April 20th Packet Answer Key

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.
Energy cannot be created or destroyed, but only changed from one form into another or transfered from one object to another
2. PE is due to position
3. KE is due to motion
4. PE converts to KE, and KE is converted to PE
5. PE = mgh
6. m = mass
7. Gravity is 9.8 m/s^2
8. h = height
9. KE $= \frac{1}{2}mv^2$

PE
KE

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

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. Energy – the ability to do work (force moves an object)
2. Joules = unit of measurement (Energy /Work)

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

3. Mass
4. Velocity
5. Velocity has a greater impact on KE since it is squared.
6. Elastic - energy when objects are stretched or compressed
7. GPE - Gravitational Potential Energy - energy that depends on height
8. Weight = mass x gravity

9. 9.8 m/s² is the constant value used for gravity (include units)

Calculations

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

$W = m \times g$

$W = 100kg \times 9.8\ m/s^2$

$W = 980\ kg\ m/s^2$

$W = 980\ N$

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)

$m = 5896.7g = 5.8967\ kg$

$G = 9.8\ m/s^2$

$H = 5\ m$

$GPE = m \cdot G \cdot H$

$GPE = W \cdot H$

$GPE = 5.9\ kg \cdot 9.8\ m/s^2 \cdot 5$

$GPE = 57.8\ N \cdot 5\ m$

$GPE = 289.1\ Nm$

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?

$m = 3586.7\ g = 3.5867\ kg$

$G = 9.8\ m/s^2$

$H = 7\ m$

$GPE = m \cdot G \cdot H$

$GPE = W \cdot H$

$3.6\ kg \times 9.8\ m/s^2 \cdot 7\ m$

$35.3\ kg\ m/s^2\ (N) \cdot 7\ m$

$247\ Nm$

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).

Forms of Energy	Description and Example	Type PE or KE
Mechanical	Moving pieces or object	KE
Thermal	(Heat) Causes the particles atoms to moves faster and increase temperature	KE
Radiant / Electromagnetic	(Light) Travels in waves and it has electrical and magnetic properties Ex: sun and microwaves	KE
Chemical	Stored energy in chemical bonds Ex; Battery, match, burning candle, photosynthesis, digestion	PE
Elastic PE	Results when an object is stretched or compressed	PE
Electrical	Moving electrical charges that produce energy and electricity	KE
Gravitational PE	The amount of energy increase with height and is related to the position of an object	PE
Nuclear	Energy stored in the nucleus of an atom is released (fission/fusion	PE

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. GPE Energy stored in a bicycle at the top of a hill

2. Thermal Energy The heat released by steaming a bag of popcorn

3. Electrical Energy used to power a computer

4. Raident The light of a candle

5. Chemical The bonds between the atoms of a match

6. EPE Plucking the string of a guitar

7. Chemical Digesting your food

8. Mechanical Turning the knob on the stove

9. Chemical Photosynthesis

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

Nuclear Reactions

Definition: Reactions involving particles in the nucleus of an atom (protons + neutrons) changes the identity of the element
Carbon 12 Carbon 14

Nuclear energy is stored in the Nucleus of the atom.

Process for releasing nuclear energy

Fission

Define: The nucleus of the atom splits into 2 nuclei releasing energy
Examples: Produce Nuclear Energy

Fusion

Union

Define: joining nuclei together to release energy
Examples: Sun, Stars

Effects of Nuclear Energy

Pros +	Cons -
- Small amount produces a lot of energy - less greenhouse gases - low cost - cancer treatment	- nuclear waste - hazardious material - disposal - radioactive materials

Pros +	Cons -
- safe - non toxic - only gives off Helium	- require extreme temps. - not a lot of information (knowledge) - lack of materials (heat) - Expensive

Key

Energy Transformation Worksheet

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

Windmill

Energy Transformation:

Kinetic → mechanical → electrical

Flashlight

Energy Transformation:

mechanical → chemical → electricity → radiant → thermal

Microwave

Energy Transformation:

electrical → mechanical → thermal → radiant / E

Firecracker

Energy Transformation:

Chemical → radiant / EM / sound

Bicycle

Energy Transformation:

Chemical → mechanical → thermal

Battery

Energy Transformation:

Chemical → electrical → mechanical

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

Electrical to Thermal

Flat iron, heater, boiling water on stove, toast

Chemical to Thermal

Fire (burning wood)

heat packs

Electrical to Mechanical

elevator

Dryer

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? (12oz cup same temp but more particles to move)

