MINNESOTA Literacy COUNCIL
Sharing the Power of Learning

Lesson 2.11: Physical Science –Energy

Weekly Focus: Reading for Comprehension
Weekly Skill: Introduction to Energy

Lesson Summary: This week students will continue reading for comprehension and get an introduction to various forms of energy.

Materials Needed:

- Reading for Comprehension **Unit 2.11 Handout 1**
- Application of New Information: **Unit 2.11 Handout 2**
- Extra Work/Homework: **Unit 2.11 Handout 3** (6-Way Paragraphs, Advanced Level, #30, pages 60-61)

Objectives: Students will be able to…

- Gain an understanding of energy and its various forms in physical science
- Apply knowledge of energy and its various forms

College and Career Readiness Standards: RI, RST, WHST, SL

ACES Skills Addressed: EC, LS, ALS, CT, SM, N

Notes: Please review and be familiar with classroom routine notes for: reading for fluency strategies (**Routine 2**), summarizing techniques (**Routine 4**) and self-management skills (**Routine 1**). The notes will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be a short answer portion (suggested 10 minutes) where students may have to summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.

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Lesson 2.11: Physical Science –Energy

Activities:

Warm-Up: Energy Forms	Time: 5 - 10 minutes
Today's lesson involves an introduction to various forms of energy in physical science. Write on the board "*What are different forms of energy that you know of and use on a daily basis?*" Ask students to write in their notebook or journal. They can discuss the topic at their table groups or with classmates. Circulate the classroom to get students thinking about forms of energy they use. If students have a hard time getting started, ask them what form of energy they used to get to class (i.e.: gas/oil for bus or driving, food energy for walking or biking).	

Activity 1: Comprehension Reading (Unit 2.11 Handout 1)	Time: 40 - 45 minutes
1) Distribute **Unit 2.11 Handout 1** to students. **2)** Explain to students that the purpose of the reading passage is to introduce them to key vocabulary and concepts surrounding energy. **3)** Ask students to review the title and count the number of paragraphs in the reading passage. Ask students how they know where a paragraph begins. Explain that it is important to know how to find a paragraph quickly as some test questions may ask students to refer to a certain paragraph. If you have an overhead, point to it and/or label the indents. **4)** Explain to students they should read all of the paragraphs silently in order to answer the questions that follow. To help students find the main idea of the reading passage, remind them to think "*What are <u>all</u> of the paragraphs about?*" and "*What is the point that the author is trying to make?*" while reading. **5)** While students are reading, circulate and discuss with students that when reading for comprehension, there are many strategies to use: <u>read the title</u> to predict what the reading is about; while reading remember to ask "<u>What is this all about</u>?" **6)** Review answers as a whole class. Ask students to point out the evidence (proof) from the reading that led them to the answer. **7)** If there is extra time, have students read the passage in pairs to promote reading fluency. If there is extra time or to challenge students, they can write a 3 – 5 sentence summary of all of the material presented. Use <u>Routine 4 Summarizing Techniques Handout.</u>	

Break: 10 minutes

Activity 2: Application of Knowledge (Unit 2.11 Handout 2)	Time: 40 – 50 minutes
1) Distribute the handout **(Unit 2.11 Handout 2)** to students. **2)** Explain to students that the purpose of this activity is for them to review and apply the knowledge they have gained from the reading passage on energy as well as information from Newton's Laws of Motion. The handout includes real-life activities and students have to critically think which kind of energy is being used. **3)** Students are able to use their notes from previous lessons to fill in the charts. **4)** Circulate while students are working on this. Have them think about what they remember about the different forms of energy. There may be few new forms (thermal or electrical). **5)** Review answers as a whole class. Ask students to point out the evidence (proof) from the	

reading that led them to the answer.
6) If there is time, ask students to think of their own examples of kinetic and potential energy to add to the columns.

Wrap-Up: Summarize	**Time: 5 minutes**
Have students turn to a partner (or write in their journals) about what they have learned today about energy. They may want to discuss some of the areas that they would like to do further study on in the future. Their summary may include any wonderings they have about the subject. *Note: Use Routine 4 Handout*	

Extra Work/Homework: Unit 2.11 Handout 3	**Time: 15 minutes outside of class**
Students can read and answer questions from the **Unit 2.11 handout 3** (2 pages total.) This is an excellent opportunity for students to review today's material in a different format.	

