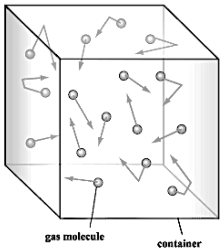
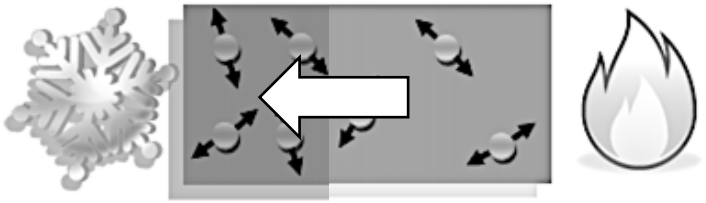
Name: _____ Date: _____ Period: _____

Review - Thermal Energy & Heat Transfer

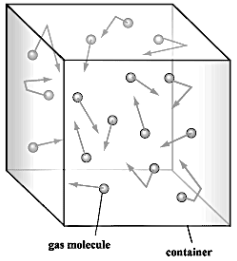
Analyze the pictures below and label them as “HEAT,” “TEMPERATURE,” or “THERMAL ENERGY.”



_____
Total Particle Energy



_____
Flow from warmer to cooler areas



_____
Average Thermal Energy

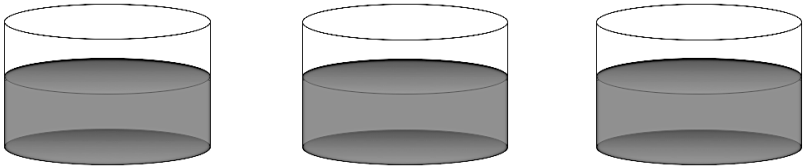
What is ABOLSUTE ZERO? _____

_____

Check the boxes to show which temperature scales have each quality below:

	Fahrenheit	Celsius	Kelvin
Used by the U.S.			
Used by scientists.			
Used by most of the world.			
Used **ONLY** by scientists.			
Based on the qualities of water.			
Does not include negative numbers.			
Absolute zero is at 0.			
Absolute zero is at -459.			
Absolute zero is at -273.			
Water freezes at 0.			
Water boils at 212.			

Which beaker has the MOST thermal energy?

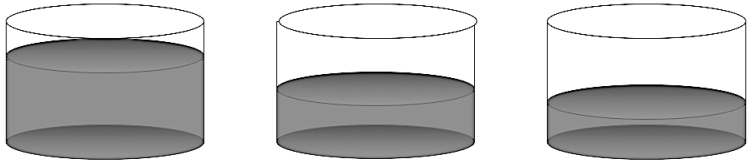


193 K
50 kg

212 K
50 kg

185 K
50 kg

Which beaker has the LEAST thermal energy?



