Contents

TEACHER GUIDE

STUDENT HANDOUTS

NAME: _____

Before You Read

What Is Energy?

1. Complete each sentence with a word or group of words from the list. Use a dictionary to help you.

chemical energy | energy | matter | mechanical energy | wave

a) Kinetic and potential are two kinds of _____.

b) Sound and light travel in _____s.

c) _____ is the ability to do work.

d) All atoms are made of _____

e) Food and batteries store energy in the form of _____.

2. Circle T if the statement is TRUE or F if it is FALSE. You may use a dictionary to help you.

T F **a)** Things in motion have **kinetic** energy.

T F **b)** Light is a form of **matter**.

T F **c)** Atoms and molecules have **kinetic** energy.

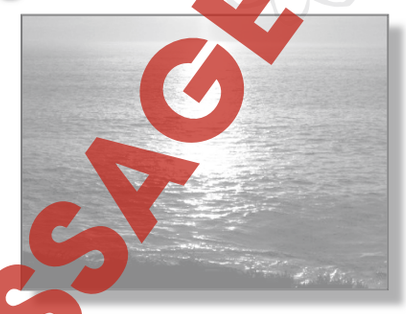
T F **d)** **Electrical** energy travels through wires.

T F **e)** **Energy** cannot be moved from one place to another.

Reading Passage

NAME: _____

What Is Energy?



Science is mostly about matter and **energy**. We say that matter is anything that has mass and takes up space. That is easy to understand. But energy is more mysterious. We can say that energy is the ability to do work. That is true, but it does not give a very clear idea of what energy is.

The best way to understand energy is to first look at all the different kinds of energy. The more kinds of energy we learn about, the more we get a feeling for it. Energy is like happiness. You can't give a simple scientific explanation of happiness, but you know when you've got it.

First, think about **mechanical energy**. There are two kinds of mechanical energy, **potential energy** and **kinetic energy**. Things in a high place have potential energy.

STOP

Name one thing that has potential energy and one thing that has kinetic energy.

_____

_____

Things that are moving have kinetic energy.

Thermal energy is the energy in the moving particles of a material. This means that thermal energy is also a kind of kinetic energy. When thermal energy moves from one thing to another it is called **heat**.

Some kinds of energy travel in the form of **waves**. Waves on water carry energy. **Sound** and **light** are two other kinds of energy that travel in waves.

Other kinds of energy are **chemical energy** and **electrical energy**. Stretched springs and rubber bands also have energy.

As we study these different kinds of energy, you will begin to get an idea of what energy is.

NAME: _____

After You Read

What Is Energy?

1. Put a check mark (✓) next to the answer that is most correct.

a) All of these words describe forms of energy, *except*.

- ○ **A** chemical
- ○ **B** electrical
- ○ **C** material
- ○ **D** thermal

b) Which of these kinds of energy travels in the form of waves?

- ○ **A** chemical
- ○ **B** kinetic
- ○ **C** potential
- ○ **D** sound

c) How does an object gain potential energy?

- ○ **A** by melting
- ○ **B** by gaining speed
- ○ **C** by cooling to a lower temperature
- ○ **D** by being raised above the ground

2. Fill in each blank with a word from the list. One word will be left over.

thermal	waves	chemical
heat	mechanical	electrical

a) _____ energy travels through wires.

b) _____ energy is in the motion of particles.

c) Light energy travels in _____.

d) Kinetic and potential are the two kinds of _____ energy.

e) When thermal energy moves to another place, it is called _____.

After You Read

NAME: _____

What Is Energy?

Answer the questions in complete sentences.

3. Name two kinds of energy that travel in waves.

_____

_____

4. What gives something potential energy? What gives something kinetic energy?

_____

_____

Extension & Application

5.

a) All the words in the list below are either **matter** or **energy**. Use the chart on the next page to sort the words into types of matter and types of energy. Write the words for things made of matter in the box on the left. Write the words for types of energy in the box on the right.

light	**water**	**air**	**blood**	**sugar**	**sound**
electricity	**potential**	**kinetic**	**wood**	**horses**	

b) In one sentence tell what matter is.

_____

_____

c) In one sentence tell what energy is.

_____

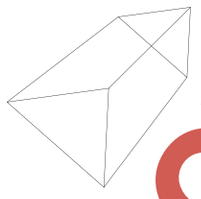
_____

Hands-On Activity # 2

Visible Light

Study the spectrum of visible light.

For this activity you will need a prism. A prism is a piece of glass shaped like this:



Your school may have a prism, or your teacher may be able to tell you where to get one. If you cannot get a prism, you can also use a glass crystal that people hang in their windows. You will also need some **white paper** and a **set of crayons** or **marking pens**.

