

4th Grade
Science
Home Packet

Riverside Elementary

March 30 – April 3,
2020

Science

4th Grade

March 30 – April 3, 2020

“HEAT ENERGY”

<p>Monday</p>	<p>Read and review Science Heat Energy <u>“NOTES”</u> taken from Science Book</p> <p>If you have internet: Watch <u>Bill Nye the Science Guy – Heat</u> Listen to Song 2 or 3 times – <u>“Radiation, Conduction, Convection”</u> by Mr. Parr Watch Videos on Youtube: Conduction – Convection – Radiation – Heat Transfer Different Modes of Heat Transfer Heat Energy (TurtleDiary.com)</p>
<p>Tuesday</p>	<p>Work Heat Worksheets</p> <p>#1 – “Fahrenheit or Celsius?” Read & answer Q. #2 – “Temperature”</p>
<p>Wednesday</p>	<p>#3 - Read “The Transfer of Heat Energy” by Readworks #4 - Answer the Questions from the story</p>
<p>Thursday</p>	<p>Work Worksheets</p> <p>#5 - “Heat Transfer” Write Conduction, Convection, or Radiation in the blank #6 – “FUELS” Read, then fill in the missing letters</p>
<p>Friday</p>	<p>Flashcards - Cut apart and Study. Make a game of it using your flashcards.</p> <p>Heat Energy Flashcards #1 Heat Energy Flashcards #2</p> <p>NO TEST AT THIS TIME. JUST FUN LEARNING!</p>

Objective: **2g.** Describe how **heat** flows from a warm object to a cold one.
 Categorize examples of materials that may or may not be used as insulators.

1. **heat** – thermal energy that flows from the particles of one object to the particles of another object
2. **conduction** – the flow of heat between two objects that touch
3. **convection** – heat transfer through liquids or gases
4. **radiation** – heat transfer from the Sun to the Earth through space (heat waves, energy waves, light waves)



5. **insulator** – does not transfer heat easily
 Examples: oven mitt, knitted hat, gloves, wool, plastic, fleece jacket, foam cup

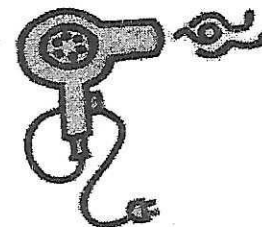


6. **conductor** – transfers heat easily
 Examples: Cooking pot, metal spoon, aluminum pan, asphalt, copper penny

7. **Heat** is the flow of **thermal energy**.

8. **Metal** is a good **conductor**. Heat travels well through metals.

9. In order for **conduction** to occur, two objects must be **touching**.



10. *When you hold a cup of hot chocolate, how does heat travel to your hands?*
 Through **conduction**

11. *Why do people often wear layers of clothing in the winter to help them stay warm?* You trap air between the layers of clothing. Trapped air is a good insulator. The insulation of the clothing and trapped air keep the heat from your body close to you.



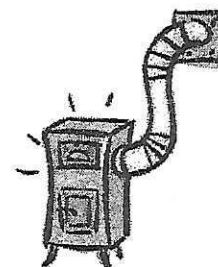
12. **Gloves** are good **insulators** of heat.
 They keep your hands warm on a cold day.

13. *What happens to a metal spoon placed in boiling water?*
The spoon gains heat because it is a conductor.



14. **Wood** would make the best **insulator** for the handle of a frying pan.

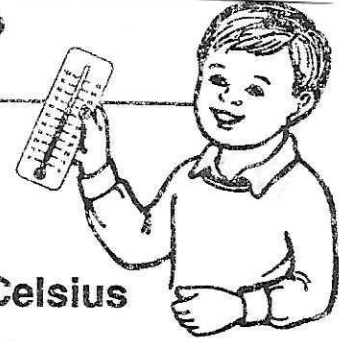
15. *How does a sweatshirt keep you warm on a cold day?*
Sweatshirts are good insulators of heat.



Fahrenheit or Celsius?