Differentiated Instruction/ELL Accommodation Suggestions	**Activity**
If some student groups finish early, they can turn their paper over and summarize the passage on energy.	**Activity 1 Handout 1**
There may be a lot of new vocabulary and ideas for some students, be prepared to assist by circulating while they are reading.	**Activity 1 & 2**

Online Resources:

Online Quiz of Physical Science: Energy

If students are able to have access to the Internet, there are some online quizzes for them to check on their knowledge of energy. The online component may help with digital literacy skills needed for GED 2014.

http://www.proprofs.com/quiz-school/story.php?title=physical-science-energy-unit-quiz

Suggested Teacher Readings:

- GED Testing Service – GED Science Item Sample (to get an idea of what the test *may* be like)

  http://www.gedtestingservice.com/itemsamplerscience/

- Assessment Guide for Educators: A guide to the 2014 assessment content from GED Testing Service:

  http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf

- Minnesota is getting ready for the 2014 GED test! – website with updated information on the professional development in Minnesota regarding the 2014 GED.

  http://abe.mpls.k12.mn.us/ged_2014_2

Unit 2.11 Handout 1 (4 pages total)

A Ball of Energy

By Gabrielle Sierra

The word "energy" can mean a whole lot of different things. It comes in many forms, but they are all important. Energy lends life and movement to many elements of our world.

The word energy comes from the Greek word "energeia," which dates all the way back to the work of Aristotle, a famous philosopher. The term "energy" is used in many different forms of study, including the natural sciences. Energy is necessary in order to perform mechanical work.

The joule is the International System of Units' unit for measuring energy. But energy can also be expressed through other units like calories, kilocalories, and ergs. Each of these additional units comes with a conversion formula to the joule.

For us on earth, the sun is the major source of energy. This is what allows plants to grow and also influences our ocean's currents. The sun loses energy by emitting light, lending a small fraction of it to earth. This transfer allows for us to have light, which travels on a variety of wavelengths.

Solar energy can be harnessed to produce many things, including electricity and heat. Some believe that solar energy can eliminate the more harmful pollutants on our earth resulting from energy powered by gas or coal. There are ways to capture solar energy with panels and use it for everyday tasks like cooking, heating water to shower, and driving.

Lesson 2.11: Physical Science –Energy

More and more architects and urban planners are incorporating solar energy into their designs of homes and office buildings. These methods, which were first employed by the Chinese and Greeks, are used to capture solar energy and then provide buildings with light and warmth. Solar-powered cars have been in development for a long time, and many believe they are a viable solution to pollution.

Solar energy is a clean form of energy, as is wind energy, captured by turbines and windmills and channeled into grids. These are both alternative to fossil fuels, which pollute the environment. Wind and solar energy are both renewable and clean.

The meaning of the word "energy" changes when you get into the physical sciences. Of the many forms of energy that have been defined by the physical sciences, one of the best known is kinetic energy.

Kinetic energy is a term related to physics that describes the energy an object possesses due to motion. Measuring an object's kinetic energy means measuring the amount of force an object needs to accelerate.

There are several forms of kinetic energy. These include: vibrational energy, or energy due to a vibrating motion; rotational energy, or energy due to a rotating motion; and translational energy, the energy due to the movement from one location to another.

A good way to examine kinetic energy is by looking at a roller coaster. The cars of a roller coaster reach their highest kinetic energy when they are at the bottom of a hill. But then they start rising again their kinetic energy become potential energy instead, which is energy an object has in relation to its position in space.

One of the best ways to examine potential energy is by looking at a bow and arrow. Energy is transferred from the potential energy in the archer's arm into the bow as it is drawn back. When it is released, the potential energy in the bow is transferred through the string and become energy as the arrow shoots outward.

Heat is another type of energy. Heat can be transferred from one body to another in a whole bunch of ways, including processes called conduction, radiation, and convection.

Conduction means that the heat is transferred by the diffusion and collision of participles within a body due to a temperature change. Radiation means that the heat is transferred through electromagnetic waves or moving particles. Convection means that heat is transferred through the movement of liquids. It is important to remember that heat is always associated with a process, such as flow and transfer.

One of the most common uses of the word "energy" is in reference to food energy. This is the energy that animals and humans derive from their food. The human body uses energy for a wide range of things, including metabolism in our organs and tissues and to move. That is why people who lead a sedentary lifestyle (or site around a lot) require less energy.

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Lesson 2.11: Physical Science –Energy

Choose the best and answer from the list provide for each statement or question.

