

**Thermal energy on the move**

**Measure of the avg. KE of the particles of a sample of matter!!**

**Total PE and KE associated with the particles of the sample of matter.**

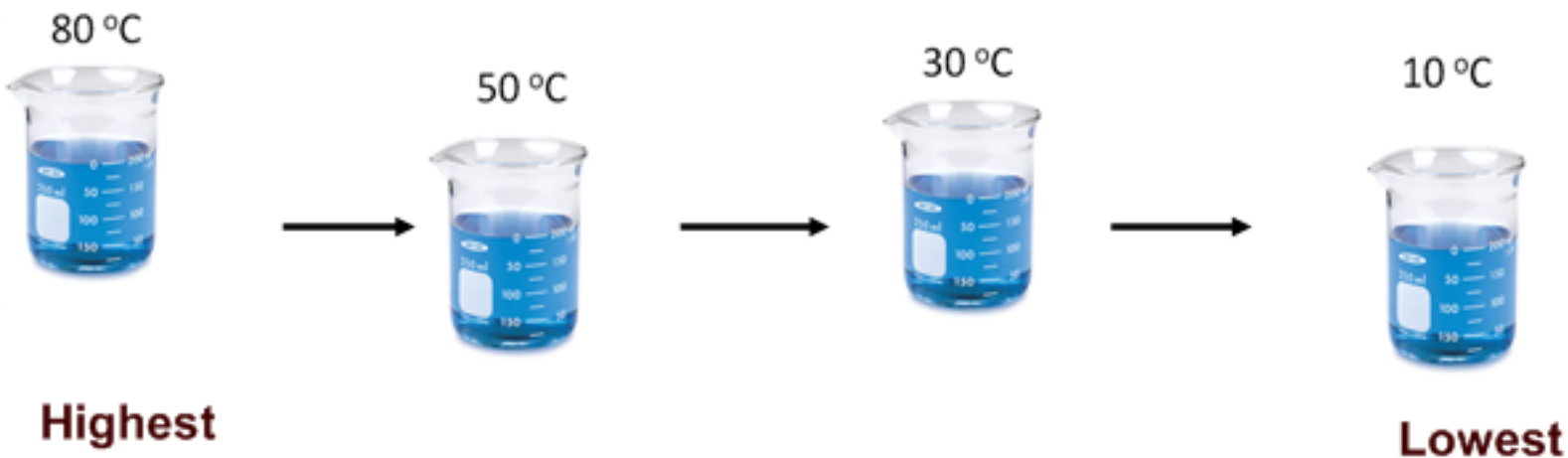
Complete the statements with the terms below:

Heat always flows from high to low.

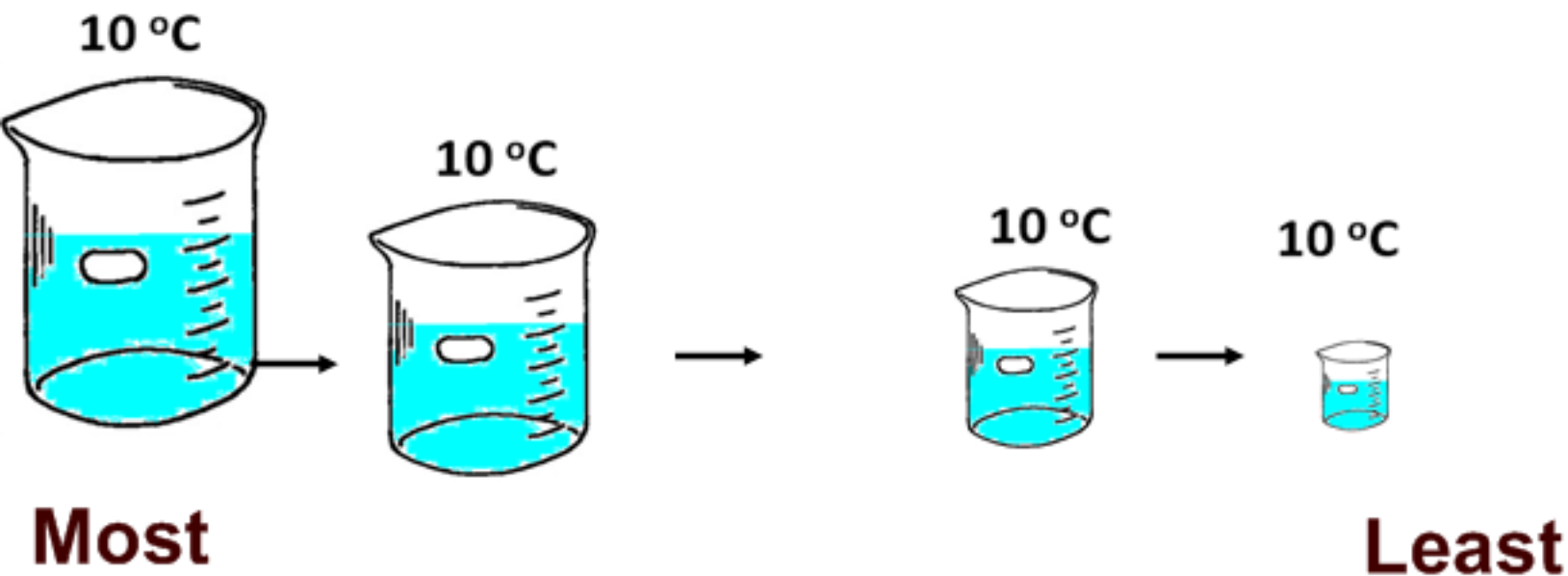
The direction of heat flow is determined by the temperature of the substances.