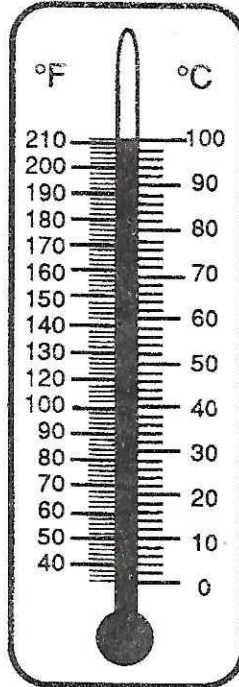
A thermometer measures temperature.

Read about two kinds of scales used on thermometers.



Fahrenheit

The Fahrenheit scale is named after Gabriel Fahrenheit, a German scientist. On this scale, the freezing point of water is 32 degrees (32°F). This means that water turns from liquid to solid at 32°F. The boiling point of water is 212°F. A person's normal body temperature is 98.6°F. Most people in the United States use the Fahrenheit scale.



Celsius

The Celsius scale is named after Anders Celsius, a Swedish scientist. It is part of the metric system. Using this scale, the freezing point of water is 0 degrees (0°C) and the boiling point of water is 100°C. A person's normal body temperature is 37°C. Most countries around the world use the Celsius scale.

Read each phrase below. Write the name of the scale it describes.

1. water freezes at 0°

2. part of the metric system

3. water boils at 212°

4. named after a German scientist

5. used in most countries

6. water freezes at 32°

7. named after a Swedish scientist

8. normal body temperature is 98.6°

Heat Energy WS #2

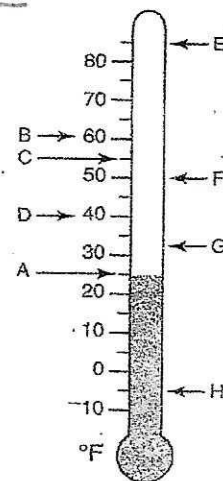
Name _____

Lesson 6.6

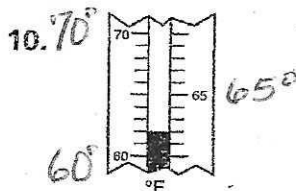
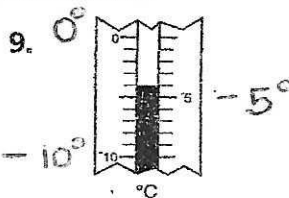
Temperature

Use the thermometer to find the temperature shown by each letter.

- | | | | |
|-------|-------|-------|-------|
| 1. A | 2. B | 3. C | 4. D |
| _____ | _____ | _____ | _____ |
| 5. E | 6. F | 7. G | 8. H |
| _____ | _____ | _____ | _____ |



Write each temperature. Then estimate to the nearest 5 degrees.



* Use a thermometer to find the change in temperature. Add or Subtract.

11. 20°F to 5°F 12. 13°F to 72°F 13. -8°C to 35°C 14. 63°C to 42°C
- _____

* Choose the better estimate. - Use Fahrenheit or Celsius? to help with this.

15. hot tea: 30°C or 95°C 16. lake: 50°F or 100°F 17. ice cream: 3°C or 40°C
- _____

Heat Energy WS #3

The Transfer of Heat Energy

This text is from the U.S. National Oceanic and Atmospheric Administration: National Weather Service.

The heat source for our planet is the sun. Energy from the sun is transferred through space and through the earth's atmosphere to the earth's surface. Since this energy warms the earth's surface and atmosphere, some of it is or becomes heat energy. There are three ways heat is transferred into and through the atmosphere:

- radiation
- conduction
- convection

Radiation

If you have stood in front of a fireplace or near a campfire, you have felt the heat transfer known as radiation. The side of your body nearest the fire warms, while your other side remains unaffected by the heat. Although you are surrounded by air, the air has nothing to do with this transfer of heat. Heat lamps, that keep food warm, work in the same way. Radiation is the transfer of heat energy through space by electromagnetic radiation.