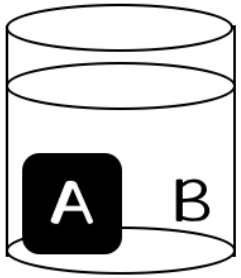
273 K
60 kg

273 K
40 kg

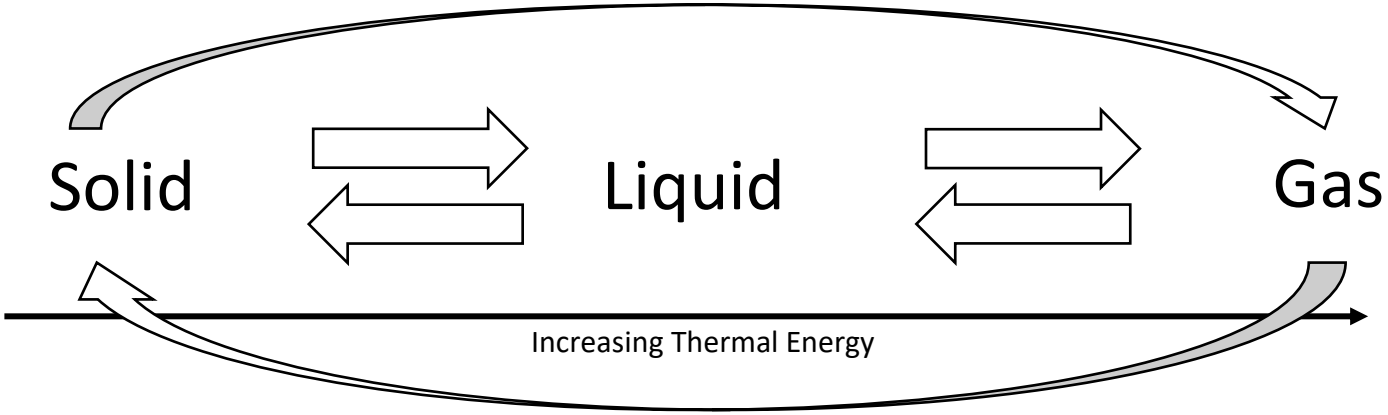
273 K
30 kg

If the **solid (A) is 284 K** and the **liquid (B) is 513 K**, draw an arrow to show the direction.
Explain <u>WHY</u>?

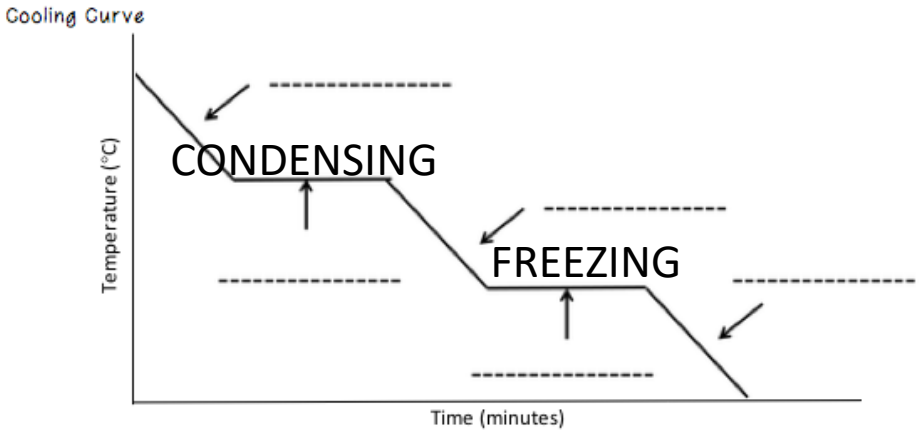
_____
_____
_____

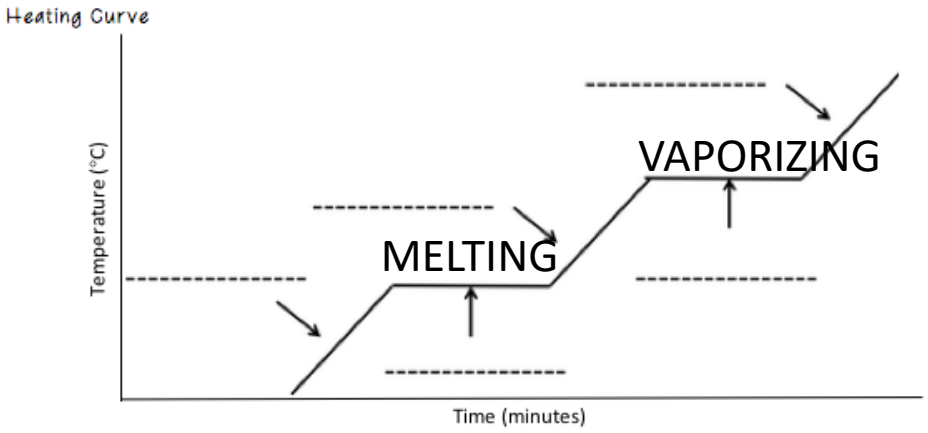


Label each arrow in the phase change diagram:



Label the state of matter at each level of the heating and cooling curves. The phase changes have been labeled for you.





