Day 1 Monday, 4/20/20
Student Work

Potential Energy and Kinetic Energy Video

Directions: Use the two videos in Google Classroom to help you answer the questions below. If you do not have the Internet you can use your notes.
Video Links: https://youtu.be/lqV5L66EP2E https://youtu.be/7K4V0NvUxRg

1. State the Law of Conservation of Energy.

2. PE is due to _____

3. KE is due to _____

4. PE converts to _____ , and KE is converted to _____

5. _____ = mgh

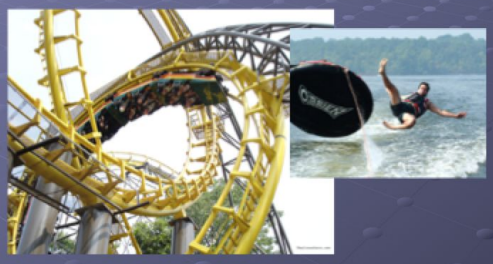
6. m = _____

7. Gravity is _____

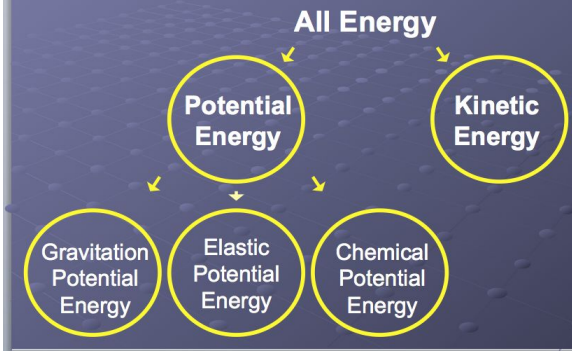
8. h = _____

9. _____= $\mathbf{mv^2}$

Potential and Kinetic Energy



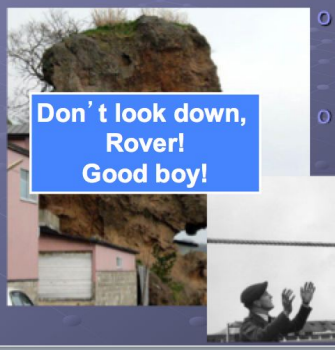
How is all energy divided?



What is Potential Energy?

- Energy that is stored and waiting to be used later

What is Gravitational Potential Energy?



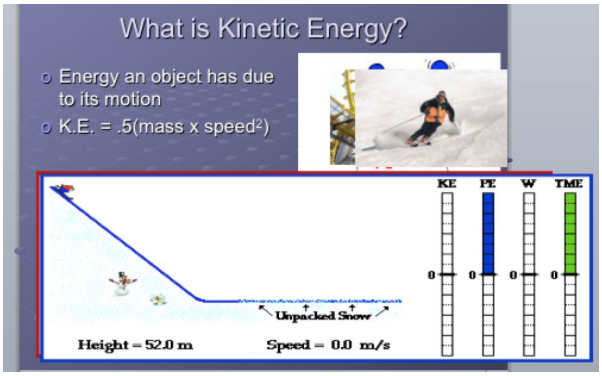
- Potential energy due to an object's position
- P.E. = mass x height x gravity

What is Elastic Potential Energy?

- Potential energy due compression or expansion of an elastic object.

What is Chemical Potential Energy?

- Potential energy stored within the chemical bonds of an object


What is Kinetic Energy?
Energy an object has due to its motion
K.E. = .5(mass x speed²)
KE
PE
W
TME
0
0
0
0
Unpacked Snow
Height = 52.0 m
Speed = 0.0 m/s

Day 1 Student Practice for after videos and reviewing PPT

Potential and Kinetic Energy

Write PE (Potential Energy) or KE (Kinetic Energy) for each description. Some descriptions may have more than one answer.

Energy of motion	**Energy that is due to the position or condition of an object (Stored Energy)**	**Can not be created or destroyed**
Can be transformed	**Increases based on position/height**	**Increases as motion increases**
Not Moving	**Your bent knees before you jump**	**Throwing a baseball**
Jumping	**A glass sitting on a desk**	**A skateboarder coming down a hill**
A glass falling off a desk	**A skateboarder at the top of a hill**	**Holding a baseball in a pitching position**

Day 2: Tuesday 4/21/20

Notes to help you.

