

Upper Elementary STEM

Overview:

Elementary STEM for 3rd grade through 5th grade is an enhancement class that continues to build the foundation for understanding the relationship among science, technology, engineering, and math. This class uses both the engineering design process and the scientific method when investigating simple machines and new concepts. Students will learn to use critical and analytical thinking skills and experience in teamwork as they strive to problem solve new challenges.

Course Rationale:

Elementary STEM creates student interests in science, technology, engineering, and math. It opens the door for students to become tomorrow's movers and shakers by providing a foundation for middle school, high school and beyond. Students need to have a robust STEM curriculum and it needs to begin at the elementary level.

Grades: 3rd Grade - 5th Grade

<u>Unit Title</u>	<u>Length of Unit</u>
Unit 1: Review of STEM Practices _____	4 - 8 weeks
Unit 2: Technology	8 - 12 weeks_
Unit 3: Engineering Curriculum Enhancement	12 - 16 weeks

Elementary STEM Curriculum

Course Title: 3-5 Grades

Unit Title: Review of STEM Practices

Length of Unit 4 - 8 weeks

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Activities/Project	Resources	Evidence of Understanding
<p>3-5 ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p> <p>3-5 ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p>Continue the development of the students' education in STEM and apply the rigor of science, technology, engineering and mathematics content as well as incorporating skills and practices of other curriculum disciplines into their learning.</p> <p>I CAN Statements:</p> <p>I can apply concepts of science, technology, engineering, and mathematics in order to understand and address real life issues and solve problems or challenges.</p> <p>I can engage in inquiry.</p> <p>I can engage in logical reasoning.</p> <p>I can collaborate as a</p>	<p>Scientist Technology Engineer Mathematician</p> <p>Question Observe Hypothesis Experiment Record Measure Data Analyze Conclude</p> <p>Work together/ Brainstorm Challenge Constraint Criteria Explore Investigate Problem solve</p>	<p>Students will learn:</p> <p>This unit will continue the development of students' STEM education. They will begin to apply the rigor of science, technology, engineering and mathematics content as well as incorporating skills and practices of other curriculum disciplines into their learning.</p> <p>Students will:</p> <ul style="list-style-type: none"> understand what an engineer, scientist, technologist, and mathematician is apply the 	<p>Books:</p> <p><u>Mariana Becomes a Butterfly</u></p> <p><u>Aisha Makes Work Easier</u></p> <p><u>Infinity and Me</u></p> <p><u>Timeless Thomas: How Thomas Edison Changed Our Lives</u></p> <p><u>Stronger Than Steel: Spider Silk DNA and the Quest for</u></p>	<p>What will be the evidence of learning?</p> <p>Formative Assessments</p> <p>Creating Models, Facilitation and questioning techniques, sharing of observations and reasoning through results, drawings and approximations of writing and labeling of investigations</p> <p>Summative Assessment</p> <p>Performance assessment: Communicate and demonstrate findings from investigation and</p>

	<p>STEM team member. I can understand how to design a solution to a specific problem using constraints on materials, time, or cost. I can create and evaluate several possible solutions to a problem based on how well the answer met the specific criteria and constraints of the problem.</p> <p>Essential Questions: What kinds of work do engineer do? Can you explain the engineering design process? What kinds of work do scientists do? Can you explain the scientific process? Name different kinds of technology? What kinds of work do technologists do? What kinds of work do mathematicians do?</p>	<p>Communicate Design/Create Solution Evaluate Evidence Making sense Model Computer Internet iPad Apps Keyboard Cell phone Camera Radio Tools</p>	<p>engineering design process</p> <ul style="list-style-type: none"> • employ creative and careful thinking to solve problems • troubleshoot and learn from failure • understand the role of materials and their properties in engineering solutions 	<p><u>Better Bulletproof Vests, Sutures, and Parachute Rope</u> <u>Edge of the Universe: A Voyage to the Cosmic Horizon and Beyond</u> <u>Citizen Scientists</u> <u>Get the Scoop on Animal Poop!</u> <u>Life in the Ocean</u> <u>Rachel Carson and Her Book That Changed the World</u></p>	<p>solution to problem.</p>
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				<p>Websites:</p> <p>http://kids.nationalgeographic.com</p> <p>http://www.discoveryeducation.com</p> <p>http://askdriverse.wsu.edu/</p> <p>http://pbskids.org/designsquad</p> <p>http://www.egfi-k12.org</p> <p>http://www.exploratorium.edu</p> <p>http://www.extremescience.com</p>	
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				<p>http://science.howstuffworks.com</p> <p>http://www.msi.chicago.org</p> <p>https://www.tynker.com</p> <p>http://www.nasa.gov/audience/forstudents/index.html</p> <p>http://www.nasa.gov/education/semac</p> <p>http://www.pbs.org/wgbh/nova</p> <p>http://www.sciencebuddies.org</p> <p>http://www.sci</p>	
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				encechannel.com http://stem-works.com https://www.techrocket.com	
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Elementary STEM Curriculum