This is what you do:

1. Put the prism where sunlight will hit one side of it. It should make a rainbow pattern on some surface nearby.
2. Arrange the prism and a sheet of white paper so that the rainbow is *on* the paper.
3. Use the pens or crayons to *copy* the rainbow on the paper *next to* the one the prism is making.
4. Write the names of the seven colors of the rainbow next to the colors. The colors are red, orange, yellow, green, blue, indigo, and violet.
5. Have your teacher help you find the wavelength of each of the colors.
6. Write the wavelength next to each color.

After You Read

NAME: _____

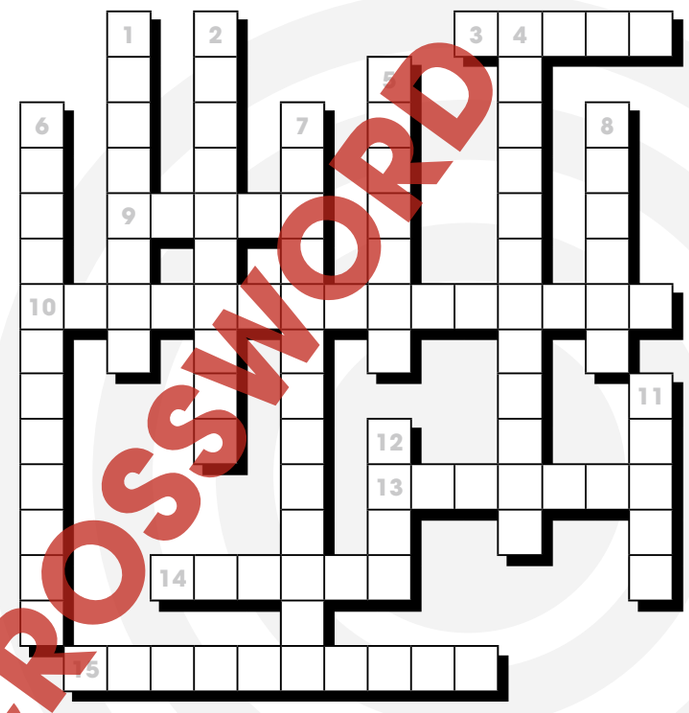
Crossword Puzzle!

Across

3. The _____ of reflection equals the _____ of incidence.
9. We hear it with our ear drum.
10. The kind of radiation that comes from the sun.
13. What smooth, shiny things do to light.
14. Something that can do work.
15. Currents that move heat.

Down

1. What we do to energy when we move it.
2. Movement of heat through a material.
4. When we use all of this, there is no more.
5. A source of energy made by splitting atoms.
6. The law of _____ of energy.
7. Power produced at large dams.
8. This kind of fuel comes from plants that lived long ago.
11. The frequency of a musical note.
12. This kind of radiation is used to take pictures of your bones.



Word List

Angle	Energy	Pitch
Conduction	Fossil	Reflect
Conservation	Hydroelectric	Sound
Convection	Nonrenewable	Transfer
Electromagnetic	Nuclear	Xray

Reading Passage

NAME: _____

Comprehension Quiz

25

Part A

Circle T if the statement is TRUE or F if it is FALSE. 7

T F 1) Potential energy is the energy of motion.

T F 2) Potential energy can be used to do work.

T F 3) A material has thermal energy because its particles are moving.

T F 4) When thermal energy is transferred, it is called heat.

T F 5) Sound can travel across empty space.

T F 6) Visible light is a form of electromagnetic radiation.

T F 7) Natural gas is a renewable source of energy.