PS. 6 Potential and Kinetic Energy Notes

Energy – the ability to do work (force moves an object)

Work - transfer of energy from one object to another

Joules = unit of measurement (Energy /Work)

2 Types of Energy

1. Kinetic Energy – Energy of motion

A. Mass – KE increase as mass increase

B. Velocity – KE increase as velocity increases

KE = Mass x Velocity2/2

Velocity has a greater impact on KE since it is squared

Example (need more force to roll a bowling ball than a golf ball so a bowling ball has more KE)

2. Potential Energy - Energy that is stored (potential to do work)

2 Forms of Potential Energy

1. Elastic PE - energy when objects are stretched or compressed

2. Gravitational PE - energy depends on height

GPE = Weight x Height or GPE = Mass (kg) x Gravity x Height

GPE increases with weight and height

Weight – mass x gravity

Gravity is 9.8m/s^2

Newton = Weight - unit of measurement for (kg x m/s^2)

joule = newton-meter (weight in Newton and height in meters)

Unit	What it measures
Joules	Energy/work
Newton	Weight = $kg/m/s^2$ = m x g
Newton Meter = Joules	GPE = weight x height

Student Work/Practice

Name_____Date_____Binder#___

PS. 6 Potential and Kinetic Energy Check

1. _____– the ability to do work (force moves an object)

2. _____= unit of measurement (Energy /Work)

Identify the 2 things that impact the amount of kinetic energy.

3. _____

4. _____

5. _____has a greater impact on KE since it is _____.

6. _____- energy when objects are stretched or compressed

7. _____- energy that depends on height

8. _____= mass x gravity

9. _____ is the constant value used for gravity (include units)

<u>Calculations</u>

1. **The mass of an astronaut is 100kg. What is the weight of the same astronaut?**

2. **A bowling ball has a mass of 5896.7g and is on a shelf that is 5m high? What is the Gravitational Potential Energy? (What do you need to find first)**

3. A container with a mass of 3586.7g is on a shelf that is 7m high? What is the Gravitational Potential Energy of the container?

Day 3 Wednesday 4/22/20

PPT Notes to help you.

TYPES OF ENERGY

Mechanical, Electromagnetic, Electrical, Chemical and Thermal

What is Mechanical Energy?

- Energy due to a object's motion (kinetic) or position (potential).

The bowling ball has mechanical energy.

When the ball strikes the pins, mechanical energy is transferred to the pins!

Examples of Mechanical Energy

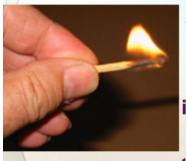
What is Electromagnetic Energy?

- Light energy
- Includes energy from gamma rays, xrays, ultraviolet rays, visible light, infrared rays, microwave and radio bands

What is Electrical Energy?

- Energy caused by the movement of electrons
- Easily transported through power lines and converted into other forms of energy

What is Chemical Energy?



- Energy that is available for release from chemical reactions.

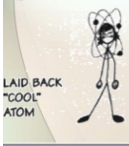
The chemical bonds in a matchstick store energy that is transformed into thermal energy when the match is struck.

Examples of Chemical Energy

What is Thermal Energy?

- Heat energy
- The heat energy of an object determines how active its atoms are.

A hot object is one whose atoms and molecules are excited and show rapid movement.



A cooler object's molecules and atoms will show less

QUIZ TIME!

What type of energy cooks food in a microwave oven?

ELECTROMAGNETIC ENERGY

What type of energy is the spinning plate inside of a microwave oven?

MECHANICAL

QUIZ TIME!

Electrical energy is transported to your house through power lines.

When you plug an electric fan to a power outlet, electrical energy is transform into what type of energy?

MECHANICAL ENERGY

QUIZ TIME!

What energy transformation occurs when an electric lamp is turned on?

