

**Maine High School Science and Technology
Content Standards Mapping**

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| The Living Environment | Boardworks High School Biology Presentations |
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| E1 Biodiversity - students describe and analyze the evidence for relatedness among and within diverse populations of organisms and the importance of biodiversity. | |
| a. Explain how the variation in structure and behavior of a population of organisms may influence the likelihood that some members of the species will have adaptations that allow them to survive in a changing environment. | Animal Adaptations Behavior Environmental Variation Evolution Plant Adaptations The Process of Evolution |
| <i>b. Describe the role of DNA sequences in determining the degree of kinship among organisms and the identification of species.</i> | - |
| <i>c. Analyze the relatedness among organisms using structural and molecular evidence.</i> | - |
| d. Analyze the effects of changes in biodiversity and predict possible consequences. | Extinction Introduction to Biodiversity Loss of Diversity |
| E2 Ecosystems - Students describe and analyze the interactions, cycles, and factors that affect short-term and long-term ecosystem stability and change. | |
| a. Explain why ecosystems can be reasonably stable over hundreds or thousands of years, even though populations may fluctuate. | Describing Populations Ecosystems and Succession Predator-Prey Relationships |
| b. Describe dynamic equilibrium in ecosystems and factors that can, in the long run, lead to change in the normal pattern of cyclic fluctuations and apply that knowledge to actual situations. | Describing Populations Ecosystems and Succession Predator-Prey Relationships |
| c. Explain the concept of carrying capacity and list factors that determine the amount of life that any environment can support. | Describing Populations |
| d. Describe the critical role of photosynthesis and how energy and the chemical elements that make up molecules are transformed in ecosystems and obey basic conservation laws. | Carbon Cycle Energy Loss in Food Chains Energy Transfer in Food Chains Nitrogen Cycle Photosynthesis 1 Photosynthesis 2 |

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| E3 Cells - Students describe structure and function of cells at the intracellular and molecular level including differentiation to form systems, interactions between cells and their environment, and the impact of cellular processes and changes on individuals. | |
| a. Describe the similarities and differences in the basic functions of cell membranes and of the specialized parts within cells that allow them to transport materials, capture and release energy, build proteins, dispose of waste, communicate, and move. | Eukaryotic Cells Organelles Prokaryotic Cells The Fluid Mosaic Model |
| b. Describe the relationship among DNA, protein molecules, and amino acids in carrying out the work of cells and how this is similar among all organisms. | Controlling Protein Synthesis DNA Nucleic Acids Protein Synthesis Proteins Transcription and Translation |
| c. Describe the interactions that lead to cell growth and division (mitosis) and allow new cells to carry the same information as the original cell (meiosis). | Meiosis Mitosis The Stages of Meiosis The Stages of Mitosis |
| d. Describe ways in which cells can malfunction and put an organism at risk. | Genetic Mutations HIV and AIDS |
| e. Describe the role of regulation and the processes that maintain an internal environment amidst changes in the external environment. | Glucoregulation Homeostasis Thermoregulation |
| f. Describe the process of metabolism that allows a few key biomolecules to provide cells with necessary materials to perform their functions. | Aerobic Respiration Anaerobic Respiration |
| g. Describe how cells differentiate to form specialized systems for carrying out life functions. | Cells to Organisms Cell Differentiation |
| E4 Heredity and Reproduction - Students examine the role of DNA in transferring traits from generation to generation, in differentiating cells, and in evolving new species. | |
| a. Explain some of the effects of the sorting and recombination of genes in sexual reproduction. | Genetic Variation Meiosis |
| b. Describe genes as segments of DNA that contain instructions for the cells and include information that leads to the differentiation of cells. | Genes and Alleles |
| c. Explain how the instructions in DNA that lead to cell differentiation result in varied cell functions in the organism and DNA. | Cell Differentiation |
| d. Describe the possible causes and effects of gene mutations. | Genetic Mutations Inherited Diseases |

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| E5 Evolution - Students describe the interactions between and among species, populations, and environments that lead to natural selection and evolution. | |
| a. Describe the premise of biological evolution, citing evidence from the fossil record and evidence based on the observation of similarities within the diversity of existing organisms. | Fossil Record The Process of Evolution |
| b. Describe the origins of life and how the concept of natural selection provides a mechanism for evolution that can be advantageous or disadvantageous to the next generation. | Evolution The Process of Evolution |
| c. <i>Explain why some organisms may have characteristics that have no apparent survival or reproduction advantage.</i> | - |
| d. Relate structural and behavioral adaptations of an organism to its survival in the environment. | Animal Adaptations Behavior Plant Adaptations The Process of Evolution |