

V Grade 8 Energy and Energy Resources

Content Area: **Science**
Course(s):
Time Period: **Generic Time Period**
Length: **35 Instructional Days**
Status: **Published**

Stage 1: Desired Results

What is energy?

What are energy resources?

What is thermal energy?

How can thermal energy be used?

How does thermal energy relate to temperature and heat?

Unit Overview/ Rationale

Energy is the ability to cause change.

Energy resources contain energy that can be transformed into other, more useful forms of energy.

Thermal energy is the sum of kinetic energy and the potential energy in the particles that make up a material.

Thermal energy can be used to do work .

Heat is the movement of thermal energy energy from a warmer object to a cooler object.

Standards & Indicators

SCI.5.2.D

The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.

[CCSS.ELA-Literacy.RST.6-8.1](#)

Cite specific textual evidence to support analysis of science and technical texts.

[CCSS.ELA-Literacy.RST.6-8.2](#)

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

[CCSS.ELA-Literacy.RST.6-8.3](#)

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

[CCSS.ELA-Literacy.RST.6-8.10](#)

By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

[CCSS.ELA-Literacy.RST.6-8.7](#)

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

[CCSS.ELA-Literacy.RST.6-8.8](#)

Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

[CCSS.ELA-Literacy.RST.6-8.9](#)

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

MS-PS3-4	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
SCI.7-8.5.2.8.D	The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.
SCI.5-6.5.2.6.E.1	Model and explain how the description of an object's motion from one observer's view may be different from a different observer's view.
SCI.7-8.5.2.8.C.b	Energy is transferred from place to place. Light energy can be thought of as traveling in rays. Thermal energy travels via conduction and convection.
SCI.7-8.5.2.8.C.2	Model and explain current technologies used to capture solar energy for the purposes of converting it to electrical energy.
SCI.7-8.5.2.8.D.a	When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer. As an object falls, its potential energy decreases as its speed, and consequently its kinetic energy, increases. While an object is falling, some of the object's kinetic energy is transferred to the medium through which it falls, setting the medium into motion and heating it.

Big Ideas - Students will understand that...

- When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer.
- As an object falls, its potential energy decreases as its speed, and consequently its kinetic energy, increases.
- While an object is falling, some of the object's kinetic energy is transferred to the medium through which it falls, setting the medium into motion and heating it.
- Nuclear reaction take place in the Sun.
- In plants, light energy from the Sun is transferred to oxygen and carbon compounds, which in combination, have chemical potential energy (photosynthesis).

Essential Questions - What provocative questions will foster inquiry and transfer of learning

Chapter 5 - Energy and Energy Resources

- What is energy?
- What are potential and kinetic energy?
- How is energy related to work?
- What are different forms of energy?
- What is the law of conservation of energy?
- How does friction affect energy transformations?
- How are different types of energy used?
- What are nonrenewable energy resources?
- What are renewable energy resources?
- Why is it important to conserve energy?

Chapter 6 - Thermal Energy

- How are temperature and kinetic energy related?
- How do heat and thermal energy differ?
- What is the effect of having a small specific heat?
- What happens to a material when it is heated?
- In what ways can thermal energy be transferred?
- How does a thermostat work?
- How does a refrigerator keep food cold?
- What are the energy transformations in a car engine?

Content - Students will know...

Chapter 5

- Energy is the ability to cause change.

- Kinetic energy is energy a body has because it is moving. Potential energy is stored energy.
- Work is the transfer of energy that occurs when a force is applied over a distance.
- Different forms of energy include thermal energy and radiant energy.
- According to the law of conservation of energy, energy can be transformed from one form into another or transferred from one region to another, but energy cannot be created or destroyed.
- Friction transforms mechanical energy into thermal energy.
- Any form of energy can be transformed into other forms of energy.
- A nonrenewable energy resource is a resource that is available in limited amounts and can be used up.
- A Renewable resource is replaced in nature as fast as, or faster, than it is used.
- Conserving energy, such as turning off lights when they are not needed, is one way to reduce the rate at which energy resources are used.