ELECTRICAL ENERGY

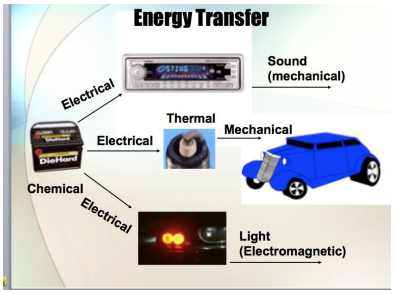
↓

ELECTROMAGNETIC ENERGY

What types of energy are shown below?

Mechanical and Thermal Energy

(Don't forget friction)

What type of energy is shown below?  Chemical Energy	What types of energy are shown below?  Electrical, Mechanical and Electromagnetic Energy	What type of energy is shown below?  Chemical Energy (yummy)
What type of energy is shown below?  Thermal Energy	Energy Transfer 	

Day 3 Student Work

Forms of Energy

Directions: Give a description and example of each type of energy. Then classify it as a form of kinetic energy (KE) or potential energy (PE). You may use your devices to help you.

Forms of Energy	Description and Example	Type PE or KE
Mechanical		
Thermal		
Radiant / Electromagnetic		
Chemical		
Elastic PE		
Electrical		
Gravitational PE		
Nuclear		

Day 3 Student Work

Name_____

Forms of Energy Quick Check

Check your understanding after completing your graphic organizer.

Identify the type/form of energy. Do this without using your notes.

1. _____Energy stored in a bicycle at the top of a hill

2. _____The heat released by steaming a bag of popcorn

3. _____Energy used to power a computer

4. _____The light of a candle

5. _____The bonds between the atoms of a match

6. _____ Plucking the string of a guitar

7. _____ Digesting your food

8. _____ Turning the knob on the stove

9. _____ Photosynthesis

10. _____ Used to produce energy at Surry Nuclear Power Plant

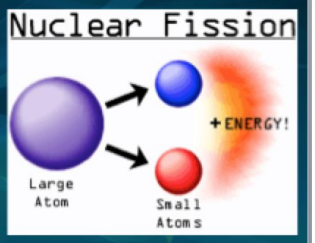
Day 4 Thursday 4/23/20
PPT Notes to help with student work.

Nuclear Energy

Click to add subtitle

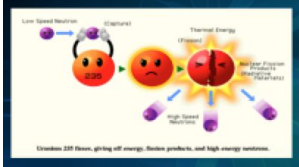
Nuclear Fission

- Nuclear fission is the process of splitting a nucleus into two nuclei with smaller masses.
- Fission means "to divide"
- Remember that fission has 2 s's, therefore it splits into TWO parts.



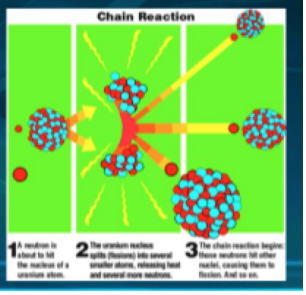
Fission cont.

- Only large nuclei with atomic numbers above 90 can undergo fission.
- Products of fission reaction usually include two or three individual neutrons, the total mass of the product is somewhat less than the mass of Uranium-235.



Chain Reaction

- A chain reaction is an ongoing series of fission reactions. Billions of reactions occur each second in a chain reaction.



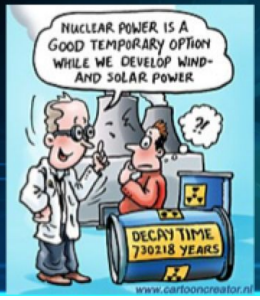
Chain Reaction cont.

- On earth, nuclear fission reactions take place in nuclear reactors, which use controlled chain reactions to generate electricity.

Chain Reaction cont.

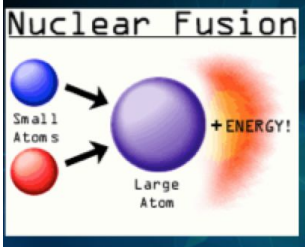
- Uncontrolled chain reactions take place during the explosion of an atomic bomb.

Fission Products



- The products of nuclear fission reactions are radioactive, but the energy released from these reactions is less harmful to the environment than the use of fossil fuels.
- The products are intensely radioactive and must be treated and/or stored.