Most of the electromagnetic radiation that comes to the earth from the sun is invisible. Only a small portion comes as visible light. Light is made of waves of different frequencies. The frequency is the number of instances that a repeated event occurs over a set time. In electromagnetic radiation, its frequency is the number of electromagnetic waves moving past a point each second.

Our brains interpret these different frequencies into colors, including red, orange, yellow, green, blue, indigo, and violet. When the eye views all these different colors at the same time, it is interpreted as white. Waves from the sun which we cannot see are infrared, which have lower frequencies than red, and ultraviolet, which have higher frequencies than violet light. It is infrared radiation that produce the warm feeling on our bodies.

Most of the solar radiation is absorbed by the atmosphere and much of what reaches the earth's surface is radiated back into the atmosphere to become heat energy. Dark colored objects, such as asphalt, absorb radiant energy faster than light colored objects. However, they also radiate their energy faster than lighter colored objects.



Conduction

Conduction is the transfer of heat energy from one substance to another or within a substance. Have you ever left a metal spoon in a pot of soup being heated on a stove? After a short time the handle of the spoon will become hot.

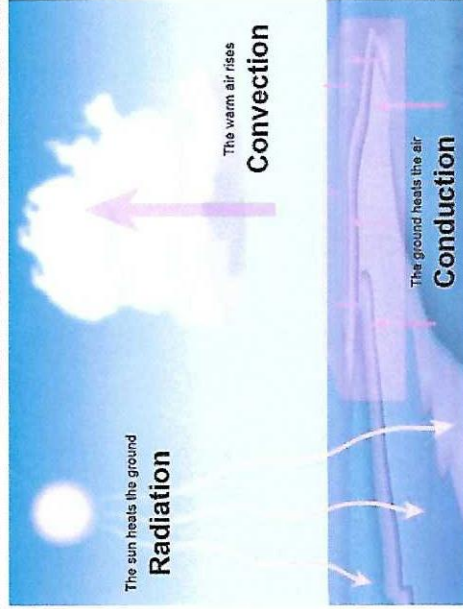
This is due to transfer of heat energy from molecule to molecule or from atom to atom. Also, when objects are welded together, the metal becomes hot (the orange-red glow) by the transfer of heat from an arc.

This is called conduction and is a very effective method of heat transfer in metals. However, air conducts heat poorly.

Convection

Convection is the transfer of heat energy in a fluid. This type of heating is most commonly seen in the kitchen when you see liquid boiling.

Air in the atmosphere acts as a fluid. The sun's radiation strikes the ground, thus warming the rocks. As the rock's temperature rises due to conduction, heat energy is released into the atmosphere, forming a bubble of air which is warmer than the surrounding air. This bubble of air rises into the atmosphere. As it rises, the bubble cools with the heat contained in the bubble moving into the atmosphere.



As the hot air mass rises, the air is replaced by the surrounding cooler, more dense air, what we feel as wind. These movements of air masses can be small in a certain region, such as local cumulus clouds, or large cycles in the troposphere, covering large sections of the earth. Convection currents are responsible for many weather patterns in the troposphere.

Heat Energy WS #4

ReadWorks

The Transfer of Heat Energy - Comprehension Questions

Name: _____ Date: _____

1. What is Earth's heat source?

- A. heat lamps
- B. dark colored objects
- C. the sun
- D. metal objects

2. What does the text list and describe?

- A. ways hot air is transferred into and through Earth's atmosphere
- B. ways heat is transferred into and through Earth's atmosphere
- C. ways radiation is transferred into and through Earth's atmosphere
- D. ways visible light is transferred into and through Earth's atmosphere

3. Read this sentence from the text.

"Most of the solar radiation is absorbed by the atmosphere and much of what reaches the earth's surface is radiated back into the atmosphere to become heat energy."

What can you conclude about heat energy?

- A. Most of the sun's energy is used to make heat energy.
- B. A small amount of the sun's energy is used to make heat energy.
- C. All of the sun's energy is used to make heat energy.
- D. None of the sun's energy is used to make heat energy.

