

Thermal Energy & **HEAT** NOTES

The energy of motion is called kinetic energy.

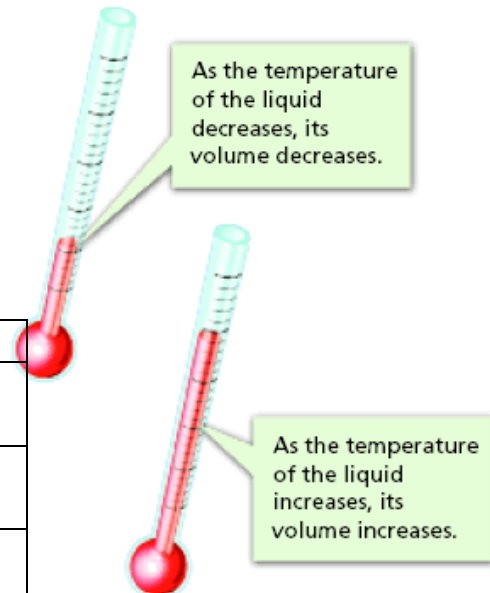
A. Temperature - is a measure of the average kinetic energy of individual particles of matter.

1. Tool used- thermometer

Numbers & units on a thermometer is called a scale and there can be different scales depending on the thermometer being used.

2. Three common scales for measuring temperature:

Scale	Temperature Points
Fahrenheit (°F)	H ₂ O freezing pt: 32°F H ₂ O boiling pt: 212°F
Celsius (°C)	H ₂ O freezing pt: <u>0°C</u> H ₂ O boiling pt: <u>100°C</u>
Kelvin (K)	ABSOLUTE ZERO: 0 K H ₂ O freezing pt: 273K H ₂ O boiling pt: 373K



B. Thermal Energy VS. Heat



* Total P.E. + K.E.

* The more particles an object has at given temp. = the more thermal energy it has

* Thermal energy transferred from matter at a **higher** temperature to matter at a **lower** temperature



Question: Lola has a mug & bucket filled from the same faucet. Which H₂O has a greater . . .

1. temperature? The temperatures of the waters are equal.
2. thermal energy? The bucket because there are a greater number of particles.

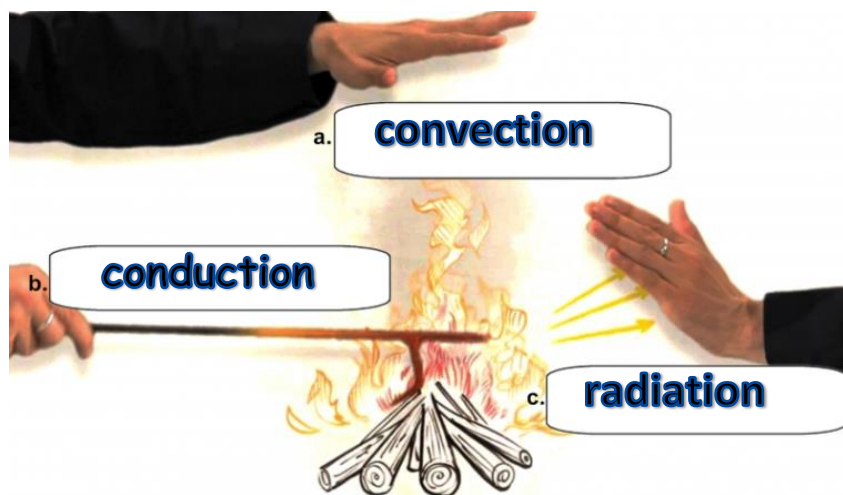
C. Specific heat is the amount of heat required to raise the temperature of 1 kilogram of a material by 1 Kelvin. The unit of measure is joules per kilogram-Kelvin or J/(kg*K).

1. The specific heat of an object depends on the object's chemical makeup.
2. Material with a high specific heat can absorb a lot of thermal energy without a great change in temperature. Material with a low specific heat needs less heat to change temperature. Ex: H₂O has a HIGH specific heat; sand has a LOW specific heat.

D. Heat Transfer

Heat moves in **ONE** direction (warmer to colder) by **3** ways:

1. **Conduction**: heat transfer from one particle of matter to another. (solid to a solid)
Ex: burn hand on pan handle
2. **Convection**: heat transfer by the movement of currents within a **liquid or gas**.
Ex: air conditioner, heater
3. **Radiation**: energy transfer by **electromagnetic** waves. (thru space/air in waves)
Ex: campfire, sunburn



E. **Conductors**: **allows** thermal energy to pass through easily.

Ex: silver, stainless steel



Question: Explain why a tile floor is a good conductor? **Tile easily transfers heat away from your feet.**

F. **Insulators**: does **not** allow thermal energy to pass through easily.

Ex: wood, wool, straw, paper



Question: What is the function of an air space in windows that are made from 2 panes of glass? **Air acts as an insulator to slow the transfer of heat.**

G. Most substances **expand** (get larger) when **heated** and **contract** (get smaller) when **cooled**.



Question: Identify a substance that expands when cooled. **Water**

H. **Temperature** affects the solubility of some substance in water.