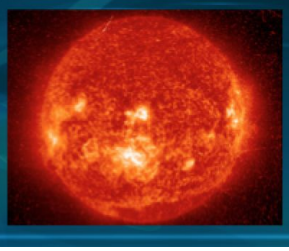
Nuclear Fusion



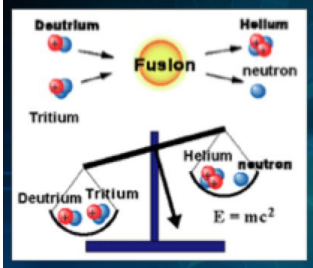
- Nuclear fusion is the combining of two nuclei with low masses to form one nucleus of larger mass.
- Nuclear fusion reactions are also called thermonuclear reactions.

Nuclear Fusion cont.

- Fusion reactions exist in stars.
- Our sun is a good example of a thermonuclear (fusion) reaction.
- It is almost impossible to create fusion reactions on earth since they need temperatures above one million degrees Celsius in order to take place.

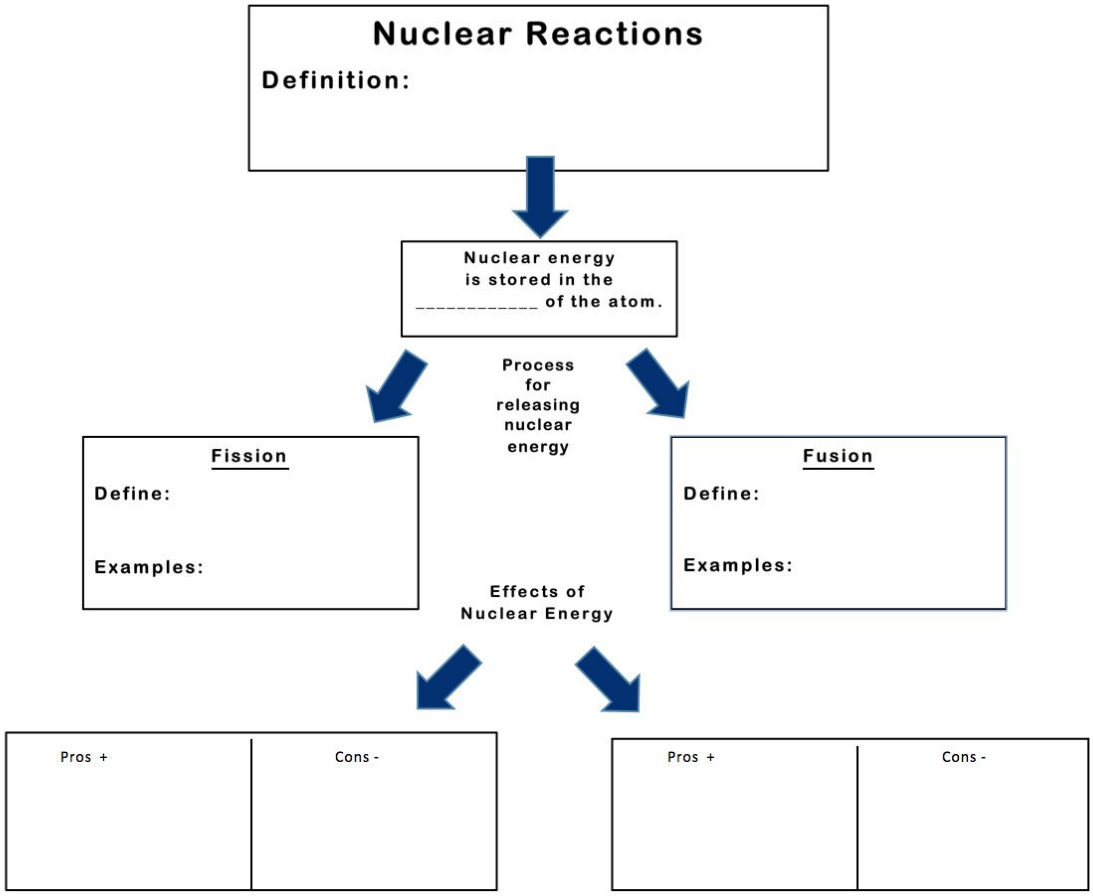


Nuclear Fusion cont.



