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| |  | | --- | | https://peer.tamu.edu/curriculum_modules/Water_Quality/images/teach.jpg |  |  |  | | --- | --- | | **TEKS for Middle School Science** | **How the TEKS are Integrated into the Lesson** | | **6.1A, 7.1A, 8.1A** Demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency approved safety standards | During the **Activities,** students will be required to use safe practices. | | **6.1B, 7.1B, 8.1B** Practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials | During the **Activities,** students will practice appropriate use and conservation of resources. | | **6.2A, 7.2A, 8.2A** Plan and implement comparative and descriptive investigations by making observations, asking well defined questions, and using appropriate equipment and technology | During the **Activities,** students will implement comparative and descriptive investigations. In the **How We Know** section, various types of investigations are featured (fossil record, radioactive dating, capture-recapture method, and two case studies) and conclusions and explanations are explored. | | **6.2C, 7.2C, 8.2C** Collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers | During the **Activities,** students will collect and record data. | | **6.2E, 7.2E, 8.2E** Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends | During the **Activities,** students will analyze data. In the **How We Know** section, various types of data collection methods (fossil record, radioactive dating, capture-recapture method, and two case studies) are presented and conclusions and explanations are explored. | | **6.3A, 7.3A, 8.3A** Analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student. | During the **What We Know** section of this unit**,**students will learn scientific explanations including the hypotheses, quoted along with examples, to simplify the scientific concepts. They will be asked to analyze and evaluate those explanations by the use of questions embedded in the unit. | | **6.3D, 7.3D, 8.3D** Relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content | Throughout the unit and in the **Story Time** section, the history of science and contributions of scientists as related to the content is presented. | | **6.4A,B; 7.4A,B; 8.4A,B**  The student knows how to use a variety of tools. The student will use preventative safety equipment. | Throughout the **Activities,** students will use laboratory tools and safety equipment as needed. | | **6.12E** Describe biotic and abiotic parts of an ecosystem in which organisms interact | This unit discusses the biotic and abiotic elements of an ecosystem that might change or upset population balance. The **What We Know** section features an explanation of factors that affect population density. | | **6.12F** Diagram the levels of organization within an ecosystem, including organism, population, community, and ecosystem | This unit emphasizes the levels of organization within ecosystems, especially at the population level. | | **7.5B** Diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids | In the **Why it Matters** section, food chains and food webs are introduced with diagrams and descriptions. | | **7.10A** Observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms | Throughout the unit, many different environments are illustrated and described, with the focus being on how different organisms fit in their niche in these environments. | | **7.10B** Describe how biodiversity contributes to the sustainability of an ecosystem | In the **Why it Matters** section of the unit, biodiversity is discussed and the importance of biodiversity to the sustainability of an ecosystem is emphasized. | | **7.10C** Observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds | The **How We Know** section features the topic of succession. The **What We Know** section gives examples of succession and its effects. | | **7.11.B** Explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb | The **What We Know** section features a discussion of relating features and behaviors of species to their function. The discussion continues with investigating the variations in populations. | | **7.11C** Identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (Geospiza fortis) or domestic animals and hybrid plants | In the **Why it Matters** section, the evolution of bacteria by natural selection due to antibiotic use is discussed. | | **7.12 A** Investigate and explain how internal structures of organisms have adaptations that allow specific functions such as gills in fish, hollow bones in birds, or xylem in plants. | This unit addresses the process of natural selection and how adaptations are a part of that process. | | **7.14A** Define heredity as the passage of genetic instructions from one generation to the next generation | In in **What We Know** section, heredity is discussed and related to populations. | | **7.14B** Compare the results of uniform or diverse offspring from asexual or sexual reproduction. | In the **Why it Matters** section, there is a comparison of the differences in offspring diversity due to asexual and sexual reproduction. | | **8.9A** Describe the historical development of evidence that supports plate tectonic theory | In the **How We Know** section, the fossil record is illustrated and discussed. | | **8.11A** Investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as quantity of light, water, range of temperatures, or soil composition | Throughout the unit, different organisms are presented and their dependence on various biotic and abiotic factors are discussed. In the **Activities**, students are given the opportunity to investigate various aspects of ecosystems and how they contribute to the survival of organisms. | | **8.11B** Explore how short- and long-term environmental changes affect organisms and traits in subsequent populations | The overall objective of the unit is to show how changes in the environment affect organisms with regards to population balance. |  |  |  | | --- | --- | | **Next Generation Science Standards**  **Disciplinary Core Ideas** | **How the NGSS are Integrated** **into the Lesson** | | **MS-LS1.B:** Growth and Development of Organisms  -Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. | In the **What We Know** sections, heredity related to natural selection and populations. | | **MS-LS2.A**: Interdependent Relationships in Ecosystems  ▪ Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.  ▪ In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.  ▪ Growth of organisms and population increases are limited by access to resources.  ▪ Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. | This unit focuses on changes in populations due to the interactions of populations with their environment and other populations in their environments. In the **Activities**, students model interactions and analyze and predict how changes in the environment and relationships with other organisms will affect individual species and overall populations. | | **MS-LS2.B:** Cycle of Matter and Energy Transfer in Ecosystems  ▪ Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. | In the **Why it Matters** section, food chains and food webs are introduced with diagrams and descriptions. | | **MS-LS2.C:** Ecosystem Dynamics, Functioning, and Resilience  ▪ Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.  ▪ Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. | The overall theme of this unit is the dynamics of populations in their ecosystems.  In the **Why it Matters** section, there is a discussion of biodiversity and its importance in the health of ecosystems.  In the **Why it Matters** section, bio invaders are discussed and a connection is made between human actions and the health of ecosystems. | | **MS-LS3.B:** Variation of Traits  -In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other.  -In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. | In the **Why it Matters** section, there is a comparison of the differences in offspring diversity due to asexual and sexual reproduction and a discussion of the benefits of sexual reproduction | | **MS-LS4.A:** Evidence of Common Ancestry and Diversity  -The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.  -Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. | The **How We Know/How We Know** section includes a discussion of fossil formation and the fossil record. | | **MS-LS4.B:** Natural Selection  - Natural selection leads to the predominance of certain traits in a population, and the suppression of others.  - In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. | In the **What We Know** section, there is a discussion of gene frequencies and natural selection. Natural selection is related to population balance throughout this section. | | **MS-LS4.C:** Adaptation  - Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. | In the **What We Know** and **Why it Matters** sections, adaptations are mentioned and related to the ability of an organism to survive changes in its environment. | | **MS-LS4.D:** Biodiversity and Humans  - Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. | In the **What We Know** section, humans are cited as a cause of population imbalance.  In the **Why it Matters** section, human interference in ecosystems is explored and the effect of that interference on humans is discussed. | |