B.1.2.3 Develop scientific explanations based on knowledge, logic and analysis. (648.02c) <p>Content Limit: Assessed in the classroom, not on the ISAT.</p>	<ul style="list-style-type: none"> Develop models of mitosis and meiosis stages, arrange in order and narrate 		
Goal 1.3: Understand Constancy, Change, and Measurement	<ul style="list-style-type: none"> 9-10.B.1.3.1 Measure changes that can occur in and among systems. (648.03b) <p>CL: E Content Limit: Students should be able to explain changes that occur in systems. Topics may include heart rate, breathing rate, dilation of pupils, cells, ecosystems, biogeochemical cycles, and chemical reactions.</p> <p>9-10.B.1.3.2 Analyze changes that can occur in and among systems. (648.03b)</p>			

	<p>CL: E Content Limit: Students should be able to analyze changes that take place in system performance due to external or environmental changes. Topics may include heart rate, breathing rate, and dilation of pupil changes.</p> <p>9-10.B.1.3.3 Measure and calculate using the metric system. (648.03c)</p> <p>CL: C Content Limit: Students should be able to use metric units to record and analyze data.</p>			
<p>Goal 1.4: Understand the Theory that Evolution is a Process that Relates to the Gradual Changes in the Universe and of Equilibrium as a Physical State</p>	<p>Reference to 7.S.3.2.1</p>			
<p>Goal 1.5: Understand Concepts of Form and Function - No objectives in Biology.</p>				
<p>Goal 1.6: Understand Scientific Inquiry and Develop Critical Thinking Skills</p>	<ul style="list-style-type: none"> 9-10.B.1.6.1 Identify questions and concepts that guide scientific investigations. (649.01a) <p>CL: E Content Limit: When presented a number of questions, students will be able to identify questions that can be investigated.</p> <ul style="list-style-type: none"> 9-10.B.1.6.2 Utilize the components of scientific problem solving to design, conduct, and communicate results of investigations. (649.01b) <p>CL: E Content Limit: Items should address experimental design.</p>	<ul style="list-style-type: none"> Design, conduct, and evaluate an experiment comparing body temperature and/or height; arm length ratio in males and females 		

	<ul style="list-style-type: none"> 9-10.B.1.6.3 Use appropriate technology and mathematics to make investigations. (649.01c) CL: C Content Limit: Students should be able to identify suitable forms of technology and mathematics needed to solve a problem presented in the question stem. 9-10.B.1.6.4 Formulate scientific explanations and models using logic and evidence. (649.01d) Content Limit: Assessed in the classroom, not on the ISAT. 9-10.B.1.6.5 Analyze alternative explanations and models. (649.01e) CL: E Content Limit: When offered a variety of possible explanations, students should be able to identify the most logical option to fit with the question stem. 9-10.B.1.6.6 Communicate and defend a scientific argument. (649.01f) CL: D Content Limit: When offered a variety of possible explanations, students should be able to identify the option that will fit with the question stem. 9-10.B.1.6.7 Explain the differences among observations, hypotheses, and theories. (649.01g) CL: D Content Limit: Students should be able to distinguish between 			
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	observations, hypotheses, and theories.			
Goal 1.7: Understand That Interpersonal Relationships Are Important in Scientific Endeavors - No objectives in Biology.				
Goal 1.8: Understand Technical Communication	<ul style="list-style-type: none"> 9-10.B.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a) CL: E Content Limit: Students should be asked to derive information from graphs, charts, and diagrams.			

Standard 2: Physical Science - No goals or objectives in Biology.

Standard 3: Biology

Students explain the importance of cells as they relate to the organization and structure of complex organisms, differentiation and specialization during development, and the chemical reactions necessary to sustain life. Students describe the functions of cell structures. Students use the theory of evolution to explain diversity of life.

Cognitive Level (CL) codes: <ul style="list-style-type: none"> B: Memorize C: Perform procedures D: Demonstrate understanding E: Conjecture, generalize, prove F: Solve non-routine problems, make connections
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<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of tenth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 3</i>
Goal 3.1: Understand the Theory of Biological Evolution	<ul style="list-style-type: none"> 9-10.B.3.1.1 Use the theory of evolution to explain how species change over time. (652.01a) CL: D Content Limit: Items could address isolation of sub-populations within a species. <ul style="list-style-type: none"> 9-10.B.3.1.2 Explain how evolution is the consequence of interactions among the potential of a species to increase its numbers, genetic variability, a finite supply of resources, and the selection by the 	<ul style="list-style-type: none"> Trophic Levels: identify an organism in each trophic level in an ecosystem, research their niches, and describe their interactions Peppered Moths: model natural selection of moths in a changing environment Resources (activities, articles, and videos): http://www.pbs.org/wgbh/evolution/index.html Bird Beak Lab 		<ul style="list-style-type: none"> cells communities DNA entropy evolution macromolecules organisms organs photosynthesis respiration species synthesis