- Nuclear fusion produces less nuclear waste than nuclear fission and the materials are easier to obtain.

Day 4 Student Work: Complete the graphic organizer. I have provided some notes. You may use your devices to complete this activity.

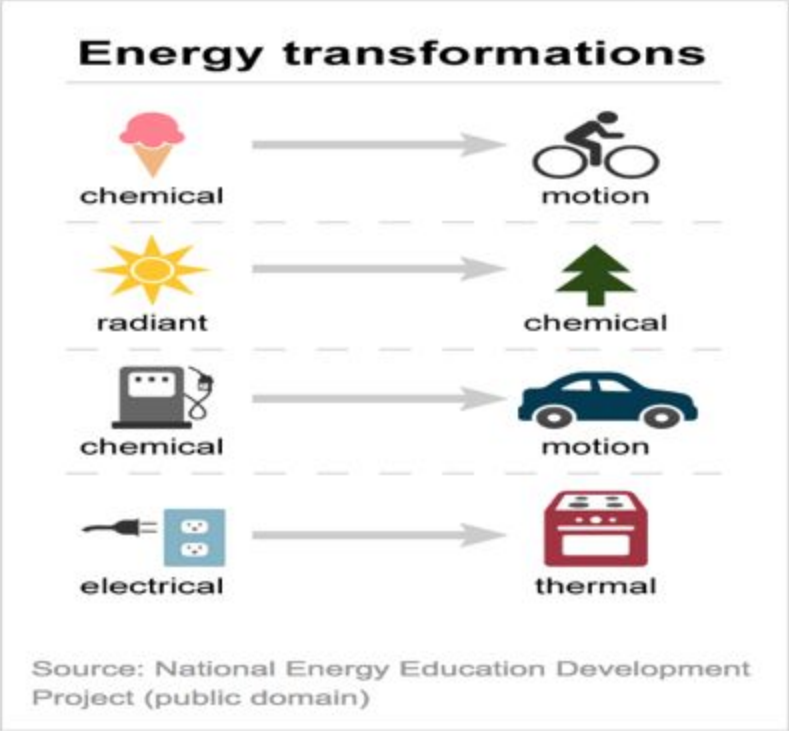


Day 5 Friday,4/24/20
Notes

Laws of energy

Energy Transformations – energy changes from one form to another. We witness energy transformations everyday. Example: a toaster changes electrical energy into thermal energy. Example: An electric toothbrush changes electrical energy into mechanical energy. Several energy transformations may occur in a single object.
A car engine burns gasoline, converting the chemical energy in gasoline into mechanical energy. Solar photovoltaic cells change radiant energy from the sun into electrical energy. Energy changes form, but the total amount of energy in the universe stays the same.

Converting one form of energy into another.



Day 5 Student Work/Practice

Energy Transformation Worksheet

Identify the different types of energy transformation in each of the pictures

Windmill

Energy Transformation:

Flashlight

Energy Transformation:

Microwave

Energy Transformation:

Firecracker

Energy Transformation:

Bicycle

Energy Transformation:

Battery

Energy Transformation:

Give an example where the following energy changes would take place:

Electrical to Thermal

Chemical to Thermal

Electrical to Mechanical

Week 2
Day 6 Monday 4/27/20

Section 1A - Temperature and Thermal Energy Notes

Temperature: measure of the average kinetic energy for individual particles

All matter has kinetic energy (atomic/molecular level)

The greater the kinetic energy the great the temperature

Ex. A 12 ounce cup of hot tea has more kinetic energy than a 12 ounce cup of cold tea. (= higher temp)

Thermal Energy – total energy of all the particles of matter

Example: A 12oz cup of tea at 83°C and a 8oz cup of tea at 83°C. Which has the greatest amount of thermal energy? (120z cup same temp but more particles to move)

*Temperature - individual particles Thermal Energy – total energy of all particles

