Sparta Area School District

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Course Outcome Summary

Course Information: **Sustainable Energy (Year A)**

Description: Students research the projected growth for Wisconsin and energy demands necessary for that population while investigating sustainable energy resources and production.

Instruction Level: Grades 6-8

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

Units

1. **Forms of Energy**
2. **Input/output of Energy Production**
3. **Hydroelectric Power**
4. **Solar Cars**
5. **Home Insulation**
6. **Electromagnetism**
7. **CBL Challenge**

Unit Outlines

1. Forms of Energy

Essential Question:

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

- What are the various methods for producing energy and their environmental impact?

Essential Knowledge:

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

- Students research and learn about the different types of sustainable energy.

2. Input/ Output of Energy Production

Essential Question:

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

- How is power input/output calculated?

Essential Knowledge:

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

- Students will investigate various ways that energy is measured (Watts, horsepower, joules, Btu).

3. Hydroelectric Power

Essential Question:

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

- What are the various methods for producing energy and their environmental impact?

Essential Knowledge:

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

- Students research and understand how turbines generate power.

4. Solar Cars

Essential Question:

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

- What are the various methods for producing energy and their environmental impact?

Essential Knowledge:

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

- Students build and test solar cars to understand factors that produce the most power.

5. Home Insulation Project

Essential Question:

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

- What methods are used for energy conservation?

Essential Knowledge:

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

- Students understand the r factors of different insulation products.

6. Electromagnetism

Essential Question:

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

- What are the various methods for producing energy and their environmental impact?

Essential Knowledge:

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

- Students learn about electromagnetism and apply their knowledge by building small electromagnets.

7. Challenge-Based Learning

Essential Question:

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

- How can we meet the energy demands in America in a safe and sustainable manner?

Essential Knowledge:

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

- Students investigate a renewable energy source to reduce our dependency on fossil fuels.

Science Standards:

- Interpretation of Data
  - Select one piece of data from a simple data presentation (e.g., a simple food web diagram)
  - Identify basic features of a table, graph, or diagram (e.g., units of measurement)
  - Understand basic scientific terminology
  - Compare or combine data from two or more simple data presentations
- Scientific Investigation
  - Understand the tools and functions of tools used in a simple experiment
- Evaluation of Models, Inferences, and Experimental Results
  - Find basic information in a model (conceptual)
  - Identify implications in a model

Technology Standards:

- Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

- Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
- Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
- Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.

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:

- Substitute whole numbers for unknown quantities to evaluate expressions
- Determine the probability of a simple event
- Write and Solve one-step equations
- Solve problems involving concepts such as rate and proportion, tax added, percentage off, and estimating by using averages
- Represent real-world problems with equations or inequalities
- Understand that functions are rules with input-output values

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
    - Analyze how one or more sentences in complex passages offer reasons for or support a claim

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