

Alignment to Texas Essential Knowledge and Skills

Sail Away

Lesson focuses on watercraft engineering and sailing. Students explore what marine engineers and naval architects do, and work in teams to design a sailboat out of everyday objects that can catch a breeze from a fan, stay afloat with a set load, and sail four feet. Students work in teams of "engineers" to design a boat with a sail structure, test their boat, evaluate the work of other "engineering" teams, and present reflections to the class.

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
Strand: Scientific Investigation and Reasoning							
1.A Demonstrate safe practices as described in the Texas Safety Standards during classroom and outdoor investigations including observing a schoolyard habitat.	1.A Demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations.	1.A Demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations.	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 Make informed choices in the use and conservation of natural resources by recycling or reusing materials such as paper, aluminum cans, and plastics.	1.B Make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans and plastic.	1.B Make informed choices in the conservation, disposal, and 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 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 descriptive investigations including asking and answering questions, making inferences, and selecting and using equipment or technology needed to solve a specific problem in the natural world.	2.A Plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions.	2.A Describe, plan and implement simple experimental investigations testing one variable.	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.B Ask well-defined questions, formulate testable	2.B Design and implement experimental	2.B Design and implement experimental	2.B Design and implement comparative and		

Alignment to Texas Essential Knowledge and Skills

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
		hypotheses, and select and use appropriate equipment and technology.	investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology.	investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology.	experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses and selecting and using appropriate equipment and technology.		
2.B Collect data by observing and measuring using the metric system and recognize differences between observed and measured data.	2.B Collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals, such as labeled drawings, writing, and concept maps.	2.C Collect information by detailed observations and accurate measuring.	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.C Construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data.	2.C Construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data.	2.G Construct appropriate simple graphs, tables, maps, and charts using technology including computers to organize, examine, and evaluate information.	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.D Analyze and interpret patterns in data to construct reasonable explanations based on evidence from investigations.	2.D Analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured.	2.D Analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence.	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 Demonstrate that repeated investigations may increase the reliability of results.	2.E Perform repeated investigations to increase the reliability of results.	2.E Demonstrate that repeated investigations may increase the reliability of results.					



Alignment to Texas Essential Knowledge and Skills

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
2.F Communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.	2.F Communicate valid, oral and written results supported by data.	2.F Communicate valid conclusions in both written and verbal forms.				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.
		3.C Draw or develop a model that represents how something works or looks that cannot be seen such as how a soda dispensing machine works.	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 Connect grade level appropriate science concepts with the history of science, science careers and contributions of scientists.	3.D Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.	3.D Connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.	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							
5.A Measure, test, and record physical properties of matter including temperature, mass, magnetism, and the ability to sink or float.	5.A Measure, compare, and contrast physical properties of matter including size, mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float.	5.A Classify matter based on physical properties including: mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), and solubility in water,				6.C Analyze physical and chemical properties of elements and compounds such as, color, density, viscosity, buoyancy, boiling point, freezing point, conductivity, and reactivity.	

Alignment to Texas Essential Knowledge and Skills

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
		and the ability to conduct or insulate thermal energy or electric energy.					
Strand: Force, Motion and Energy							
6.A Explore different forms of energy including mechanical, light, sound, and heat/thermal in everyday life.	6.A Differentiate among forms of energy including mechanical, sound, electrical, light, and heat/thermal.	6.A Explore the uses of energy including mechanical, light, thermal, electrical, and sound energy.	8.A Compare and contrast potential and kinetic energy.		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.B Describe and calculate an object's motion in terms of position, displacement, speed and acceleration.
6.B Demonstrate and observe how position and motion can be changed by pushing and pulling objects to show work being done such as swings, balls, pulleys, and wagons.	6.D Design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism.	6.D Design an experiment that tests the effect of force on an object.	8.B Identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces.		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.B Measure and graph distance and speed as a function of time using moving toys.	4.C Analyze and describe accelerated motion in two dimensions using equations including projectile and circular examples.
6.C Observe forces such as magnetism and gravity acting on objects.			8.D Measure and graph changes in motion.			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.D Assess the relationship between force, mass and acceleration, noting the relationship is independent of the nature of the force, using equipment such as dynamic carts, moving toys, vehicles and falling objects.	4.F Identify and describe motion relative to different frames of reference.

Alignment to Texas Essential Knowledge and Skills

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
						4.E Apply the concept of conservation of momentum using action and reaction forces such as is illustrated by students on skateboards.	6.B Investigate examples of kinetic and potential energy and their transformations.
						5.A Recognize and demonstrate that objects and substances in motion have kinetic energy such as vibration of atoms, water flowing down a stream moving pebbles, and bowling balls knocking down pins.	6.D Demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension.
						5.B Demonstrate common forms of potential energy including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs and batteries.	7.D Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect.
						5.G Explore the characteristics and behaviors of energy transferred by waves including acoustic, seismic, light and waves on water as they superpose on one another, bend around corners, reflect off surfaces, are absorbed by materials and change direction when entering new materials.	



Alignment to Texas Essential Knowledge and Skills

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	IPC	Physics
Strand: Earth and Space Science							
		7.C Identify alternative energy resources such as wind, solar, hydroelectric, geothermal, and biofuels.			10.A Recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents.		
					10.B Identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts.		