Sparta Area School District

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Course Outcome Summary

Course Information: **Nature's Fury (Year B)**

Description: Students explore infrastructure designs that can withstand destruction, research ways to prepare for natural disasters, and investigate weather patterns and conditions that cause natural disasters.

Instruction Level: Grades 6-8

Course Standards: Science, Technology, Engineering, Math, ELA, Social Studies

Units

1. **Concrete Bridge**
2. **Earthquake Engineering**
3. **Weather**
4. **Plate tectonics**
5. **Evacuation plans for natural disaster**
6. **Challenge Based Learning Project**

Unit Outlines

1. Concrete Bridge

Essential Question:

Students will be able to answer the question(s):

- How can we design systems to withstand natural disasters?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students explore various materials (concrete and reinforcing materials).
- Students study the effectiveness of different combinations of materials. Using this knowledge, students build and test a concrete bridge to span a distance.
- Students discover the financial aspect, the highest quality bridge for the least amount of money.

2. Earthquake Engineering

Essential Question:

Students will be able to answer the question(s):

- How can we design systems to withstand natural disasters?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students study different building techniques used by structural engineers when designing buildings to survive an Earthquake. They select one technique to research and apply to a building design that meets a certain criteria.

3. Weather

Essential Question:

Students will be able to answer the question(s):

- What are the causes of natural disasters?
- How is weather created and what are the warning signs of a weather storm?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students read about natural disasters.
- Students explore hurricanes, tornados, and avalanches to understand the reason why weather strikes in different areas of the world.
- Students learn about weather, climate, fronts and layers of the atmosphere.
- Students learn about tools to measure weather.
- Students record daily weather and log this data.

4. Plate Tectonics

Essential Question:

Students will be able to answer the question(s):

- How does Earth's composition create natural disasters?
- What are the causes of natural disasters?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students study the different movements of the earth's crust and the consequences that occur with each of these.

5. Evacuation Plans for Natural Disasters

Essential Question:

Students will be able to answer the question(s):

- What can we do to overcome the effects of natural disasters?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students gain an understanding on appropriate evacuation plans during a natural disaster.
- Students learn about perspective writing and use this idea to write personal stories about different natural disasters.

6. Challenge-Based Learning Project

Essential Question:

- What impact do natural disasters have on our society (existence)?
- What can we do to overcome the effects of natural disasters?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

- Students research a historical natural disaster.

Science Standards:

- Evaluation of Models, Inferences, and Experimental Results
    - Find basic information in a model
    - Determine which models present certain basic information
- Scientific Investigation
    - Understand the methods used in a simple experiment
    - Understand the tools and functions of tools used in a complex experiment
    - Find basic information in a text that describes a complex experiment
    - Understand a simple experimental design
- Interpretation of Data
    - Understand basic scientific terminology
    - Find basic information in text that describes a complex data presentation
    - Determine how the values of variables change as the value of another variable changes in a simple data presentation
    - Select data from a complex data presentation (e.g., a phase diagram)

- Translate information into a table, graph, or diagram

Technology Standards:

- Articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- Students build networks and customize their learning environments in ways that support the learning process.
- Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
- Students gather information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
- Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

Engineering Standards:

- Use tools to observe, measure, make things, and transfer information.
- Follow a set of instructions to produce a product using appropriate tools and materials.
- Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- After testing, determine similarities and differences among several solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Build a model that will be used for testing, and make modification so design outcomes can be achieved.

Math Standards:

- Perform one-operation computation with whole numbers and decimals
- Perform common conversions of money and of length, weight, mass, and time within a measurement system
- Solve routine one-step/two-step arithmetic problems
- Describe the changes visible in a graph
- Extract relevant data from a basic table or chart and use the data in a computation
- Solve real-world problems by graphing
- Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals)
- Construct an equation to model a linear relationship

- Compare and contrast two set of data

ELA Standards:

- English
  - Determine whether a simple essay has met a straightforward goal
  - Determine the most logical place for a sentence in a paragraph
  - Delete obviously redundant and wordy material
  - Revise expressions that deviate markedly from the style and tone of the essay
  - Recognize and correct marked disturbances in sentence structure
  - Recognize and correct inappropriate shifts in verb tense and voice when the meaning of the entire sentence must be considered
  - Ensure straightforward pronoun-antecedent agreement
  - Use the appropriate word in frequently confused pairs
  - Use appropriate punctuation in straightforward situations
- Writing
  - Generate reasons for a position that are vague or simplistic; show a little recognition of the complexity of the issue in the prompt by briefly noting implications and/or complications of the text.
  - Present a thesis that establishes focus on the topic issue, and/or briefly or unclearly responding to counterarguments to the writer's position.
  - Provide adequate development in support of ideas; clarify ideas by using some specific reasons, details, and examples
  - Use some appropriate transitional words and phrases
  - Present a somewhat developed introduction and conclusion
  - Show adequate use of language to communicate by correctly employing many of the conventions of Standard English grammar, usage, and mechanics, but with some distracting errors that may occasionally impede understanding, choosing words that are appropriate, and using some varied kinds of sentence structures to vary pace.
- Reading
  - Identify a clear central idea or theme in somewhat challenging passages or their paragraphs
  - Summarize key supporting ideas and details in somewhat challenging passages
  - Recognize a clear intent of an author or narrator in somewhat challenging passages
  - Locate simple details at the sentence and paragraph level in somewhat challenging passages
  - Draw simple logical conclusions in somewhat challenging passages
  - Draw a logical conclusions using information from two informational texts
  - Identify simple cause-effect relationships within a single paragraph in somewhat challenging and literary narratives
  - Infer a purpose in somewhat challenging passages and how that purpose shapes content and style

Social Studies Standards:

- Chronological Reasoning
- Sequencing - Design one's own sequential pattern of events and explain why they occurred in this manner
- Historical Connections
- Comparison - Categorize the traits of two items by placing them into "like" topics (grouping a list of traits)
- Analyzing Historical Sources
- Evidence - Describe details/ evidence that support a main idea/ argument statement