4. Read these sentences from the text.

Convection is the transfer of heat energy in a fluid. . . .

Air in the atmosphere acts as a fluid. The sun's radiation strikes the ground, thus warming the rocks. As the rock's temperature rises due to conduction, heat energy is released into the atmosphere, forming a bubble of air which is warmer than the surrounding air. This bubble of air rises into the atmosphere.

What inference can you make about radiation, conduction, and convection?

- A. Radiation, conduction, and convection work together to transfer heat energy in Earth's atmosphere.
- B. Radiation, conduction, and convection are not important in transferring heat energy in Earth's atmosphere.
- C. Radiation, conduction, and convection transfer heat energy from Earth's atmosphere to the sun.
- D. Radiation, conduction, and convection work together to transfer heat energy in the sun.

5. What is the main idea of this text?

- A. The source of heat for Earth is the sun, and some of the sun's energy is used to make heat energy.
- B. White light is when the eye views all the different light frequencies at the same time.
- C. The transfer of heat energy from one substance to another or within a substance is called conduction.
- D. Heat energy is transferred into and through Earth's atmosphere by radiation, conduction, and convection.

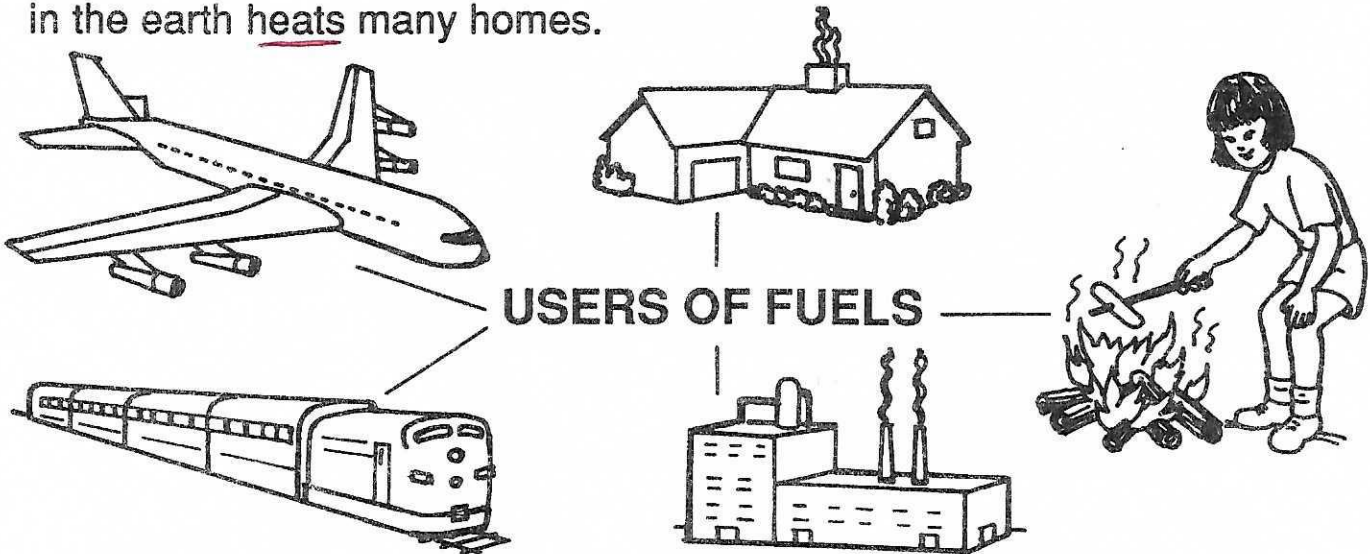
Conduction, convection, or radiation?