Heat transfer through **direct contact** is _____

Heat transfer through **electromagnetic waves** is _____

Heat transfer through circulation in a **gas or liquid** is _____

Check the type of heat transfer best shown by each example.

	Convection	Conduction	Radiation
Smoke moving in a burning building.			
Cooking using a microwave.			
Cheese melting on a burger.			
The burners on a stove top.			
Water boiling to make pasta.			
The Sun's energy used for photosynthesis.			
A fireplace heating a room.			

Thermometers work because energy from its surroundings enters or leaves it, causing the liquid in the thermometer to either_____ (gains energy) or _____ (loses energy).

Heat engines convert _____ energy to _____ energy.

PS.7d Practical Applications of Heat, Temperature, and Thermal Energy

On the microscopic scale -- When heat is transferred to a material through CCR, the particles out of which that material is formed will move _____, and generally get farther apart.

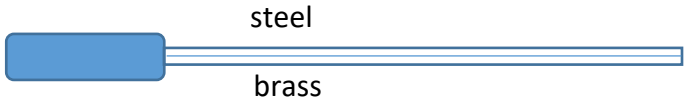
On the macroscopic scale – When a heat is transferred to a material through CCR, the material will _____.

This phenomenon is simply called _____ _____.

A bimetallic strip:

Two different metals are bonded together**. Brass expands more than steel when heated**. Sketch what will happen to the bimetallic strip below when it is heated. (after)

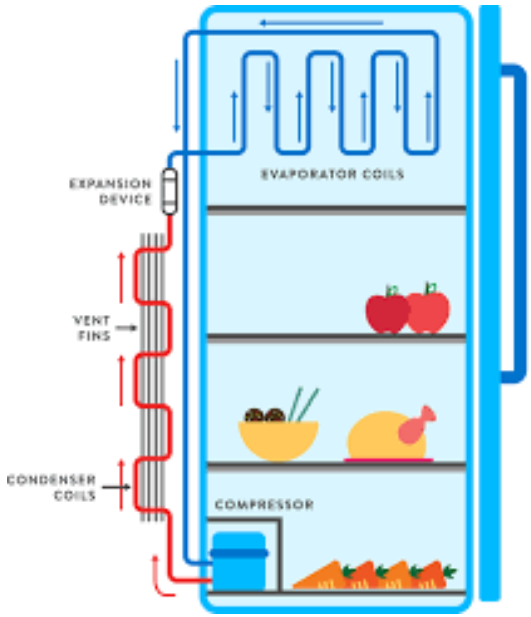
Before:



After:

A thermostat is a device that is designed to turn heating and/or cooling systems on or off to maintain a constant _____.
A **thermometer** is a device that measures the _____ of the particles in a material.

Refrigeration:

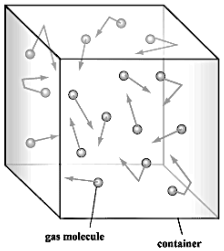


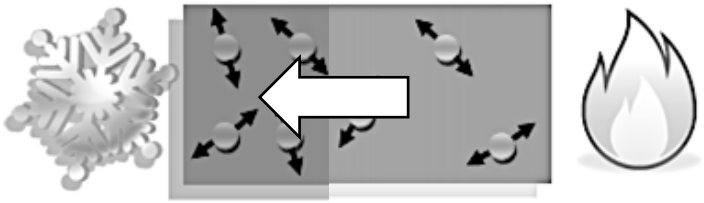
For a refrigerator to work, the refrigerant, or coolant, passes through the **expansion device** which allows it to absorb energy and _____**.** Then, the refrigerant passes through **evaporation coils** and absorbs _____ from inside the refrigerator. After that, the **compressor** squeezes the refrigerant, which _____ the temperature and pressure. Lastly, the refrigerant passes through **compressor coils** where vents allow heat to be _____ into the environment, cooling the refrigerant back down before starting the cycle over again.

