**Alignment to Texas Essential Knowledge and Skills**

**Hull Engineering**

Lesson focuses on how the shape of ship's hull can impact its speed and stability potential in water. Teams of students design their own ship's hull on paper, and build it using Styrofoam and other everyday materials. Teams review all hull designs, predict which will go farthest, and then test their design on water using a pull meter or rubber band for propulsion. Teams evaluate all hull designs, reflect on their findings, and present to the group.

| Grade 6 | Grade 7 | Grade 8 | IPC | Physics |
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| ***Strand: Scientific Investigation and Reasoning*** | | | | |
| 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards. | 1.A Demonstrate safe practices during laboratory and field investigations. | 1.A Demonstrate safe practices during laboratory and field investigations. |
| 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Practice appropriate use and conservation of resources including disposal, reuse, or recycling of materials. | 1.B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. | 1.B Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. |
| 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions, and using appropriate equipment and technology. | 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions and using appropriate equipment and technology. | 2.A Plan and implement comparative and descriptive investigations by making observations, asking well- defined questions, and selecting and using appropriate equipment and technology. | 2.B Plan and implement investigate procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology. | 2.E Design and implement investigative procedures including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness. |
| 2.C Collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers. | 2.C Collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers. | 2.C Collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers. | 2.C Collect data and make measurements with precision. | 2.H Make measurements with accuracy and precision and record data using scientific notation and International System (SI) units. |
| 2.D Construct tables, using repeated trials and means to organize data and identify patterns. | 2.D Construct tables and graphs, using repeated trials and means to organize data and identify patterns. | 2.D Construct tables and graphs, using repeated trials and means, to organize data and identify patterns. | | |
| 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends. | 2.D Organize, analyze, evaluate, make inferences, and predict trends from data. | 2.J Organize and evaluate data and make inferences from data including the use of tables, charts, and graphs. |
| | | | 2.E Communicate valid conclusions. | 2.K Communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. |

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| 3.B Use models to represent aspects of the natural world such as a model of Earth's layers. | 3.B Use models to represent aspects of the natural world such as human body systems, and plant and animal cells. | 3.B Use models to represent aspects of the natural world such as an atom, a molecule, space or a geologic feature. | | |
| 3.D Relate the impact of research on scientific thought and society including the history of science and contributions of scientists as related to the content. | 3.D Relate the impact of research on scientific thought and society, including history of science and contributions of scientists as related to the content. | 3.D Relate the impact of research on scientific thought and society including the history of science and contributions of scientists as related to the content. | 3.D Evaluate the impact of research on scientific thought, society, and the environment. | 3.D Explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society. |
| | | | 3.E Describe connections between physics and chemistry and future careers. | 3.E Research and describe the connections between physics and future careers. |
| ***Strand: Matter and Energy*** | | | | |
| | | | 6.C Analyze physical and chemical properties of elements and compounds such as, color, density, viscosity, buoyancy, boiling point, freezing point, conductivity, and reactivity. | |
| ***Strand: Force, Motion and Energy*** | | | | |
| 8.B Identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces. | | 6.A Demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion. | 4.A Describe and calculate an object's motion in terms of position, displacement, speed and acceleration. | 4.A Generate and interpret graphs and charts describing different types of motion including the use of real-time technology such as motion detectors or photogates. |
| 8.C Calculate average speed using distance and time measurements. | | 6.B Differentiate between speed, velocity and acceleration. | 4.B Measure and graph distance and speed as a function of time using moving toys. | 4.B Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration. |
| 8.D Measure and graph changes in motion. | | 6.C Investigate and describe applications of Newton's law of inertia, law of force and acceleration and law of action-reaction, such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches. | 4.C Investigate how an object's motion changes only when a net force is applied, including activities and equipment such as toy cars, vehicle restraints, sports activities and classroom objects. | 4.D Calculate the effect of forces on objects including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects. |
| | | | | 4.F Identify and describe motion relative to different frames of reference. |