

- Question(s) 1. What happens to particles when heated?**
2. What is the difference between thermal energy and temperature?

TEMPERATURE AND HEAT

Temperature - a measure of the average value of the _____ of the molecules in random motion. (SI Unit for temperature is Kelvin (K)).

Thermal expansion - almost all substances _____ when they are Heated and _____ when they are cooled -----
 exception water

Thermal energy - sum of the _____ and _____ energy of all the particles in an object; thermal energy of an object _____ as temperature increases

Temperature Conversion Equations	
$^{\circ}\text{F} \rightarrow ^{\circ}\text{C}$	$^{\circ}\text{C} \rightarrow ^{\circ}\text{F}$
$^{\circ}\text{C} = (5/9)(^{\circ}\text{F} - 32)$	$^{\circ}\text{F} = (9/5)(^{\circ}\text{C}) + 32$

_____ - thermal energy that flows from something at a _____ temperature to something at a _____ temp.

Specific heat - amt of heat Needed to raise the temp of 1 kg of some material by 1°C

Specific Heat of Common Materials	
Substance	Spec. Heat (J/(kg°C))
Water	4,184
Wood	1,760
Carbon	710
Glass	664
Iron	450

Thermal Energy Equation

(Q)

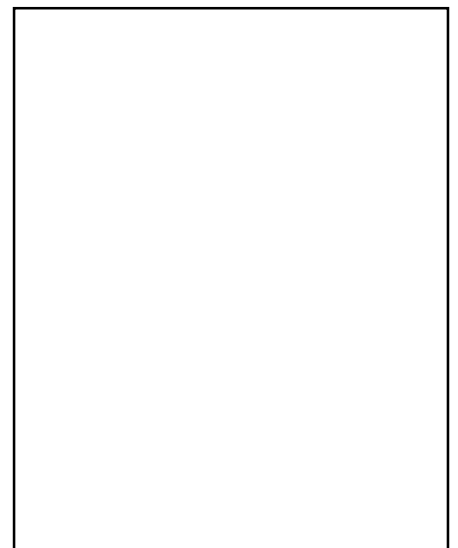
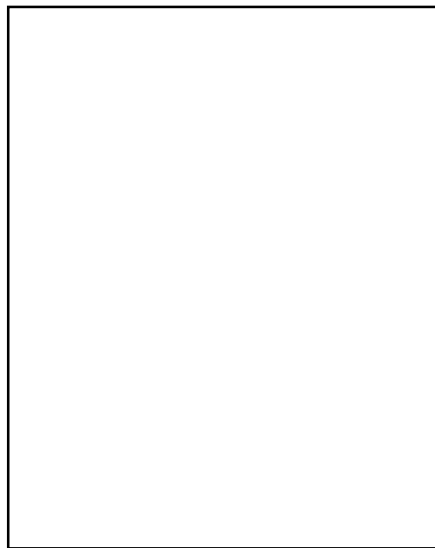
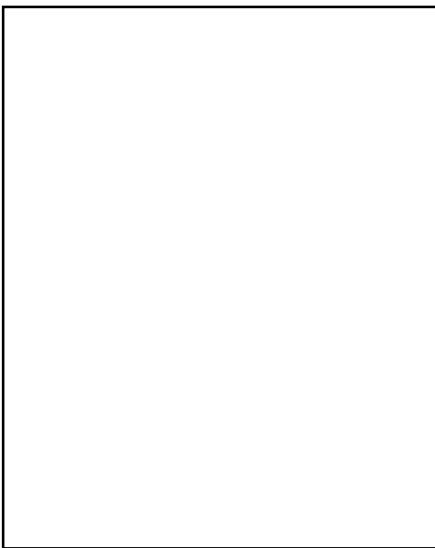
Change in thermal energy (J) =
Mass (kg) x Δ temp ($^{\circ}\text{C}$) x
(c) Specific heat (J/kg°C)
 $Q = m(T_f - T_i) C$

Matter & Energy

- A state of matter is a _____
- ✓ **Solids: Definite _____ and defined _____; particles are closely packed and ordered.**
- ✓ **Liquids: _____ and NO _____ of its own. Particles are _____ packed but not as rigid as a solid**
- ✓ **Gas: can flow, NO _____ or volume.**

Changes of a _____ in a system are caused by changes in _____.

Model It-Use page 7 of your textbook to complete the assignment HERE



**Question(s): How is heat transferred?
How is energy conserved during transformation?**

TRANSFERRING THERMAL ENERGY

Thermal energy is transferred from place to place by:



CONDUCTION	CONVECTION	RADIATION
transfer of thermal energy	transfer of thermal energy in a fluid	transfer of energy by electromagnetic waves.
by collisions between particles in matter	by the movement of warmer and cooler fluid from place to place.	

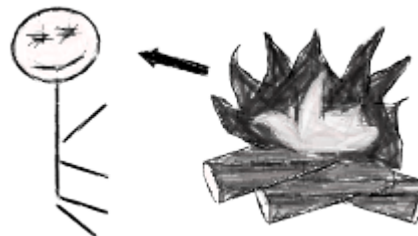
Conduction occurs in solids, liquids, and gases. _____ are the best conductors of heat

_____ occurs in fluids. Rising of warmer fluid and sinking of cooler fluid forms a convection current



The transfer of energy by radiation is most important _____.

Insulator – material in which heat flows slowly



Examples of materials that are insulators are wood, some plastics, fiberglass, and air.

Question: Why can't heat be converted completely into work?

USING HEAT

All heating systems require some source of energy – common types include:

Forced – Air Systems – most common type of heating using a furnace to heat air then a fan blows air through ducts to rooms

Radiator Systems – closed metal container that contains hot water or steam which is transferred to surrounding air by conduction; this warm air moves through room by convection

Electric Heating Systems – electrically heated coils placed in floors and in walls heat surrounding air by conduction

Two types of systems that use Sun's energy:

Positive Solar heating – radiant energy from the sun is transferred to the room through windows

Active Solar heating – systems that use solar collectors that absorb radiant energy from sun

Thermodynamics – study of the relationship among thermal energy, heat and work

↘ **1st Law – the increase in thermal energy of a system equals the work done on the system plus the heat transferred to the system**

↘ **2nd Law – it is impossible for heat to flow from cool object to warm object unless work is done**