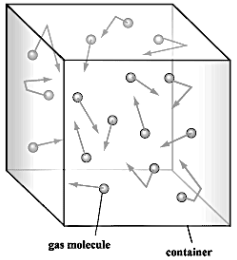
Name: _____ Date: _____ Period: _____

Review - Thermal Energy & Heat Transfer

Analyze the pictures below and label them as "HEAT," "TEMPERATURE," or "THERMAL ENERGY."







THERMAL ENERGY — Total Particle Energy

HEAT — Flow from warmer to cooler areas

TEMPERATURE — Average Thermal Energy

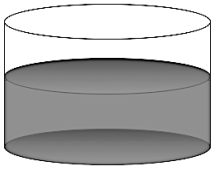
What is ABOLSUTE ZERO? THE TEMPERATURE AT WHICH NO ADDITIONAL ENERGY CAN BE REMOVED FROM MATTER. THEORITACLLY ALL MOTION WOULD CEASE.

Check the boxes to show which temperature scales have each quality below:

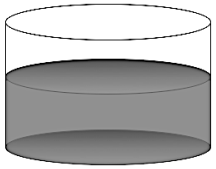
	Fahrenheit	Celsius	Kelvin
Used by the U.S.	X		
Used by scientists.			X
Used by most of the world.		X	
Used **ONLY** by scientists.			X
Based on the qualities of water.		X (best answer)	
Does not include negative numbers.			X
Absolute zero is at 0.			X
Absolute zero is at -459.	X		
Absolute zero is at -273.		X	
Water freezes at 0.		X	
Water boils at 212.	X		

All 3 have freezing and melting points for water, but the Celsius scale was devised using pure water as its basis.

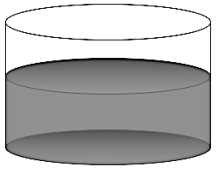
Which beaker has the **MOST** thermal energy?



193 K
50 kg

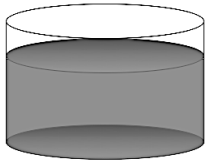


212 K
50 kg

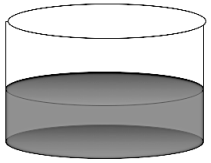


185 K
50 kg

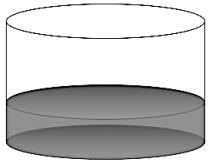
Which beaker has the **LEAST** thermal energy?



