Grade 5 STEM Unit 1: Energy

Content Area: **STEM**
Course(s): **STEM Grade 5**
Time Period: **MP1**
Length: **7 days**
Status: **Published**

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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 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.

Science and Engineering Practices

Asking Questions and Defining Problems

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5- ETS1-1)

ETS1.B: Developing Possible Solutions

Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) □

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Engineering, Technology, and Science on Society and the Natural World

People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)

Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Rationale and Transfer Goals

This unit introduces students to the concept of energy and its different forms, helping them understand the role of energy in everyday life. By exploring energy transformations and conservation, students will gain a deeper appreciation for the interplay between energy and the environment.

Enduring Understandings

There are many different types of energy.

Energy is used to grow food and to digest food.

Energy exists in various forms and can be transformed from one form to another. Understanding energy conservation is crucial for making sustainable choices and minimizing waste.

An advantage of renewable energy is that it will never run out unlike the fossil fuels we more commonly use.

A disadvantage of wind and solar energy is it can be difficult to store efficiently.

Essential Questions

What is energy and how does it manifest in different forms?

How does energy transform from one form to another?

What are the benefits of conserving energy and making sustainable choices?

Content - What will students know?

- Forms of Energy
- Energy Transformations
- Energy Conservation
- Sustainable Energy Resources

Skills - What will students be able to do?

- Identify and classify types of energy
- Analyze examples of energy transformations
- Describe the importance of energy conservation
- Explore renewable and non-renewable energy sources

Activities - How will we teach the content and skills?

- Energy Slides and notes
- Energy Conservation worksheet
- Wind Power Reading Comprehension
- Hydropower-Energy from Moving Water reading comprehension
- Prototype Wind Turbine
- Solar Oven Project and Reflection

Evidence/Assessments - How will we know what students have learned?

- Energy forms categorization, class discussions
- Presentation materials, group discussions
- Solar Oven Project Rubric
- Prototype Wind Turbine Rubric
- Daily Formative Assessment

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Forms of energy and energy transformations.		Compare and contrast the energy transformations observed in this

		unit with the principles of simple machines from the upcoming unit.

Key Resources

- www.teachengineering.org
- www.awea.org
- www.energyquest.ca.gov/
- www.eia.gov/kids/
- www.nrel.gov

21st Century Life and Careers

9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).
9.4.5.CI.4	Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).
9.4.5.CT.1	Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
9.4.5.CT.2	Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
9.4.5.CT.3	Describe how digital tools and technology may be used to solve problems.
9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

Interdisciplinary Connections/Companion Standards

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RI.5.1 Quote accurately from a text and make relevant connections when explaining what the text says

explicitly and when drawing inferences from the text. (3-5-ETS1-2)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different perspectives of a topic. (3-5-ETS1-1), (3-5-ETS1-3)

W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1), (3-5-ETS1-3)

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1), (3-5-ETS1-3)

NJSLS Mathematics

MP.2 Reason abstractly and quantitatively. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)

MP.4 Model with mathematics. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)

MP.5 Use appropriate tools strategically. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)

3-5.OA Operations and Algebraic Thinking (3-5-ETS1-1), (3-5-ETS1-2)