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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 Find Out** section, various types of investigations are featured (radioactive oxygen, radioactive dating, and crop rotation 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 Find Out** section, various types of data collection methods (radioactive oxygen, radioactive dating, and crop rotation 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. | | **6.5B** Recognize that a limited number of the many known elements comprise the largest portion of solid Earth, living matter, oceans, and the atmosphere | In the **How We Know** section, the makeup of the atmosphere is discussed with respect to the Nitrogen Cycle. In the **What We Know** section, the amount of Oxygen in the atmosphere is discussed. | | **6.7A** Research and discuss the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources | In the **How We Know** section, the making of oil is presented and disadvantages of using fossil fuels is discussed. Other methods of energy are presented briefly and links are provided for further information. | | **7.5A** Recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis. | In the **How We Know** section, the process of photosynthesis is diagramed and explained. In the **What We Know** section, photosynthesis is again emphasized and explained with regards to the Carbon cycle. | | **7.5B** Diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids | In the **What We Know** section, photosynthesis is discussed as the basis for food chains and food webs. | | **8.5D** Recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts | In the **How We Know** section, the chemical equation for photosynthesis is presented and described. The formulas for the molecules are presented and the elements in each are identified. Also, the formulas for different Nitrogen, Carbon, Sulfur, and Oxygen-containing compounds in the atmosphere and soil are presented in this section. In the **What We Know** section, a model of a molecule is shown and it is described with respect to which elements it contains and how many of each. | | **8.11B** Explore how short- and long-term environmental changes affect organisms and traits in subsequent populations | In the **What We Know** section, the formation of ozone is presented linked to changes in both the Earth and in the DNA of organisms. Also, throughout the unit the effects of Anthropogenic environmental concerns are explored. |  |  |  | | --- | --- | | **Next Generation Science Standards**  **Disciplinary Core Ideas** | **How the NGSS are Integrated** **into the Lesson** | | **MS-PS1.A:** Structure and Properties of Matter  ▪ Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. | In the **How We Know** section, the chemical equation for photosynthesis is presented and described. The formulas for the molecules are presented and the elements in each are identified. Also, the formulas for different Nitrogen, Carbon, Sulfur, and Oxygen-containing compounds in the atmosphere and soil are presented in this section. In the **What We Know** section, a model of a molecule is shown and it is described with respect to which elements it contains and how many of each. | | **MS-PS1.B:** Chemical Reactions  ▪ Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. | In the **How We Know** section, the chemical equation for photosynthesis is presented and described. The formulas for the molecules are presented and the elements in each are identified. Also, the formulas for different Nitrogen, Carbon, Sulfur, and Oxygen-containing compounds in the atmosphere and soil are presented in this section. In the **What We Know** section, a model of a molecule is shown and it is described with respect to which elements it contains and how many of each. | | **MS-LS1.C:** Organization for Matter and Energy Flow in Organisms  ▪ Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. | In the **How We Know** section, the process of photosynthesis is diagramed and explained. In the **What We Know** section, photosynthesis is again emphasized and explained with regards to the Carbon cycle. | | **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. | This unit focuses on exchange cycles between the non-living and living parts of ecosystems and how those systems affect 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, the importance of cycling matter and energy is emphasized. In the **How We Know** section, decomposition is discussed. | | **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 **Introduction**, recycling by humans is mentioned as a way to conserve natural resources. In the **Why it Matters** section, human actions are cited as creating environmental hazards. Throughout the unit, human disruption of natural cycles is explored. | | **MS-ESS2.A:** Earth’s Materials and Systems  ▪ All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms. | This entire unit is devoted to the processes involved in energy flowing and matter cycling within and among the planet’s systems. | | **MS-ESS2.C:** The Roles of Water in Earth’s Surface Processes  ▪ Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. | In the **What We Know** section, the water cycle is explained and emphasized. Water is also mentioned throughout the unit as a reactant and product in other cycles. | | **MS-ESS3.C:** Human Impacts on Earth Systems  ▪ Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things. | In the **Introduction**, recycling by humans is mentioned as a way to conserve natural resources. In the **Why it Matters** section, human actions are cited as creating environmental hazards. Throughout the unit, human disruption of natural cycles is explored. | | **MW-ESS3.D**: Global Climate Change  ▪ Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities | In the **How We Know** section, there is a discussion of how fossil fuels (oil) is formed in the earth. There is a mention of global warming. In the **What We Know** section, in the segment on the oxygen cycle, there is a description of ozone and a discussion of its contribution toward the warming of the earth. At the end of this unit, there is mention of anthropogenic actions that affect all of the exchange cycles, including global climate change. | |