273 K
60 kg



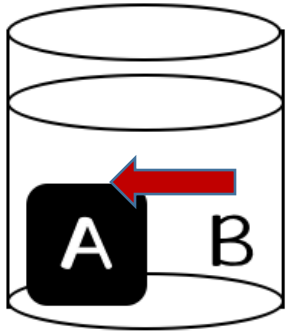
273 K
40 kg



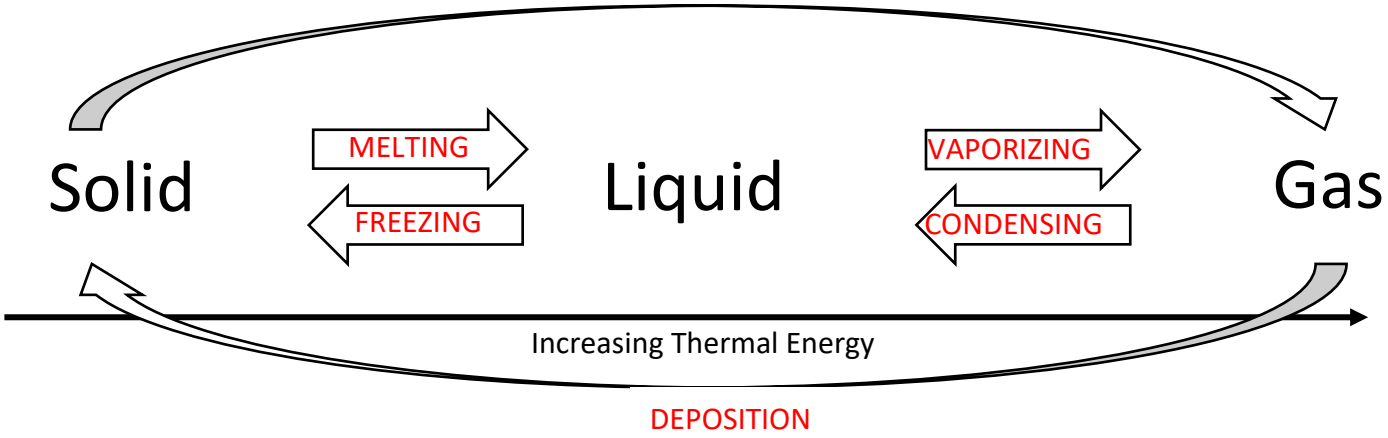
273 K
30 kg

If the **solid (A) is 284 K** and the **liquid (B) is 513 K**, what direction will the thermal energy flow and WHY?

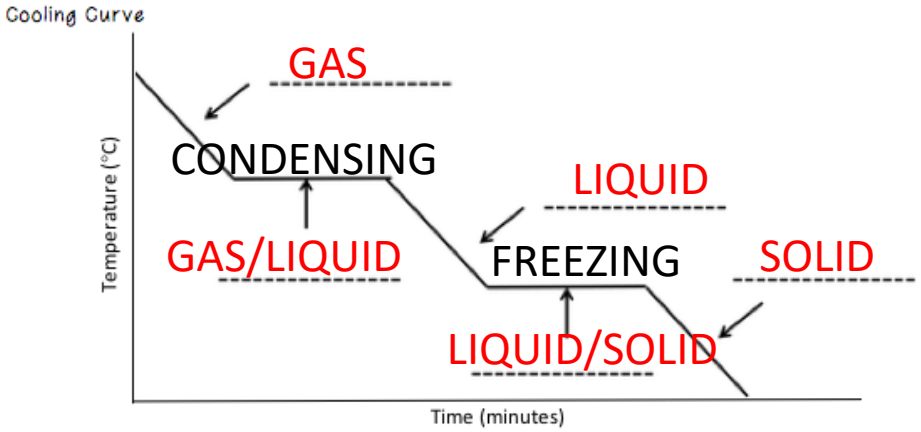
THE HEAT WILL FLOW FROM THE WATER INTO THE SOLID.
HEAT ALWAYS FLOWS FROM WARMER TO COOLER MATTER.

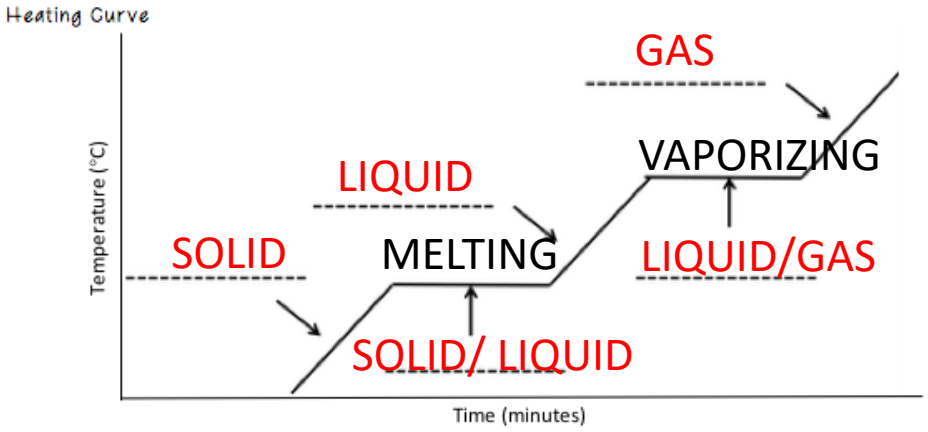


Label each arrow in the phase change diagram:



Label the heating and cooling curves.