Course Title: 3-5th Grade

Unit Title: Technology

Length of Unit: 8-12 weeks

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Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Activities/Projects	Resources	Evidence of Understanding
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and	Students often think of technology as a device with a power source. Not all technology is digital. With the activities	Technology Computer iPad Internet Apps Keyboard	Kids will learn: This unit will provide students with the understanding of what technology is and how it pertains to their lives. They will	Books: <u>The Boy Who Harnessed the Wind</u> <u>Frozen in Time:</u>	What will be the evidence of learning? Formative Assessments Facilitation and questioning techniques,

<p>constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p>planned, STEM components will be applied and the Engineering Design Process practiced.</p> <p>I CAN Statements:</p> <p>I can understand the definition of technology.</p> <p>I can have basic knowledge of what part technology plays in STEM.</p> <p>I can talk about how inventors/engineers earlier have shared their ideas and how they have changed over time.</p> <p>I can recall relevant information from lab experiences.</p> <p>I can gather relevant information from print and digital sources.</p> <p>I can work well in a team trying out ideas and designs.</p> <p>I can also troubleshoot my work and improve</p>	<p>Cell phone Camera/Digital Tools</p> <p>Constraints Criteria Mechanical Engineer Engineering Design Process Engineer</p> <p>Dominoes Hourglass</p> <p>Sundials and Obelisks</p> <p>Candle Clock A water clock or clepsydra</p>	<p>use the definition of technology – <i>which includes any product made by humans to meet a want or need.</i></p> <p>The primary goal of this unit is to challenge youth to think creatively and use the Engineering Design Process to design their own technologies that are able to measure time.</p> <p>Students will become familiar and interact with a variety of technology tools as a part of their academic program in areas such as: communication, documenting events, using informational software and websites. They will benefit from exposure to more advanced applications that they will eventually use independently or in a group..</p> <p>This unit will provide students with the background of technology -- for example they will discover and learn about is timekeeping devices.</p> <p>Students will use their engineering skills to develop an accurate timer. The overview of the activities in this unit is as follows:</p> <p><i>Activity 1: Technology Through Time</i></p>	<p><u>Clarence Birdseye's Outrageous Idea About Frozen Food</u></p> <p><u>Mr. Ferris and His Wheel</u></p> <p><u>What Do You Do With a Problem?</u></p> <p><u>Girls Think of Everything: Stories of Ingenious Invention by Women</u></p> <p><u>Women in Science: 50 Fearless Pioneers Who Changed the World</u></p> <p>Video:</p> <p>Objectified http://tinyurl.com/kwlee2r</p> <p>Engineering Everywhere Special Report video: http://www.eie.org/time</p>	<p>sharing of observations, and reasoning through results, drawings, and approximations of writing, designing, and labeling of investigations. Use appropriate tools strategically</p> <p>Summative Assessment Performance assessments Communicating and demonstrating the Engineering Design Process through the investigations in the activities Quizzes</p>
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	<p>designs.</p> <p>I can persevere through the Engineering Design Process in making a water timing technology.</p>		<p>Youth are introduced to a definition of technology and consider how technologies are IMPROVED over time. They will match pairs of older and modern technologies and IMAGINE ways to IMPROVE the modern version.</p> <p><i>Activity 2: Youth explore their own perceptions of time.</i> Students will learn their individual perceptions of time are not always accurate without the use of any modern timekeeping technology. Their perceptions of time will change based on the activities they are participating in. Students will come to the conclusion that engineers developed technologies to keep an accurate account of time.</p> <p><i>Activity 3: Youth will engineer a timer by exploring the natural rhythms of falling dominoes.</i> Students will be encouraged to think creatively about ways time is measured. They will identify and understand how regular and repeating events, like falling dominoes, can be used to track time.</p> <p><i>Activity 4: Creating a Water Timer to showcase</i></p> <p>Youth will learn about the history of water timers dating back as early as 16th century</p>		
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			B.C. They will use the Engineering Design Process to create a water timer that accurately times either 1 or 2 minutes. Students will work in a team until all improvements are complete. Students will showcase their water timing technologies to show its accuracy.		
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Elementary STEM Curriculum