Chapter 6

- The temperature of a material is the average kinetic energy of the particles that make up the material.
- Heat is the movement of thermal energy from a warmer material to a cooler one.
- Thermal energy can be transferred through conduction, radiation, or convection.
- When a material is heated, the thermal increases and the material expands.
- When a material has a low specific heat, transferring a small amount of energy to the material increases its temperature significantly.
- Two different metals in a bimetallic coil inside a thermostat expand and contract at different rates. The bimetallic coil curls and uncurls, depending on the thermal energy of the air, pushing a switch that turns a heating or cooling device on or off.
- A refrigerator keeps food cold by moving thermal energy from inside the refrigerator out to the refrigerator's surroundings.
- In a car engine, the chemical energy in fuel is transformed into thermal energy. Some of this thermal energy is then transformed into the mechanical energy.

Skills - Students will be able to...

- Relate the kinetic and potential energies of a roller coaster at various points on its path.
- Describe the flow of energy from the Sun to the fuel tank of an automobile.
- Model the relationship of the height of an object and its potential energy.

Stage 2: Assessment Evidence

Assessment

End of Unit Assessments (multiple choice and constructed responses)

Mini-lab Performance-based Assessments (rubrics)

Essential Questions Responses

Page Keeley Science Probes (formative assessments)

CHOICE ASSESSMENTS:

Performance-based Project- Roller Coaster WebQuest

Performance-based Project- Presentations to the Class

Stage 3: Learning Plan

Learning Activities

Academic Vocabulary Activities: journals, e-flash cards, puzzles, e-games

Mini-Labs (student engagement)

Launch Labs (teacher and/or student led)

Inquiry Labs (use of inquiry skills)

Interactive technology: Roller coaster WebQuest, classroom presentations, science videos, transparencies, interactive whiteboard activities, online assessments

Language arts strategies: make tables, answer guiding questions, organizing ideas, illustrating ideas, outlines, infer meaning, compare and contrast, make connections

Accommodations for students with IEPs and learning difficulties:

-Visual sentence frames using academic vocabulary for discussion

-Graphic organizers and sentence starters for literary analysis writing

-Graphic organizers for comparing and contrasting of characters, plot, and theme in order to create a written narrative.

-Graphic organizers/worksheets for book club roles that explains in detail about what each role entails

-Model how to perform specific roles for book clubs

-Use visuals to show important vocabulary for students to make connections

-Have students share their text to text, text to world, and text to self-connections

-One on one teacher support for comprehension and fluency

- Modeling and scaffolding to highlight specific moments, vocabulary, and figurative language, and using context clues to use inference skills

-Show and discuss exemplar writing pieces before students being their own

-Close reading chapters/chunks

-Re-reading key sections for fluency and comprehension

-Colored overlays and reading windows to reduce visual distractions

-Sentence starters for writing assignments

-Vocabulary word banks and strategies (Say it, Define it, Act it)

-Think aloud and Think-Pair-Share

For ELL students:

-Visuals for vocabulary

-Word wall

-Additional word work such as illustrating vocabulary and playing vocabulary games

-Partner reading

-Choral reading

-Think-aloud while modeling writing

-Analyze sample summaries before writing

-Color-coded sticky notes for close reading to identify which sticky notes pertain to vocabulary

-Questions about text, etc.

-When students make an error in speaking, answer or restate what they said using the correct form without drawing attention to the mistake.

For gifted students:

-Have students complete extended research projects on a related issue of their choice as it pertains to a content area

-Students perform a written/oral debate on topics related to content

Resources

Glencoe Earth and Space iScience, McGraw Hill, 2012

Page Keeley Science Probes

Brain POP shorts

Various literature selections connected to science topics

Internet video clips

Online resources from Glencoe

Power Point (Super Lab)

Unit Reflections & Teacher Notes

Combine this chapter with Chapter 6. This becomes a large unit on Energy and Alternative energies, and thermal energies.

Students really enjoy the Antarctica Project where they must design and build a research facility in Antarctica, and they must incorporate the use of alternative energy sources in their final stages of their project.

This year we are not doing the Antarctica project due to space limitations. Instead, students are working in groups to develop their own power point presentations to take turns presenting the lessons to the class as if they are the teachers. They are researching their topics, creating their power points, developing worksheets for guided reading to accompany their presentations, and they are assessing the other students through the use of a quiz they create from scratch. This is completed in class, virtually eliminating the problems of not being able to get to other people's houses, and allowing me to view their progress, participation, and level of effort with respect to levels of contribution.

