

Madison Public Schools

Grade 3 STEAM Curriculum

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Course Overview

Description

The goal of STEAM is to integrate science, technology, engineering, art, and math. This cross-curricular unit is designed to build on what students have learned or will learn in their science, math, language arts, and technology curricula. Students are given a series of tasks and to complete throughout the unit. Students will have a better understanding of extreme weather events and the impact on people and the environment. Students will learn how to prepare

Goals

This course aims to:

- Develop and reinforce engineering and design principles
- Develop and reinforce research skills and analyze information
- Make observations and data collection
- Develop and reinforce drawing and labeling a schematic
- Create a model
- Develop their use of technology
- Present information to an audience
- Support the 3rd grade science, math, and language arts curriculum

Resources

NJ Technology Standards <https://www.state.nj.us/education/cccs/2014/tech/8.pdf>
NGSS <http://ngss.nsta.org/AccessStandardsByTopic.aspx>
Madison Grade 3 Science Curriculum <https://drive.google.com/drive/u/o/recent>

Modifications and Adaptations for Special Needs Learners

(Gifted and Talented Students, English Language Learners, Special Education Students, At-Risk Students)

Unit 1 Overview	
Unit Title: Extreme Weather	
Unit Summary: (1 paragraph summary of unit) This unit provides the language and techniques for analyzing situations involving interpreting data, chance and uncertainty. Students will have the opportunity to make predictions based on experimental probabilities and their analysis of data. A firm grasp of data analysis and probability is a critical component of making decisions and justifying the decisions in the real world.	
Suggested Pacing: 17 Lessons	
Learning Targets	
Unit Essential Questions: <ul style="list-style-type: none"> • What are some extreme weather events? • What are some of the effects of these weather events? • What can we do stay safe from extreme weather events? • How are structures built to better withstand extreme weather? 	
Unit Enduring Understandings: <ul style="list-style-type: none"> • Extreme weather has disastrous effects on people and the environment. • Warnings and weather forecasts can help people stay safe • Specific materials and structures are used for buildings that have to endure extreme weather events. • Identify ways technology can help with school projects/assignments. 	
Evidence of Learning	
Unit Benchmark Assessment Information: There are a variety of ways students will demonstrate their learning: research and discussions, performance tasks, design challenges and reflections.	

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (used throughout unit)	Pacing
Identify how weather is measured.	Using TCI units 3, 4, and 5, students will create a weather station.	Students will analyze weather data use the data to make predictions for the following year.	<p>3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p> <p>ESS2.D: Weather and Climate Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent 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>	Weeks 1-3
Research extreme weather events	<p>-Blizzard -Dust storm -Hurricane -Thunderstorm -Tornado -Wildfire</p> <p>Find factual information through database research. Information to find:</p> <p>-Title slide -What is it? -How/why do they occur? -Geographic area? -Damage? -Better building materials and structures? -How to be safe? -Bibliography</p>	<p>Each group will create a slideshow on their extreme weather event. Groups will have 3-4 students. Each student will be responsible for 1-2 slides.</p> <p>Teacher created note taking sheet.</p> <p>Each group to list research responsibilities of each person in group and turn in</p>	<p>Technology</p> <p>8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems. Select and use applications effectively and productively.</p> <p>8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.</p> <p>8.1.5.A.5 Create and use a database to answer basic questions.</p> <p>8.1.5.C.1 Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.</p>	Week 4-10

	https://www.worldbookonline.com Find factual information through internet research		<p>8.1.5.D.1 Understand the need for and use of copyrights.</p> <p>8.1.5.D.2 Analyze the resource citations in online materials for proper use.</p> <p>8.1.5.D.3 Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.</p> <p>8.1.5.D.4 Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.</p> <p>8.1.5.E.1 Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.</p> <p>ELA Literacy RI.3.1 - Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2), (3-ESS3-1) W.3.7 - Conduct short research projects that build knowledge about a topic.(3-ESS3-1) W.3.8 - Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2)</p> <p>Science and Engineering Practices Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)</p> <p>Disciplinary Core Ideas A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)</p>	
Share presentations with class	-Eye contact -Speak loud enough -Do not read from screen -Speak using complete sentences	Teacher created rubric for presentations to cover skills taught		Week 11-12
Design a building that can withstand hurricane winds.	Part I https://youtu.be/jP7WViY3crA Part II https://youtu.be/sTM7z8LYlx8	Discuss challenge with students and how they will test their design and compete with other groups by multiplying the number of seconds by the height of their structure. After each trial, they can revise	<p>8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints</p> <p>8.2.5.C.1 Collaborate with peers to illustrate components of a designed system.</p>	Week 13

		<p>their design and try again.</p> <p>Each student to sketch a structure to hold a tennis ball and withstand a fan blowing on it. The following materials can be used: index cards, straws, craft sticks, string, pipe cleaners, and tape</p> <p>Use the link below as a guide for this challenge. https://pmm.nasa.gov/education/sites/default/files/interactive_files3/Hurricane%20Towers%20TG.pdf </p>	<p>8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development.</p> <p>8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.</p> <p>Science 3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.</p> <p>W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</p> <p>W.3.7 Conduct short research projects that build knowledge about a topic.</p>	
Setup spreadsheet	<p>Each student to create spreadsheet to record data. Students will:</p> <ul style="list-style-type: none"> -use formula to multiply -use square to click and drag to extend formula or pattern -create a line graph of their trials -customize and label line graphs 	<p>Sample spreadsheet</p>	<p>Technology 8.1.5.A.4 Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.</p> <p>Science and Engineering Practices Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)</p> <p>Math MP.5 - Use appropriate tools strategically. (3-ESS2-1)</p>	Week 14
Build structure	<p>Groups to decide on a model and then create using the materials given.</p>	<p>Students can test their structures, add their data in their spreadsheets and find ways to improve their structures based on observations.</p>	<p>Science and Engineering Practices Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.(3-ESS3-1)</p> <p>Technology 8.2.5.C.6 Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.</p> <p>8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.</p> <p>8.2.5.D.2 Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions</p>	Week 15-16