1. Select the word that is NOT a type of energy covered in the text.

A. Kinetic **B.** Solar
C. Stationary **D.** Food

2. How does the author contrast solar energy with fossil fuels?

A. Solar energy is Chinese and fossil fuels are Greek.
B. Solar energy is clean and renewable while fossil fuels cause pollution.
C. Fossil fuels are classified as kinetic energy and solar energy is classified as potential energy.
D. Fossil fuels are older than solar energy.

3. The sun loses energy by transferring light to the earth. On earth, we are able to use the light for solar power among other things.

What conclusion can you draw from the above statement?

A. Light is the only way to transfer energy.

B. The heat from the sun is a result of the light energy.

C. Energy lost by one object can be captured or used by another.

D. The sun uses kinetic energy.

4. If somebody leads a very active lifestyle, what will they require?

A. less energy from food **B.** more heat energy
C. solar power **D.** more energy from food

5. What is the passage mostly about?

A. several different types of energy, what they do, and how they work
B. how humans use energy from the sun
C. the difference between kinetic energy and potential energy
D. how to measure energy

6. Read the following sentence: "The meaning of the word energy changes when you get into the physical sciences."
What did the author want to communicate to the reader by using this sentence?

A. that she was going to continue her explanation of solar energy
B. that she was going to remind the reader that energy is a scientific topic
C. that she was about to transition the focus of her article to the physical sciences
D. that she was going to introduce the definition of potential energy

7. Choose the answer that best completes the sentence below.
Radiation transfers heat through electromagnetic waves; _____, convection transfers heat through liquid.

A. however
B. so
C. for instance
D. as a result

8. What is the major source of energy for humans on Earth?

_____

_____

_____

9. When an object starts moving on its own, potential energy becomes kinetic energy.
Use evidence from the text to support this statement.

_____

_____

_____

10. Use evidence from the passage to explain what solar energy can be used for and how solar energy is different from other forms of energy

_____

_____

_____

Unit 2.11 Handout 1 –

A Ball of Energy

TEACHER ANSWER KEY

1. C
2. B
3. C
4. D
5. A
6. C
7. A
8. **Answers may vary, suggested answer:**

The sun is the major source of energy for humans on Earth.

9. **Answers may vary, suggested answer:**

The potential energy in an arrow become kinetic energy after it is shot. The potential energy in a rollercoaster car going up a hill becomes kinetic energy when it starts to go down the hill. In both cases, the potential energy became kinetic when an outside force (the arm or the rollercoaster) stopped causing the movement of the object.

10. **Answers may vary, suggested answer:**

Solar energy can generate electricity and heat, it can help plants grow, and make cars move. The passage says that solar energy is a clean form of energy. Some people believe solar energy pollutes less than energy from gas or coal.

Unit 2.11 Handout 2 - (3 pages total)

Name _____ Date _____

Classifying Potential or Kinetic Energy

Various forms of energy can be classified as being either a potential energy source or a kinetic energy source. Classify the phrases in the word box as examples of potential or kinetic energy.

standing at the top of a slide	throw a curve ball	book on a high shelf
wind up for the pitch	a battery	a speeding car
juice in an orange	frog leaping into the water	execute a swan dive
move downhill in a roller coaster	book falls from a high shelf	a parked car
roll down a grassy hill	move down a slide	
an unburned lump of coal	frog sitting on a lily pad	

Potential Energy	Kinetic Energy

Name _____ Date _____

Potential vs. Kinetic Energy

Potential energy is stored energy. It can be released or harnessed to do work. **Kinetic energy** is the energy possessed by an object as a result of its motion. Label each description as an example of **kinetic energy** or **potential energy**.

