

Alignment to Texas Essential Knowledge and Skills

Engineering Air Traffic

Lesson focuses on the engineering behind air traffic control systems. Teams of students explore principles of radar and how engineered equipment is compiled to provide data to help air traffic controllers keep planes at a safe distance from each other, yet efficiently landing and taking off on schedule. Students work in teams to evaluate data generated for a virtual air traffic system, and determine a plan to bring three planes safely through a set airspace. They then recommend engineering enhancement to the current system.

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.
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.
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.

Alignment to Texas Essential Knowledge and Skills

Grade 6	Grade 7	Grade 8	IPC	Physics
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.
				4.B Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration.
			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.
			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.	7.B Investigate and analyze characteristics of waves including velocity, frequency, amplitude, and wavelength and calculate using the relationship between wavespeed, frequency, and wavelength.
				7.C Compare characteristics and behaviors of transverse waves including electromagnetic waves and the electromagnetic spectrum and characteristics and behaviors of longitudinal waves including sound waves.
				7.D Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect.
				7.F Describe the role of wave characteristics and behaviors in medical and industrial applications.