Heat transfer through **direct contact** is **CONDUCTION**

Heat transfer through **electromagnetic waves** is **RADIATION**

Heat transfer through circulation in a **gas or liquid** is **CONVECTION**

Check the type of heat transfer best shown by each example.

	Convection	Conduction	Radiation
Smoke moving in a burning building.	X		
Cooking using a microwave.			X
Cheese melting on a burger.		X	
The burners on a stove top.		X	
Water boiling to make pasta.	X		
The Sun's energy used for photosynthesis.			X
A fireplace heating a room.			X

Thermometers work because energy from its surroundings enters or leaves it, causing the liquid in the thermometer to either **EXPANDS** (gains energy) or **CONDENSES (CONTRACTS)** (loses energy).

Heat engines convert **THERMAL** energy to **MECHANICAL** energy.

PS.7d Practical Applications of Heat, Temperature, and Thermal Energy

On the microscopic scale -- When heat is transferred to a material through CCR, the particles out of which that material is formed will move **FASTER,** and generally get farther apart.

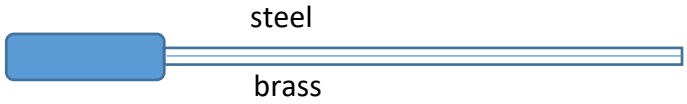
On the macroscopic scale – When a heat is transferred to a material through CCR, the material will **EXPAND**.

This phenomenon is simply called **THERMAL EXPANSION.**

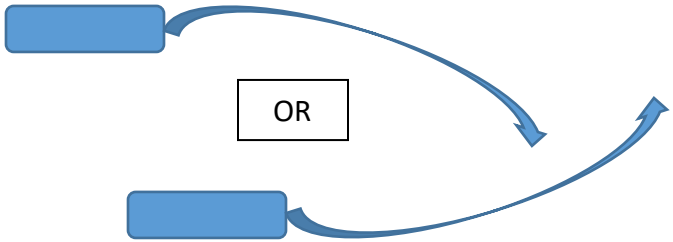
A bimetallic strip:

Two different metals are bonded together**. Brass expands more than steel when heated**. Sketch what will happen to the bimetallic strip below when it is heated. (after)

Before:

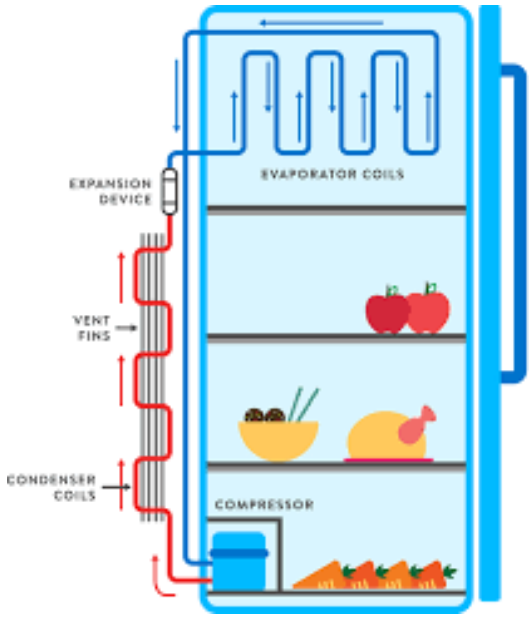


After:



A thermostat is a device that is designed to turn heating and/or cooling systems on or off to maintain a constant **TEMPERATURE.**
A **thermometer** is a device that measures the **AVERAGE THERMAL ENERGY** of the particles in a material.

Refrigeration:



For a refrigerator to work, the refrigerant, or coolant, passes through the **expansion device** which allows it to absorb energy and **EVAPORATE** Then, the refrigerant passes through **evaporation coils** and absorbs **HEAT** from inside the refrigerator. After that, the **compressor** squeezes the refrigerant, which **INCREASES** the temperature and pressure. Lastly, the refrigerant passes through **compressor coils** where vents allow heat to be **RELEASED** into the environment, cooling the refrigerant back down before starting the cycle over again.