Unit 1 - Harnessing Human Energy

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In the Harnessing Human Energy unit, students will develop an understanding of energy and how it can affect matter. They will gather evidence that energy can be neither created nor destroyed. They will discover the difference between potential energy and kinetic energy and how each type of energy can be converted into the other. They will gain experience analyzing the transfer of energy within a system in order to understand the parts of the system and their interactions.

Enduring Understandings

Cause and effect relationships may be used to predict phenomena in natural or designed systems.
Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.
Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).
Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy and matter flows within systems.

Essential Questions

How is it possible to charge electrical devices when the power is out?
How do you know something has energy?
How do objects get energy?
What is the best way to capture energy from a bodies' motion?

Learning Objectives

Whenever something moves or changes, it is because of energy.
When something is moving, it has kinetic energy.
When something has the ability to make things more or change in the future, it has potential energy, even if it is not moving or changing now.
Nothing creates energy. If something has energy, the energy must have been transferred from something else.
Energy can be transferred from one object to another, and energy can be converted from one type to another.
Explore the Simulation and use physical materials to build energy systems.
Use the Sim to learn about how energy is transferred.
Analyze different possible sources of energy for the rescue team.
Design and build physical models of energy systems that harness human energy.
Evaluate and critique an energy-harnessing device that has been proposed as an energy solution for a school.
Science Innovators Scrapbook Project. (Lessons satisfy the following legislative requirements: DEI,

LGBTQIA+ & People w/ Disabilities, AAPI, Climate Change, and Amistad.

Standards: Content

MS-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
MS-PS3-2	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
MS-PS3-5	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
MS-ETS1-1	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.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary quizzes, Warm Ups, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research
Summative	In correlation with the NJSLS, students must demonstrate the following as summative assessments: MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. MS-ETS1-1. 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.
Alternative & Benchmark	Alternative assessments as required by student IEP/504/I&RS - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, and anecdotal notes. Benchmark – LinkIt Benchmark Assessment, Teacher Generated Assessments
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Amplify Digital Curriculum, Generation Genius, BrainPop, Microsoft 365, Primary and Secondary Source Documents, Lab Materials as needed, Amplify Readings, Labs, Simulations

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

X	Amistad	X	Diversity, Equity, and Inclusion
X	Holocaust	X	LGBT and Disabilities (Grades 6-12)
X	Climate Change	X	Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
X	Responsible Decision-Making	X	Social Awareness
X	Self-Management		

21st Century Skills & Themes

X	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting
X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
X	Information and Media Literacy		Digital Citizenship		Economic and Government Influences

X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		