



Marietta City Schools

District Unit Planner

Science Grade 8

Unit title	Energy Forms & Transformations	MYP year	3	Unit duration (hrs)	15 Hours
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system.

- Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.
- Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.).
- Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

In third grade, students should have mastered the following:

S3P1.a. Ask questions to identify sources of heat energy.

In fourth grade, students should have mastered the following:

S4P2. b. Design and construct a device to communicate across a distance using light (and/or sound).

Concepts/Skills to be Mastered by Students

- Energy
- Energy Transformations
- Kinetic and Potential

Key Vocabulary: (KNOWLEDGE & SKILLS)

Energy, energy transformation, law of conservation of energy, kinetic energy, thermal energy, mechanical energy, electrical energy, magnetic energy, potential energy, chemical potential, gravitational potential, elastic potential, convert, transfer, velocity

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

How does matter and energy interact within the universe?

Unit Phenomena (LEARNING PROCESS)

How can we design the best roller coaster that maximizes energy within the system?

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

- Students will likely have many alternate conceptions about energy. Two common ones are that only living things have energy and that objects can create their own energy.
- Students may not have a full understanding of the Law of Conservation of Energy, which states that:
Energy can neither be created nor destroyed; rather, it can only be transformed or transferred from one form to another.
- Students may need literary devices to help them remember the difference between kinetic and potential energy (root words, analogies, and mnemonics).

Key concept	Related concept(s)	Global context
<p align="center">Systems</p> <p>Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.</p>	<p align="center">Energy (MYP/CCC) Transformation (MYP)</p>	<p align="center">Scientific and technical innovation</p> <p>How the world works: an inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p>

Statement of inquiry

Scientific and technical advancements have led to the development of multiple systems that facilitate energy transformations.

Inquiry questions**Factual**

What is energy?
 What forms does energy take?
 How does kinetic energy differ from potential energy?
 What does the Law of Conservation of Energy state?

Conceptual

Why does energy matter to us? How does it play a role in our everyday lives?
 How do you know if something has energy?
 How do objects get energy?
 How do I know whether something has potential or kinetic energy?
 How does energy change forms?

Debatable

What is the best way to capture energy from the human body in order to power a device?

What design is the best for a roller coaster that maximizes energy within its system?		
MYP Objectives	Assessment Tasks	
What specific MYP objectives will be addressed during this unit?	Relationship between summative assessment task(s) and statement of inquiry:	List of common formative and summative assessments.
<p>Science:</p> <p>Criterion A: Knowing and Understanding</p> <p>i. describe scientific knowledge</p> <p>ii. apply scientific knowledge to solve problems set in familiar and unfamiliar situations</p> <p>Criterion D: Reflecting on the Impacts of Science</p> <p>i. describe the ways in which science is applied and used to address a specific problem or issue</p> <p>ii. discuss and analyze the various implications of using science and its application in solving a specific problem or issue</p> <p>iii. apply scientific language effectively</p> <p>Design:</p> <p>Criterion A: Inquiring and Analyzing</p> <p>i. explain and justify the need for a solution to a problem</p>	<p>SOI: Scientific and technical advancements have led to the development of multiple systems that facilitate energy transformations.</p> <p>Throughout this unit, and as part of their unit assessment, students will have multiple opportunities to analyze, evaluate, and create systems that facilitate energy transformations.</p> <p>Students will identify energy forms and demonstrate their understanding of the process of energy transformations in terms of the human need for energy.</p> <p>Through the exploration of scientific inventions and innovations, students will demonstrate their ability to plan and design a system that can be used to make a fan spin/power a light.</p> <p>Students will also explore the physics of roller coasters and pendulums while understanding the PE to KE energy transformations that occur, and while evaluating models of functioning roller coasters and pendulums with different variables of PE/KE being given.</p>	<p>Formative Assessment(s):</p> <p>CFA: PE/KE Variables</p> <p>Summative Assessment(s):</p> <p>Energy Forms and Transformations Unit Assessment Paper I (Science: A,D)</p>

<p>Criterion B: Developing ideas</p> <p>i. develop a design specification which outlines the success criteria for the design of a solution based on the data collected</p> <p>iii. present the chosen design and outline the reasons for its selection</p> <p>iv. Develop accurate planning drawings/diagrams and outline requirements for the creation of the chosen solution</p> <p>Criterion C: Creating the solution</p> <p>iii. follow the plan to create the solution, which functions as intended</p> <p>Criterion D: Evaluating</p> <p>iii. describe how the solution could be improved</p>		
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Approaches to learning (ATL)

Category: Self-Management
Cluster: Organization
Skill Indicator: Bring necessary equipment and supplies to class.

Learning Experiences

Add additional rows below as needed.

Objective or Content		Personalized Learning and Differentiation
<p>S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. a. Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object.</p>	<ul style="list-style-type: none"> ● Energy Skate Park PhET ● Ball Drop Exploration ● Analyzing and Interpreting PE/KE Graphs ● Design a Rollercoaster System (Design: A-D) ● Lab: Investigating Pendulums (Science: B-D) 	<ul style="list-style-type: none"> ● Discovery Education Science Techbook ● NGSS Case Studies for Differentiated Learners ● Next Generation Science Standards: “All Standards, All Students” ● Extensions – Enrichment Tasks/Projects <p>Task-Specific Differentiation</p> <ul style="list-style-type: none"> ● Scaffolding ● Extended Learning ● Sentence Starters ● Leveled Tasks ● Mode/Method of Presentation ● Type of Product
<p>S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. b. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.).</p>	<ul style="list-style-type: none"> ● Energy Skate Park PhET ● Ball Drop Exploration ● Analyzing and Interpreting PE/KE Graphs ● Design a Rollercoaster System (Design: A-D) ● Lab: Investigating Pendulums (Science: B-D) 	
<p>S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. c. Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].</p>	<ul style="list-style-type: none"> ● Energy Forms and Changes PhET ● Energy Transformation CER ● Designing a System to Make a Fan Spin 	

Content Resources

Georgia Grade 8 Science: Interactions of Matter and Energy Instructional Segment

Discovery Education Grade 8 Science Techbook

Unit 2: Types of Energy

Concept 2.1 Kinetic Energy

Concept 2.2 Potential Energy

PhET:

Energy Forms and Changes

Energy Skate Park

Amplify: Harnessing Human Energy Unit

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