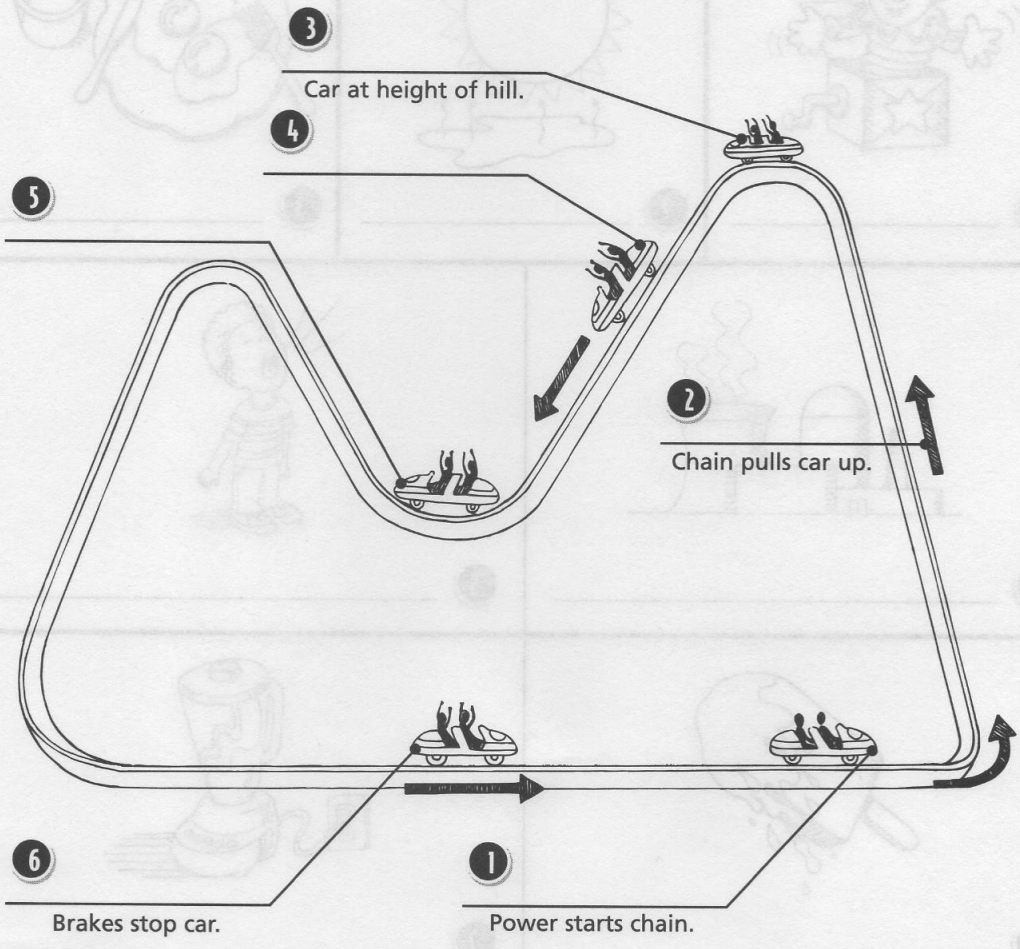
1. _____ A skier is poised at the top of a steep slope.
2. _____ A concrete dam holds back a large reservoir of water.
3. _____ An archer has pulled back the string of his bow, ready to release the arrow at the distant target.
4. _____ A woman swings her golf club down toward the golf ball sitting on the tee.
5. _____ A man swings an axe toward a log.
6. _____ A flowerpot is falling from a windowsill.
7. _____ A catapult is loaded with a boulder and pulled back into position. It is ready to be launched.
8. _____ A fast-moving stream runs toward the mill.
9. _____ The baseball player swings her bat.
10. _____ A roller coaster has reached the top of the highest crest.
11. _____ A marble rolls across the table.
12. _____ A child is about to let go of a yo-yo.

Name _____ Date _____

Energy of One Kind or Another

Scientists classify all energy as kinetic energy or potential energy. At any given time, energy is being stored as potential energy or it is being given off as kinetic energy. The actions of a roller coaster can show how objects move from one type of energy to another. Use the terms in the word box to label the diagram.

electrical energy	potential energy changing to kinetic energy
mechanical energy	most potential energy
most kinetic energy	thermal energy



Unit 2.11 Handout 2

Teacher Answer Key

Page 1 Classifying Potential or Kinetic energy

Potential Energy	Kinetic Energy
Standing at the top of a slide	Move down a slice
Sind up for the pitch	Throw a curve ball
A battery	Execute a swan dive
Juice in an orange	Move downhill in a roller coaster
An unburned lump of coal	Frog leaping into the water
Frog sitting on a lily pad	Roll down a grassy hill
Book on a high shelf	Book falls from a high shelf
A parked car	A speeding car

Page 2:

1. potential energy
2. Potential energy
3. Potential energy
4. kinetic energy
5. kinetic energy
6. kinetic energy
7. Potential energy
8. kinetic energy
9. kinetic energy
10. Potential energy
11. kinetic energy
12. Potential energy

Page 3: Energy of One Kind or Another

1. electrical energy (electrical power to begin the roller coaster)
2. mechanical energy (chain is moving car)
3. most potential energy (at the top of hill)
4. potential energy changing to kinetic energy (moving)
5. most kinetic energy (at bottom)
6. thermal energy (creating friction)

Unit 2.11 Handout 3

ANSWER KEY

1. a. N (narrow)
   b. B (broad)
   c. M (main)
2. a
3. c
4. b
5. a
6. c