

6th Grade STEM UA: Energy Transfer & Materials Science

Stage 1 Desired Results		
ESTABLISHED GOALS: <u>Competencies:</u> - Students will demonstrate the ability to define the criteria and constraints of a design problem (taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions) with sufficient precision in order to ensure a successful solution. - Students will demonstrate the ability to evaluate competing design solutions using a systematic process in order to determine how well they meet the criteria and constraints of the problem. - Students will demonstrate the ability to analyze data from tests to determine similarities and differences among several design solutions in order to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. - Students will demonstrate the ability to develop a model to generate data for iterative testing and modification of a proposed object, tool or process such that an optimal design can be achieved. - Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials. - Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences. - Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style. <u>Content Standards:</u> - A1. Select and use appropriate measuring tools to accurately gather, manipulate, and communicate information. - A2. Exhibit the safe and proper selection, use and maintenance of technical equipment, materials, and processes.	Transfer	
	Students will be able to independently use their learning to solve problems using the engineering design process.	
	Meaning	
	ENDURING UNDERSTANDINGS Students will understand that... - Energy exists in many forms and can be transferred among those forms. - Many forms of engineering incorporate the transfer of energy - Chemical Engineers have important roles to play in advancing materials used in life. - A career in STEM will allow students to play a role in society's future. - The engineering process is a useful tool to solve everyday problems.	ESSENTIAL QUESTIONS - What energy makes the most significant impact on Society? - What defines the success of solving a problem?
	Acquisition	
	Students will know... - that chemical engineers combine chemistry and engineering. - that nanotechnology is a growing field of materials science and can be used in a plethora of applications. - that there are six simple machines to make work easier. - that most devices (tools) transfer energy and movement. <u>vocabulary:</u> chemical / mechanical engineers, nanotechnology, lever, wheel and axle, pulley, screw, wedge, and inclined plane, gears, applied force, torque, potential energy, kinetic energy,	Students will be skilled at... - analyzing text - presenting ideas either orally or in written word. - applying the design process which includes: - defining a problem - collecting information - analyzing ideas - developing solutions/ building a model - presenting to others - improving on a design

• · A3. Discover and develop talents, aptitudes, and interests of the individual related to technical pursuits. • · A4. Demonstrate an awareness of career opportunities and requirements needed to make informed and meaningful choices in their education/employment in technical occupations. • · B1. Design, schedule, manage, and assess technical processes and systems. • · C1. Demonstrate those technical skills needed to find, use and communicate information effectively in a technological world. • · D1. Design, develop, manage, and evaluate activities using identified problem-solving techniques. • · E1. Exhibit an understanding of the relationship between academic concepts and practices to their applications in a technological setting. • · F1. Evaluate the effects of technology's development on society through time. • · F2. Evaluate examples of how technological systems and processes have developed to satisfy human needs and wants. • · G1. Describe technology's impact on society and the environment, and its capacity to enhance or destroy the human condition and quality of life. • · H1. Demonstrate an understanding of and an appreciation for the importance of accepting individual responsibility, developing a solid work ethic and learning to plan and work effectively.		
Content Area Literacy Standards		21st Century Skills
RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i>. RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually. RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. WHST.6-8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.		• <i>Use Systems thinking</i> • <i>Solve problems</i> • <i>Work creatively with others</i> • <i>Implement innovations</i>

<i>Science and Engineering Practices</i>	•
S&E P 1. Asking questions (for science) and defining problems (for engineering) S&E P 2. Developing and using models S&E P 3. Planning and carrying out investigations S&E P 4. Analyzing and interpreting data S&E P 5. Using mathematics and computational thinking S&E P 6. Constructing explanations (for science) and designing solutions (for engineering) S&E P 7. Engaging in argument from evidence S&E P 8. Obtaining, evaluating, and communicating information	

Stage 2 - Evidence

<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S): -Yeast / chemical reaction powered cars -Rube Goldberg -Bridge building -chemical engineering: creating adhesives, cleaning up an oil spill,
	OTHER EVIDENCE:

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

<i>Language Arts Integration</i>	<i>Mathematics Integration</i>
1.OA.1 Use	1.OA.1 Use
<i>Technology Integration</i>	<i>District Materials</i>
1.OA.1 Use	

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