1. _____ The heat you feel from a fireplace
2. _____ This type of heat transfer causes plates to move
(your hands touching a plate.)
3. _____ boiling water
4. _____ Heat you feel from a hot stove
5. _____ Frying a pancake
6. _____ fast particles colliding with slower particles
7. _____ air travels this way
8. _____ transfer through solids
9. _____ transfer through space
10. _____ moves as a wave
11. _____ moves as a current (electricity)
12. _____ sun rays reaching earth
13. _____ occurs with fluids -(liquids)
14. _____ a coil on an electric stove
15. _____ this type of transfer is affected by color

Fuels

Anything that is burned to produce heat is a fuel. People use fuels to heat homes, cook foods, and make hot water. Fuel also provides power for cars, trains, airplanes, and other kinds of transportation.

Long ago, people burned wood as fuel to make fire for heat and light. Later, people used oils from animal fat and plants to burn in lamps. The discovery of coal helped factories produce great amounts of power to make products. Today, petroleum, an oily liquid, is used to power most kinds of transportation. The natural gas that comes from wells drilled deep in the earth heats many homes.



Complete the sentences by filling in the missing letters.

1. ue is anything that is burned to produce heat.
2. Wood and oi are fuels.
3. Long ago, people used wood to make ir.
4. People use fuels to ea homes and oo foods.
5. oa is used in many factories.
6. e o eu is used to power cars, trains, and airplanes.
7. Many homes are heated by a u a a.

HEAT ENERGY FLASHCARDS #1

<p>thermal energy that flows from the particles of one object to another object</p>	<p>the flow of heat between two objects that touch</p>	<p>heat transfer through liquids or gases</p>	<p>heat transfer from the Sun to the Earth through space. heat waves energy waves light waves</p>
<p>does NOT transfer heat easily</p>	<p>Does transfer heat easily</p>	<p>Heat is the flow of _____.</p>	<p>Metal is a good _____.</p>
<p>In order for conduction to occur, two objects must be _____.</p>	<p>When holding a cup of hot chocolate, How does heat travel to your hands?</p>	<p>Gloves keep your hands warm on cold days. Gloves are good _____.</p>	<p>When a metal spoon is placed in boiling water, the spoon gains heat because it is a _____.</p>

HEAT ENERGY FLASHCARDS #2

What would make the best insulator for the handle of a frying pan?

How does a sweatshirt keep you warm on a cold day?

Rubbing your hands together?

the sun warming the surface of the lake?

- A. conduction
- B. convection
- C. radiation

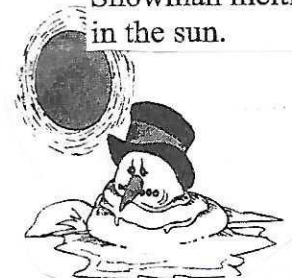
- A. conduction
- B. convection
- C. radiation

A wood burning stove heating a room?

the handle of a metal spoon getting hot as it sits in how chocolate?

Tongue freezing to a metal pole.

Snowman melting in the sun.



- A. conduction
- B. convection
- C. radiation

- A. conduction
- B. convection
- C. radiation

- A. conduction
- B. convection
- C. radiation

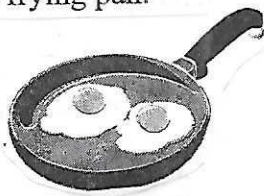
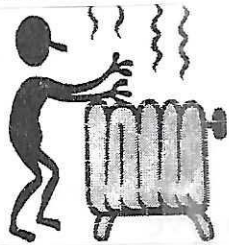
- A. conduction
- B. convection
- C. radiation

Warming hand over a radiator.

Eggs cooking in a frying pan.

Warmth from the fireplace circulating through the house.

Water boiling in a kettle.



- A. conduction
- B. convection
- C. radiation

- A. conduction
- B. convection
- C. radiation

- A. conduction
- B. convection
- C. radiation

- A. conduction
- B. convection
- C. radiation

Flashcards #1 Answers -Turn paper over and write answer on back of card
before cutting apart the cards.

radiation	convection	conduction	Heat
conductor	thermal energy	conductor	insulator
conductor	insulators	through conduction	touching

Flashcards #2 Answers

C. radiation	A. conduction	Sweatshirts are good insulators	Wood
C. radiation	A. conduction	B. convection	C. radiation
B. convection	C. radiation	A. conduction	B. convection