

Alignment to Texas Essential Knowledge and Skills

Solar Structures

This lesson focuses on how the sun’s energy can be used to heat and cool buildings. Teams of students construct passive solar houses from everyday materials. They then test their solar houses to determine how well they regulate temperature.

Grade 3	Grade 4	Grade 5	Grade 6	Grade 8	IPC	Chemistry	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.	1.A Demonstrate safe practices during laboratory and field investigations, including the appropriate use of safety showers, eyewash fountains, safety goggles and fire extinguishers.	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 Demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.	1.C 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.B Ask well-defined questions, formulate testable hypotheses, and select and use 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 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.E Plan and implement investigative 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 Collect data by observing and measuring using the metric system and	2.B Collect and record data by observing and measuring, using	2.C Collect information by detailed observations and	2.C Collect and record data using the International System of Units (SI) and	2.C Collect and record data using the International System of Units (SI) and	2.C Collect data and make measurements with precision.	2.F Collect data and make measurements with accuracy and	

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recognize differences between observed and measured data.	the metric system, and using descriptive words and numerals, such as labeled drawings, writing, and concept maps.	accurate measuring.	qualitative means such as labeled drawings, writing, and graphic organizers.	qualitative means such as labeled drawings, writing, and graphic organizers.		precision.	
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.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 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.D Organize, analyze, evaluate, make inferences, and predict trends from data.	2.H Organize, analyze, evaluate, make inferences, and predict trends from data.	
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.I Communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphs, journals, summaries, oral reports and technology-based reports.	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 an atom, a molecule, space or a geologic feature.			
3.D Connect grade level appropriate	3.D Connect grade-level	3.D Connect grade-level	3.D Relate the impact of research on	3.D Relate the impact of research on	3.D Evaluate the impact of research on	3.D Evaluate the impact of research	3.D Explain the impacts of the

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science concepts with the history of science, science careers and contributions of scientists.	appropriate science concepts with the history of science, science careers, and contributions of scientists.	appropriate science concepts with the history of science, science careers, and contributions of scientists.	scientific thought and society including the history of science and contributions of scientists as related to the content.	scientific thought and society including the history of science and contributions of scientists as related to the content.	scientific thought, society, and the environment.	on scientific thought, society, and the environment.	scientific contributions of a variety of historical and contemporary scientists on scientific thought and society.
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, relative density (sinking and floating), and solubility in water, and the ability to conduct or insulate thermal energy or electric 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.	
5.C Predict, observe and record changes in the state of matter caused by heating or cooling.	5.B Predict the changes caused by heating and cooling, such as ice becoming liquid water and condensation forming on the outside of a glass of ice water.						
			7.A Research and debate the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources.			5.I Critique the advantages and disadvantages of various energy sources and their impact on society and the environment.	
						5.H Analyze energy conversions such as those from radiant, nuclear, and geothermal sources,	

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					fossil fuels such as coal, gas, oil, and the movement of water or wind.		
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.		5.B Demonstrate common forms of potential energy including gravitational, elastic, and chemical, such as a ball on an inclined plane, springs and batteries.	11. A Understand energy and its forms including kinetic, potential, chemical and thermal energies.	
	6.B Differentiate between conductors and insulators.		9.A Investigate methods of thermal energy transfer including conduction, convection, and radiation.	10.A Recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents.	5.E Investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction and radiation, such as in weather, living and mechanical systems.	11.B Understand the law of conservation of energy and the processes of heat transfer.	6.F Contrast and give examples of different processes of thermal energy transfer including conduction, convection, and radiation.
						11.D Perform calculations involving heat, mass, temperature change and specific heat.	
			9.B Verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting.				6.E Describe how the macroscopic properties of a thermodynamic system such as temperature, specific heat, and pressure are related to the molecular level of matter including kinetic or potential energy of atoms.
			9.C Demonstrate energy transformations such as the energy in a flashlight battery				

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			changes from chemical energy to electrical energy to light energy.				
							7.D Investigate behaviors of waves including reflection, refraction, diffraction, interference, resonance, and the Doppler effect.
Strand: Earth and Space Science							
7.D Explore the characteristics of natural resources that make them useful in products and materials such as clothing and furniture, and how resources may be conserved.	7.C Identify and classify the Earth's renewable resources including air, plants, water, and animals, and nonrenewable resources including coal, oil, natural gas; and the importance of conservation.						