Part B

Put a check mark next to the answer that is most correct. 3

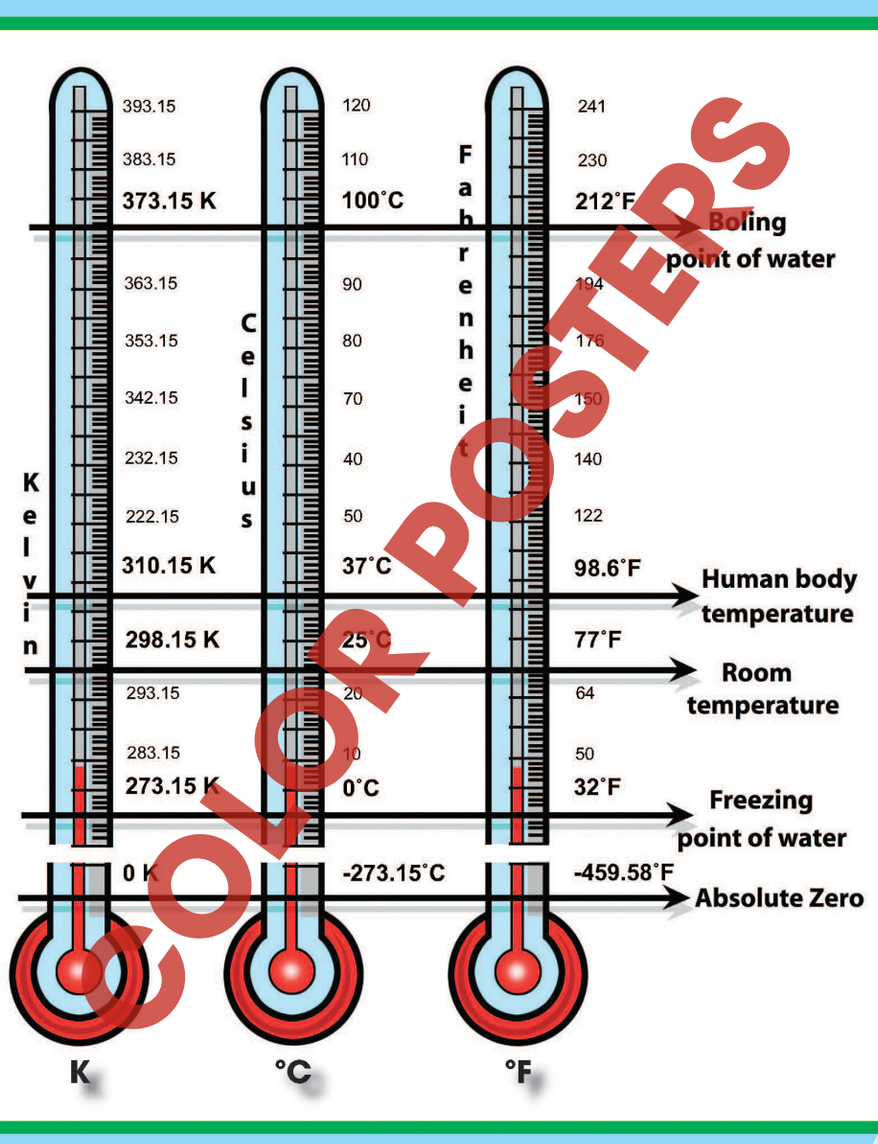
1) Where is chemical energy stored?
- ○ **A** in convection currents
- ○ **B** in stretched molecules
- ○ **C** in the motion of particles
- ○ **D** in the bonds between atoms

2) Which is a problem with nuclear energy?
- ○ **A** Nuclear waste is hard to get rid of.
- ○ **B** Nuclear fuel is quickly running out.
- ○ **C** Nuclear power plants pollute the air.
- ○ **D** Nuclear power is the most expensive energy source.

3) What does temperature measure?
- ○ **A** the speed of heat transfer
- ○ **B** the amount of heat in an object
- ○ **C** the total energy of all molecules
- ○ **D** average kinetic energy of particles

SUBTOTAL: /10

Temperature Scales



NAME: _____

After You Read

Light Energy

Answer the questions in complete sentences.

3.

a) Which colors are reflected by a white shirt?

_____

b) Which colors are absorbed by a black shirt?

_____

c) Which colors are reflected by a red shirt?

_____

4. What is the law of reflection?

_____

_____

Extension & Application

5. It takes approximately *1 second* for light to travel from the moon to Earth. Suppose there was a large mirror on the moon. Now, a bright light flashes on Earth. How long would it take for you to *see* the light reflected by the mirror? Explain how you got your answer.

_____

_____

6. Sound travels one mile in 5 seconds. Light travels much, much faster. When there is a lightning strike, we see the flash and then hear the thunder later. Explain how you could tell how far away you were from a lightning strike.

_____

_____

3.

a) all colors

b) all colors

c) red light

4.

The angle of incidence equals the angle of reflection.

5.

Approximately 2 seconds because the light had to travel to the moon and back

6.

Count the seconds between the flash and the sound and divide by 5. The result is the number of miles away the lightning struck.

1.

a) potential energy

b) nuclear

c) photosynthesis

d) fossil fuels

e) nonrenewable (accept reversal of **d)** and **e)**)

2.

a) F

b) T

c) T

d) F

e) F

Chemical for food, fuel.
Answers will vary.

1.

a) fossil

b) elastic

c) nuclear

d) chemical

e) hydroelectric

f) solar

2.

a) ✓ B

b) ✓ C

c) ✓ C

EZ

3.

If we use all the coal there will be no more for millions of years. Answers will vary.

4.

The sun will keep sending energy for many millions of years. Answers will vary.

5.

a)
Renewable: hydroelectric, solar, wind, wood
Non-renewable: coal, oil, natural gas, nuclear

b)
Answers will vary

c)
Answers will vary