

Alignment to Texas Essential Knowledge and Skills

Engineering Ups and Downs

Lesson focuses on the engineering behind elevators. Teams of students explore principles and requirements of vertical travel, then design and construct a working elevator to service a toy car garage using wheels, pulleys, string, cardboard and other materials.

Grade 6	Grade 7	Grade 8	IPC	Physics
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.B Design and implement experimental investigations by making observations, asking well- defined questions, formulating testable hypotheses, and using appropriate equipment and technology.	2.B Design and implement experimental investigations by making observations, asking well- defined questions, formulating testable hypotheses, and using appropriate equipment and technology.	2.B Design and implement comparative and experimental investigations by making observations, asking well- defined questions, formulating testable hypotheses and selecting and using appropriate equipment and technology.		
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,

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				summaries, oral reports, and technology-based reports.
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: Force, Motion and Energy				
8.A Compare and contrast potential and kinetic energy.	7.A Contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still.	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 analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration.
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.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.
8.D Measure and graph changes in motion.			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.	6.B Investigate examples of kinetic and potential energy and their transformations.
8.E Investigate how inclined planes and pulleys can be used to change the amount of force to move an object.			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.	



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			5.B Demonstrate common forms of potential energy including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs and batteries.	