Questions

1. Compare and contrast thermal energy and temperature.

2. Explain why thermal energy is a form of KE. _____

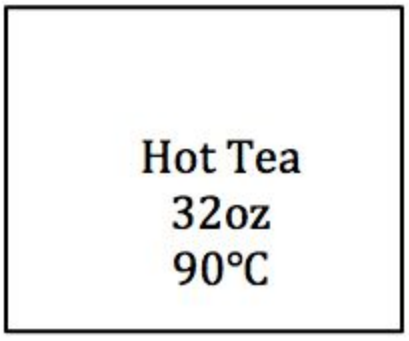
_____

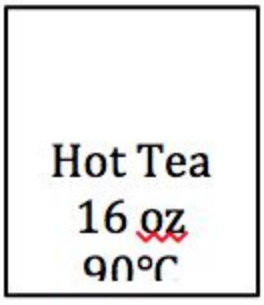
3. Define: Heat _____

_____

4. Can an object contain heat?

5. Do both containers have the same amount of thermal energy? Explain your answer.





Day 7 Tuesday 4/28/20
Notes

Section1B – Temperature Scales Notes

	Fahrenheit (°F)	Celsius (°C)	Kelvin (°K)
Used	**United States**	**All over the World**	**Physical Science**
# of intervals (= parts)	**180**	**100**	**100**
Freezing Point	**32°F**	**0°C**	**273°K**
Boiling Point	**212°F**	**100°C**	**373°K**
Absolute Zero	**-460°F**	**-273°C**	**0°K**

Absolute Zero

1. **Lowest temperature**
2. **No more energy can be removed from matter**

Temperature Conversions

Kelvin → Celsius

Subtract 273

340°K – 273 = 67°C

Celsius → Kelvin

Add 273

15°C + 273 = 288°

Student Practice

1

The figure above shows a glass and bathtub full of water at the same temperature of 33° C. What statement correctly describes the amount of heat in the glass and bathtub?

A The bathtub full of water has more heat than the glass of water.
B The heat of both the glass and bathtub full of water is 66° C.
C The glass of water has more heat than the bathtub full of water.
D The heat of both the glass and bathtub full of water is 33° C.

2

Convert 43 °C to K.

3

A measure of the average kinetic energy of the individual particles in an object is called —

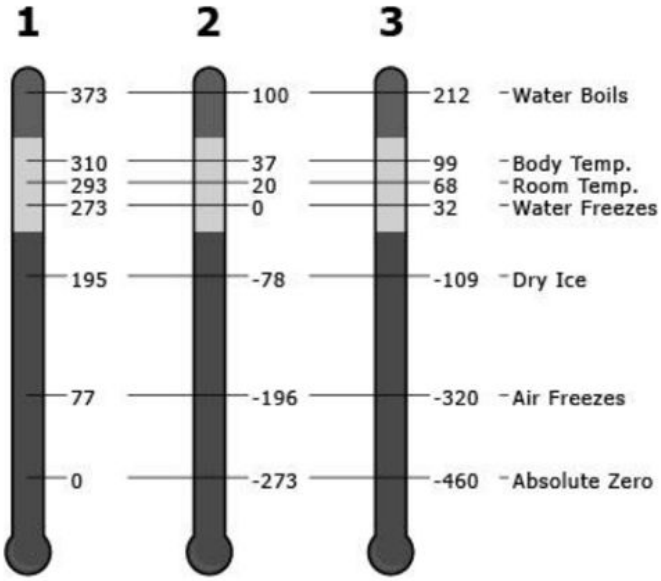
A conduction
B thermal energy
C convection
D temperature

4

Which of the following temperatures would NOT allow molecule movement?

0° C	−175° C	32 K
100 K	O K	−273° C

5



Thermometer number 1 represents temperatures in degrees —

A Absolute
B Kelvin
C Celsius
D Fahrenheit

6

A student lists three temperature measurements: 100°F, 100°C, and 100 K. Of the three measurements, which is the highest temperature?

A 100 K
B All three temperatures are exactly the same.
C 100°C
D 100°F

7

Which temperature scale has 0 as the coldest possible temperature?