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

Questions

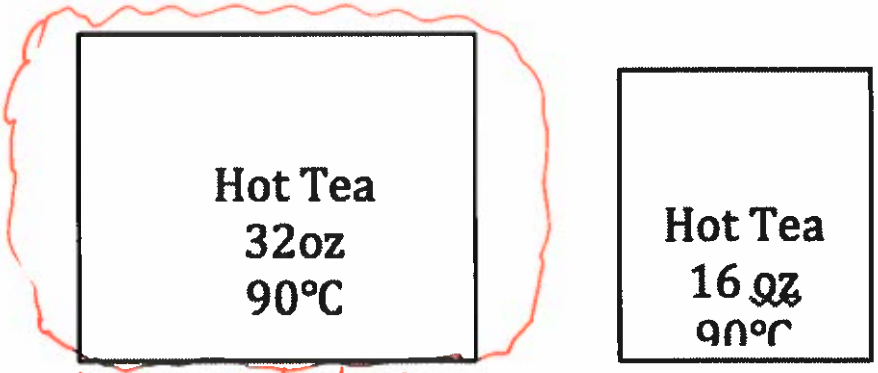
1. Compare and contrast thermal energy and temperature.
Both deal with KE. Temperature is the average KE, and thermal energy is the total KE of particles.

2. Explain why thermal energy is a form of KE. It deals with the movement of particles (energy in motion = KE)

3. Define: Heat Transfer or movement of thermal energy. It moves warm → cool ↑temp → ↓temp

4. Can an object contain heat?
No, heat transfers due to movement of particles hot → cold

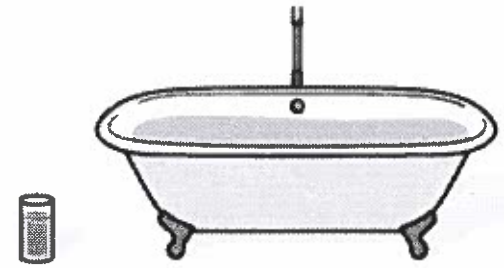
5. Do both containers have the same amount of thermal energy? Explain your answer.



More particles
more energy
more thermal energy

Student Practice

1



16 oz. 1,690 oz.

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.

316 °K

43 + 273 ✓ 316

3

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

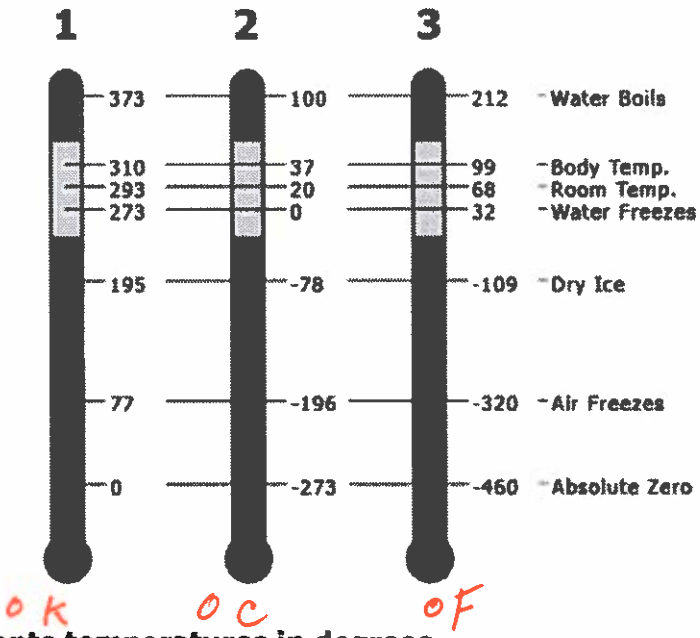
A conduction
B thermal energy
C convection
D temperature

4

Which of the following temperatures would NOT allow molecule movement?