Share findings	Groups will share their observations about structures. Pros and cons of their structure.	Reflection sheet		Week 17
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****Continuous activities to be completed throughout unit**

Code	https://studio.code.org/s/course-2018	Can be done in between units and if some students are finished with their work early. Teacher to utilize dashboard to monitor student progress. Dashboard to assign courses as well.	Continuous
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Unit 2 Overview	
Unit Title: Force and Motion	
Unit Summary: In this unit students will develop an understanding that force and motion are part of our daily activities. Students will gain an understanding that those science principles can help us in our day to day lives. Students will see through force and motion principles, how carnival games are not designed for people to win. Students will create their own game demonstrating force and motion principles. Third graders will also have an opportunity to create a 3D object to go along with their game.	
Suggested Pacing: 15 lessons	
Learning Targets	
Unit Essential Questions: <ul style="list-style-type: none"> • How are carnival constructed so fewer people win? • How can knowing force and motion principles help in winning more often? • How can recyclables be used for other things? 	
Unit Enduring Understandings: <ul style="list-style-type: none"> • Science principles(force and motion) are everywhere in our daily life. • Carnival games are designed using force and motion principles. • Understanding force and motion principles can help in daily life activities. 	
Evidence of Learning	
Unit Benchmark Assessment Information: There are a variety of ways students will demonstrate their learning: research, discussions, performance tasks, design challenges and reflections.	

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards	Pacing
<p>Identify some of their favorite carnival games.</p> <p>Discuss why they like those games.</p> <p>Identify any special skills needed to win at those games.</p> <p>Identify strategies they employed.</p> <p>Identify how science is a factor in carnival games.</p>	<p>Watch video of the science used behind games.</p> <p>https://www.youtube.com/watch?v=tk_ZlWJ3qJI</p>	<p>Each group to create a chart about one carnival game from video and how science is used against people playing the game.</p> <p>Discuss</p>	<p>Technology 8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.</p> <p>ELA Literacy W.3.8 - Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2)</p> <p>Science and Engineering Practices Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)</p>	Week 1-2
<p>Brainstorm and sketch a carnival game to be constructed and played.</p>	<p>Slideshow with pictures of popular carnival games. Remind students of science concepts already learned from their science unit in Force and Motion(e.g. Magnets, electromagnets, center of mass, balance, gravity, force)</p>	<p>Each person to sketch and label a game they would be able to create and play.</p> <p>Collect sketches and place students into groups based on similar sketches.</p> <p>Each group to decide on their group game and finalize sketch, measurements, and materials.</p>	<p>Technology 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system. 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development. 8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.</p> <p>Science and Engineering Practices Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <p>Math MP.5 - Use appropriate tools strategically. (3-ESS2-1)</p>	Week 3-4
<p>Construct game</p>	<p>Students to bring in recycled materials from home in addition to materials at school to begin construction. Requirements: -Functional game that can be played repeatedly -Appropriate decoration</p>		<p>Technology 8.2.5.A.3 Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints 8.2.5.C.1 Collaborate with peers to illustrate components of a designed system. 8.2.5.C.2 Explain how specifications and limitations can be used to direct a product's development. 8.2.5.C.4 Collaborate and brainstorm with peers to solve a</p>	Week 5-8

			<p>problem evaluating all solutions to provide the best results with supporting sketches or models.</p> <p>Science and Engineering Practices</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <p>Math</p> <p>MP.5 - Use appropriate tools strategically. (3-ESS2-1)</p>	
3D print a piece to carnival game	Students to utilize 3D printing software to create a piece to their game.		<p>Science and Engineering Practices</p> <p>Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p>	Week 9
Troubleshoot game	Groups to play their own games and make improvements as necessary		8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.	Week 10
<p>Write bulleted list of instructions for their game.</p> <p>Create a poster that illustrates the science principle behind game.</p>	<p>Use Google Doc, bullet points (1-2 people can be working on instructions)</p> <p>Use poster board (1-2 people can be working on poster)</p>	<p>Teacher to supply students with an example of instructions and poster.</p> <p>Teacher to supply students with specific requirements of each.</p>	<p>Technology</p> <p>8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.</p>	Week 11-12
Play other carnival games created by their classmates.	Games can be set up around the room and students can play each others games.			Week 13-14
<p>Reflect on their games and how to improve.</p> <p>Identify science concepts that make their game work</p> <p>Identify how to change their game to make it more difficult.</p>	Each student to fill out reflection sheet independently.	Reflection		Week 15

****Continuous activities to be completed throughout unit**

Code	https://studio.code.org/s/coursed-2018	Can be done in between units and if some students are finished with their work early. Teacher to utilize dashboard to monitor student progress. Dashboard to assign courses as well.	Continuous
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