Course Title: 3-5th Grade

Unit Title: Engineering Curriculum Enhancement

Length of Unit: 12 - 16 weeks

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Standards & Benchmarks	Essential Questions, Learning Targets & “I can” Statements	Key Vocabulary	Activities/Projects	Resources	Evidence of Understanding
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare	Students often think of technology as a device with a power source. Not all technology is digital. With the activities planned, STEM components will be applied and the Engineering Design	Constraints Criteria Mechanical Engineer Engineering Design Process Engineer Simple	Kids will learn: This unit will provide students with the understanding of machines and mechanisms and how it pertains to their lives. They will apply the understanding of simple machines and build structures,	Books: <u>The Boy Who Harnessed the Wind</u> <u>Frozen in Time: Clarence Birdseye’s Outrageous Idea About Frozen Food</u>	What will be the evidence of learning? Formative Assessments Facilitation and questioning techniques, sharing of observations, and reasoning through results, drawings, and approximations of writing,

<p>multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>	<p>Process practiced.</p> <p>I CAN Statements:</p> <p>I can understand the definition of technology.</p> <p>I can have basic knowledge of what part technology plays in STEM.</p> <p>I can talk about how inventors/engineers earlier have shared their ideas and how they have changed over time.</p> <p>I can recall relevant information from lab experiences.</p> <p>I can gather relevant information from print and digital sources.</p> <p>I can work well in a team trying out ideas and designs.</p> <p>I can also troubleshoot my work and improve designs.</p> <p>I can persevere through the</p>	<p>Machines: Screw Inclined Plane Wedge Wheel and Axle Lever Pulley</p> <p>Collaboration Working in groups Communication Revising to improve</p> <p>Research iPad</p>	<p>using the Engineering Design Process.</p> <p>The primary goal of this unit is to challenge youth to think creatively, work collaboratively, and persevere.</p> <p>Students will become familiar and interact with a variety of ways. They will find solutions and have an opportunity to test several different builds to allow for improvement and understanding.</p> <p>Students will use their engineering skills to develop an basic understandings of simple machines and their practical application.</p> <p>Students develop good communication skills working in groups of two and four - depending on the build and its criteria and constraints.</p> <p>Students will learn to research an American inventor and explain their importance to our society.</p> <p>Students begin to develop skills to create and design their own experiments.</p>	<p><u>Mr. Ferris and His Wheel</u></p> <p><u>What Do You Do With a Problem?</u></p> <p><u>Girls Think of Everything: Stories of Ingenious Invention by Women</u></p> <p><u>Women in Science: 50 Fearless Pioneers Who Changed the World</u></p> <p>Video:</p> <p>Objectified http://tinyurl.com/kwlee2r</p> <p>Engineering Everywhere Special Report video: http://www.eie.org/time</p> <p>Various teachertube/youtube videos on simple machines and how they work</p>	<p>designing, and labeling of investigations. Use appropriate tools strategically</p> <p>Summative Assessment Performance assessments Communicating and demonstrating the Engineering Design Process through the investigations in the activities Quizzes</p>
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	Engineering Design Process in making a water timing technology.				
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