A Celsius
B Fahrenheit
C Bohr
D Kelvin

Day 8 Wednesday 4/29/20

Student work and practice. Follow the instructions in the PPT.

Heat Transfer

Conduction
Convection
Radiation

Part 1

- Define and give 5 examples for the following terms on a sheet of paper
  - Conduction
  - Convection
  - Radiation

Part 2
Practice Time

- Number a sheet of paper from 1 – 10
- Using the following slides determine if the picture is an example of conduction, convection on radiation.

1

The transfer of heat from one substance to another through direct contact.

2

The transfer of heat through electromagnetic waves.

3

Macaroni rising and falling in boiling water.

4

Touching a hot stove.

5

An ice cube melting in your hands.

6

The transfer of heat through currents caused by the warming and cooling of liquids or gases.

7

Heat waves given off by the pavement.

8

Feeling hot sand on your feet at the beach.

9

Moving wind or ocean currents.

10 Ironing a shirt. 		

Day 9 Thursday 4/30/20
Student Notes

The Nature of Heat

Heat – movement of thermal energy from a high temp → low temp

Warmer → Cooler

Heat – is a type of energy transfer (measured in joules)

Heat moves in 1 direction: Warmer → Cooler

Molecules move until they reach equilibrium (balance)

3 Types of Heat Transfer

1. **Conduction**
2. **Convection**
3. **Radiation**

Conductors - conducts heat well (metals)

Insulators - don't conduct heat well (plastic, paper, and rubber)

Day 9
Student Practice

1. **When heat flows from one substance to another, what happens to the temperature of the substance giving off the heat and to the temperature of the substance receiving heat?**

   _____
   _____
   _____
   _____

2. **You put an equal amount of hot water and cold water in an ice tray to make ice cubes. Which one will freeze faster? Explain your answer.**

   _____
   _____
   _____
   _____

3. **Explain how thermal energy/heat are related to the states of matter.**

   _____
   _____
   _____
   _____

4. **Classify the following as an insulator or conductor.**

   a. **Feathers** _____
   b. **Wool** _____
   c. **Wood** _____
   d. **Tile** _____
   e. **Silver** _____
   f. **Fiberglass** _____

Day 10

Student QR Notes

Directions: Your will use the QR Codes to help you answer items 1-7

Part 1: Thermal Expansion (Scan QR Code 1 and 2)

1. Define thermal expansion_____

_____

_____

2. Thermal expansion occurs in the following: (Shade the correct boxes)

Gases	Liquids	Solids

List 3 examples of thermal expansion:

3_____

4. _____

5. _____

6. Which shows the most thermal expansion.

Gases	Liquids	Solids

7. When is a person most likely to run out of gas due to thermal expansion?

Explain your answer.

_____

_____

_____

QR Code 1	QR Code 2

Day 10
Student Try This Activity

Clicking Coins

Name_____

Procedure:

1. Place an empty, uncapped plastic soda/water bottle or glass bottle in the freezer for five minutes. (Alternatively, you can place the bottle in a bowl ice water.)
2. Wet a coin with water.
3. Remove the bottle from the freezer and IMMEDIATELY cover the mouth of the bottle with the wet coin.
4. Observe what happens and record below. (It may take a few moments to start.)

Observations:

_____

_____

Explain What Happened:
Fill in the blanks using these terms: *slower, faster, farther apart, closer together, contract, expand, thermal energy, cool, warm*

Putting the bottle in the freezer causes the air to _____down. Cooling causes matter to (take up less space), and causes particles to move _____ and move _____ . When removed from the freezer, the air in the bottle starts to _____ up and gain _____. Because it is warming, the air will _____ (take up more space). The particles move _____ and move _____ . The expanding gas exerts enough pressure on the coin to cause it to rise up on one side.

Make a CLAIM based on EVIDENCE:
Complete the following Claims/Evidence/Reasoning grid to answer the question below.
You must use evidence from this activity in your answer.

Why did the coin "click" on top of the bottle when it was removed from the cold?

My Claim	*My Evidence*	*My Reasoning*