	<p>environment of those offspring better able to survive and reproduce. (652.01a)</p> <p>CL: D Content Limit: Items should address genetic variability in a species, competition for environmental resources within a species, and environmental natural selection.</p>			
<p>Goal 3.2: Understand the Relationship between Matter and Energy in Living Systems</p>	<ul style="list-style-type: none"> • 9-10.B.3.2.1 Explain how matter tends toward more disorganized states (entropy). (653.01a) <p>CL: D Content Limit: Items should probe the concept of entropy.</p> <ul style="list-style-type: none"> • 9-10.B.3.2.2 Explain how organisms use the continuous input of energy and matter to maintain their chemical and physical organization. (653.01b) <p>CL: E Content Limit: Food webs would be an appropriate way to probe this understanding.</p> <ul style="list-style-type: none"> • 9-10.B.3.2.3 Show how the energy for life is primarily derived from the sun through photosynthesis. (653.01c) <p>CL: D Content Limit: The basic photosynthetic reaction should be covered in depth.</p> <ul style="list-style-type: none"> • 9-10.B.3.2.4 Describe cellular respiration and the synthesis of macromolecules. (653.01d) <p>CL: D Content Limit: Students should understand and be responsible for the basic reaction, the</p>	<ul style="list-style-type: none"> • Toilet to Tap: research the path of a local water molecule through the water cycle 		

	<p>exchange/production of oxygen and carbon dioxide for respiration, and the steps involved in production of macromolecules by living cells.</p> <ul style="list-style-type: none"> 9-10.B.3.2.5 Show how matter cycles and energy flows through the different levels of organization of living systems (cells, organs, organisms, communities) and their environment. (653.01h) <p>CL: D Content Limit: Energy flow through food webs can be used to assess this objective.</p>			
<p>Goal 3.3: Understand the Cell is the Basis of Form and Function for All Living Things</p>	<ul style="list-style-type: none"> 9-10.B.3.3.1 Identify the particular structures that underlie the cellular functions. (651.01a) <p>CL: D Content Limit: Items should probe the function of organelles including chloroplasts, the nucleus, and vacuoles.</p> <ul style="list-style-type: none"> 9-10.B.3.3.2 Explain cell functions involving chemical reactions. (651.01b) <p>CL: D Content Limit: Items should probe the function of organelles including chloroplasts, the nucleus, and vacuoles.</p> <ul style="list-style-type: none"> 9-10.B.3.3.3 Explain how cells use DNA to store and use information for cell functions. (651.01c) <p>CL: D Content Limit: Items should address DNA replication and mitosis as the mechanism for transferring DNA to the next generation of cells.</p> <ul style="list-style-type: none"> 9-10.B.3.3.4 Explain how 	<ul style="list-style-type: none"> Develop concept maps of animal and plant cell organelles and functions 		

	<p>selective expression of genes can produce specialized cells from a single cell. (651.01e)</p> <p>CL: D Content Limit: Items should address the role genes play in differentiation.</p>			
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Standard 4: Earth and Space Systems - No goals or objectives in Biology.

Standard 5: Personal and Social Perspectives; Technology

Students understand that science and technology interact and impact both society and the environment.

Students describe issues such as water and air quality, hazardous waste, renewable and nonrenewable resources.

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<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of tenth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 5</i>
<p>Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced</p>	<ul style="list-style-type: none"> ● 9-10.B.5.1.1 Analyze environmental issues such as water and air quality, hazardous waste, forest health, and agricultural production. (656.01a) <p>CL: E Content Limit: Issues relevant to Idaho should be addressed: stream degradation, logging, mining, dams, and wind turbines.</p>	<ul style="list-style-type: none"> ● Video: Erin Brokovich followed by discussion ● Local Life: Environmental Quality Debate research project 		<ul style="list-style-type: none"> ● hazardous waste ● nonrenewable resources ● renewable resources ● technology
<p>Goal 5.2: Understand the Relationship between Science and Technology</p>	<ul style="list-style-type: none"> ● 9-10.B.5.2.1 Explain how science advances technology. (655.01a) <p>CL: E Content Limit: Use scientists whose discoveries have significance and ramifications in today’s world to frame items.</p> <ul style="list-style-type: none"> ● 9-10.B.5.2.2 Explain how 	<ul style="list-style-type: none"> ● Genetic Engineering Debate research project 		

	<p>technology advances science. (655.01a)</p> <p>CL: E Content Limit: Use common pieces of technology (lenses, electricity, computers, etc.) as the foundation for items that lead students to see the role technology has in advancing science.</p> <ul style="list-style-type: none"> 9-10.B.5.2.3 Explain how science and technology are pursued for different purposes. (656.01b) <p>CL: E Content Limit: Items should address the role of technology in applying science to improve some aspect of human life, and the role of science in answering questions and extending knowledge.</p>			
<p>Goal 5.3: Understand the Importance of Natural Resources and the Need to Manage and Conserve Them</p>	<ul style="list-style-type: none"> 9-10.B.5.3.1 Describe the difference between renewable and nonrenewable resources. (656.03a) <p>CL: D Content Limit: Topics like oil, metallic ores, and wood products are suitable for consideration.</p>			

Terms of significance that are not derived from a particular standard

<p>abiotic absorb absorption adaptation additives antibiotic atomic mass atomic number ATP autotrophy average bacterium biotic blastocyst cell transport cellular respiration</p>	<p>centimeter chemical reactivity chloroplast competition concentration daughter cell decaying decline decomposer dilated differentiation dispersion distribute divergence dominant durable</p>	<p>ecosystem elements embryonic equivalent fossil fuels gene glucose habitat heterogeneous heterotrophy homogenous hormone inherited isolation lipid mean meiosis</p>	<p>meiotic metals micrometer mitochondria mitochondrion mitosis mitotic molecule mutations nanometer native non-metals non-native nucleotide base nucleus organelle oxygenation</p>	<p>percent phenotype plausible population predation primary consumer producer product protein protein synthesis pyruvate radioactive decay rate reactant recessive</p>	<p>recombination replication resistant sediment selection silt starch stimuli turgor vacuole zygote</p>
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