|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | https://peer.tamu.edu/curriculum_modules/Water_Quality/images/teach.jpg |  |  |  | | --- | --- | | **TEKS for Middle School Science**  **6-8 Middle School TEKS**  **AS-Aquatic Science TEKS**  **B-Biology TEKS**  **C-Chemistry TEKS**  **ES-Environmental Systems TEKS**  **NOTE: Some of the wording of the process TEKS 1-4 have been condensed to include multiple subjects** | **How the TEKS are Integrated into the Lesson** | | **6.1A, 7.1A, 8.1A, B.1A, AS.1A, C.1A, ES.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, B.1B, AS.1B, ES.1B, C.1C** 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, B.2E, AS.2E**, **C.2E**, **ES.2E** 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. | | **6.2C, 7.2C, 8.2C, B.2F. AS.2F, ES.2G, C.2F** 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, B.2G, C.2H** Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends | During the **Activities,** students will analyze data. | | **AS.2G. ES.2G** Demonstrate the use of course apparatuses, equipment, techniques, and procedures. | During the **Activities**, the students will use equipment to collect data and follow procedures. | | **AS.2H, ES.2I** Organize, analyze evaluate, build models, make inferences, and predict trends from data. | In the **activity**, students will analyze and evaluate data. | | **AS.2J, ES.2K, AS.2J** Communicate valid conclusions using essential vocabulary and multiple modes of expression such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. | During the **Activities**, students will communicate conclusions using various forms of reports. | | **ES.2J, AS.2I** Perform calculations using dimensional analysis, significant digits, and scientific notation. | In the **Lesson Presentation**, students will learn how to calculate pH. This part of the **Lesson Presentation** includes a description of scientific notation. | | **C.2G** Express and manipulate chemical quantities using scientific conventions and mathematical procedures including dimensional analysis, scientific notation, and significant figures. | In the **Lesson Presentation**, students will learn how to calculate pH. This part of the **Lesson Presentation** includes a description of scientific notation. In the **Activities**, students will measure and calculate these parameters. | | **6.3A, 7.3A, 8.3A** **C.3A**, **ES.3A, AS.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. | In the **Activity,** students will investigate the pH of a local water sources and use critical thinking to determine if the water would be suitable for aquatic life. | | **6.4 A,B, 7.4A,B, 8.4A,B, B.2F** The student knows how to use a variety of tools. The student will use preventative safety equipment. **7.4A** specifies water test kits | Throughout the **Activities,** students will use laboratory tools and safety equipment as needed. | | **AS.5B** Collect baseline quantitative data, including pH, salinity, temperature, mineral content, nitrogen compounds, and turbidity from an aquatic environment. | In the **Lesson Presentation**, students will learn how to measure and pH. In the **Activities**, students with measure pH of water and household samples. | | **AS.7C** Identify water quantity and quality in a local watershed. | In the **Lesson Presentation**, students will learn how to measure and calculate pH. These skills will be needed to identify and measure water quantity and quality in watershed. | | **ES.5B** Identify source, use, **quality**, management, and conservation of water. | In the **Lesson Presentation** and **Activities**, the students will analyze water quality. | | **7.8C** Model the effects of human activity on ground water and surface water in a watershed | In the **Lesson Presentation,** the students will see how pH is affected by human activity on surface water in a watershed. In the **Activity**, the students will measure the pH of local water samples to determine their suitability for aquatic life. | | **ES.9B** Investigate the types of air, soil, and water pollution such as chlorofluorocarbons, carbon dioxide, pH, pesticide runoff, thermal variations, metallic ions, heavy metals, and nuclear waste. | In the **Lesson Presentation,** pH as an agent of water pollution will be explored. | | **ES.9C** Examine the concentrations of air, soil, and water pollutants using appropriate units. | In the **Lesson Presentation**, students will learn how hydrogen ion concentration in the water is measured on the pH scale and how pollutants can change the pH of water. | | **C.10H** Define pH and calculate the pH of a solution using the hydrogen ion concentration. | This is the main focus of the **Lesson Presentation** and the **Activity**. |  |  |  | | --- | --- | | **Next Generation Science Standards**  **Disciplinary Core Ideas** | **How the NGSS are Integrated** **into the Lesson** | | **MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.**  Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage, land usage, and pollution of the air, water or land. | Water quality testing is a method used for monitoring and minimizing human impact on the environment. Measuring pH of water is a key skill used in water quality testing. The **Lesson Presentation** defines pH and shows how it is used to determine water quality. Human activities that affect pH are discussed. | |