0° C	-175° C	32 K
100 K	0 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

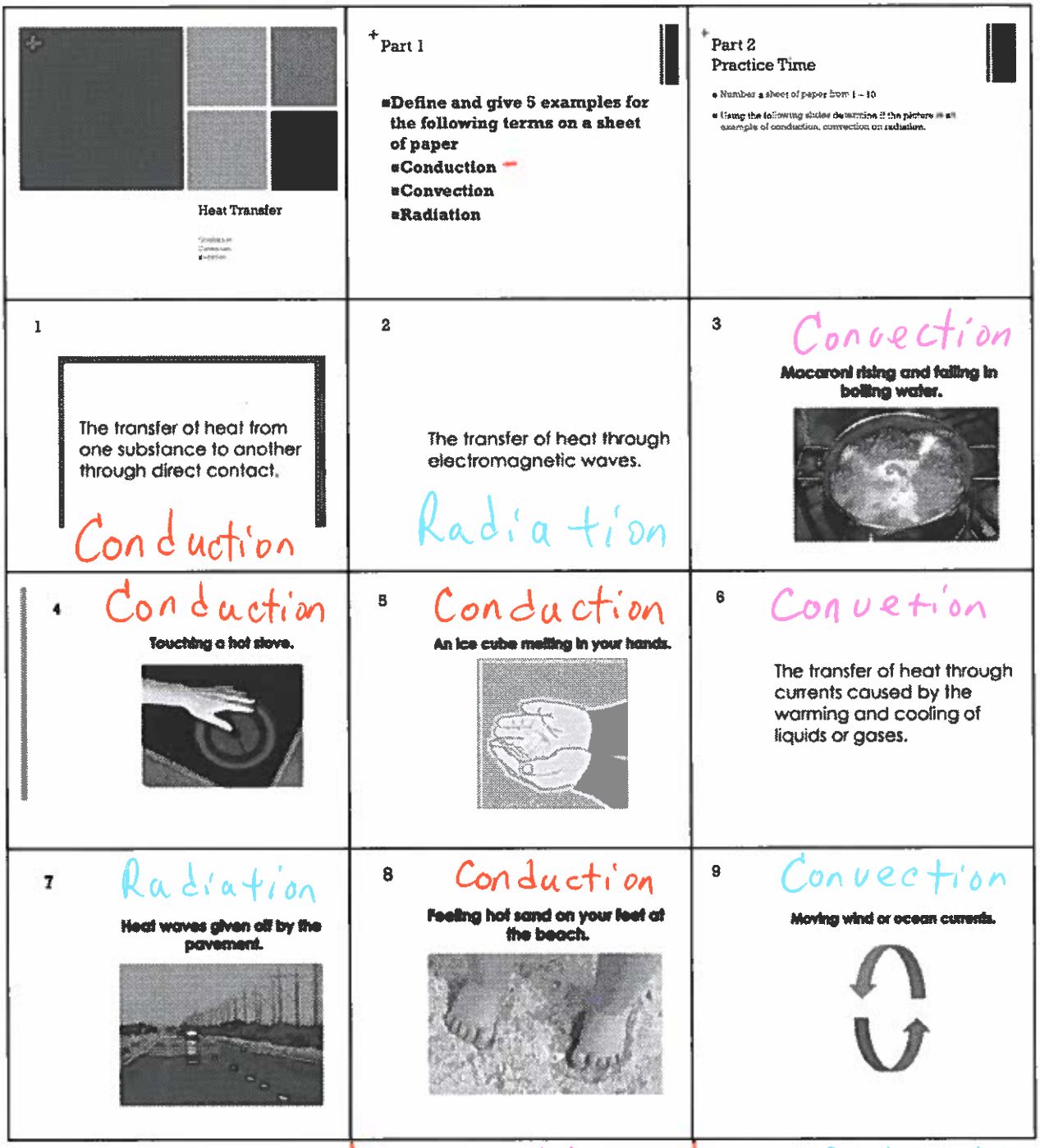
7

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.



Conduction
- Heat transfer by direct contanct

Examples: Ironing a shirt, pot on the stove, hot car seat, burn from a flat iorn

Convection
- Heat transfer by air current moving ↑↓. Heat Rises then cools and falls.

Examples: Heat vent, Air Fryer Air Popper

Radiation
Heat transfer throu waves

Examples: microwa UV light from the sun Heat from a campfire, cell phone, light fron a candle

10 Conduction **Ironing a shirt.** 		

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?**

The substance with the higher temp ↑ and ↑ KE will transfer thermal energy to the substance with the low temp ↓ and ↓ KE (thermal). Particles continue to move (transfer) until they balance.
Balance = Equilibrium

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.**

The hot water will freeze faster. There is a greater temperature difference between the hot water temp and freezer temp. Heat will be transfered out of the water faster causing it to freeze faster.

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

As thermal energy increases the temperature increases and the movement (KE) of particles which results in phase changes.

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

a. **Feathers** — Insulator
b. **Wool** — Insulator
c. **Wood** — Insulator
d. **Tile** — Conductor
e. **Silver** — Conductor
f. **Fiberglass** — Insulator

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 Something expands due to heat (shape, volume, area)

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

Gases ✓	Liquids ✓	Solids ✓

List 3 examples of thermal expansion:

3 Thermometer, bimetallic strips

4. Gasoline in a tank / can

5. Rail track (Bridges (draw))

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.

The hot temperatures in the summer make the particles move more (KE) in the gass. This causes the gas to expand and seem like there is more gas in the tank.

QR Code 1	QR Code 2