When mixing hot and cold water, the amount of heat lost by the hot water will be gained by the cold water.

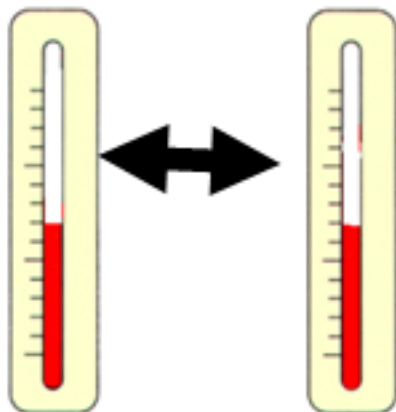
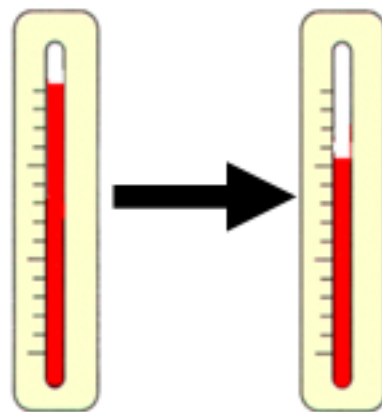
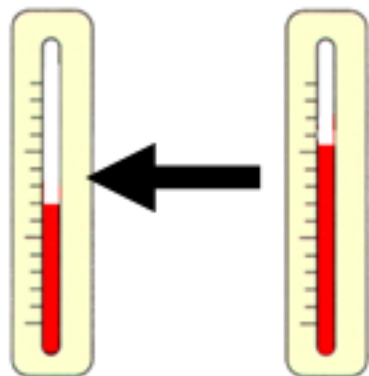
**Place the following beakers of water from highest to lowest temperature?**



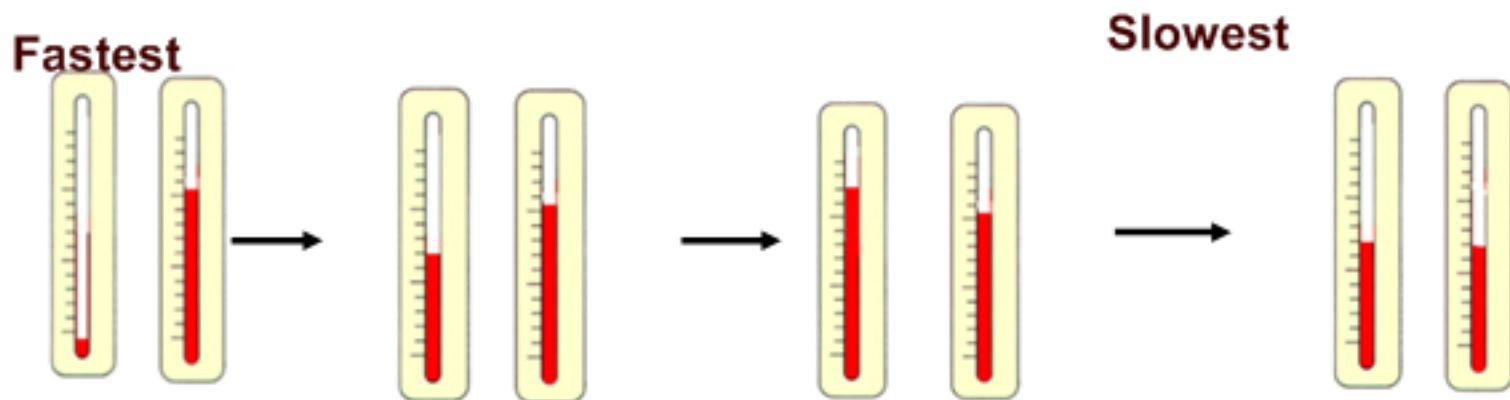
Place the following beakers in order of the amount of Thermal Energy they contain:



Drag the arrows to show the direction of heat flow between the pairs of thermometers!!!



**Place the following pairs of thermometers in order of heat transfer from fastest to slowest:**

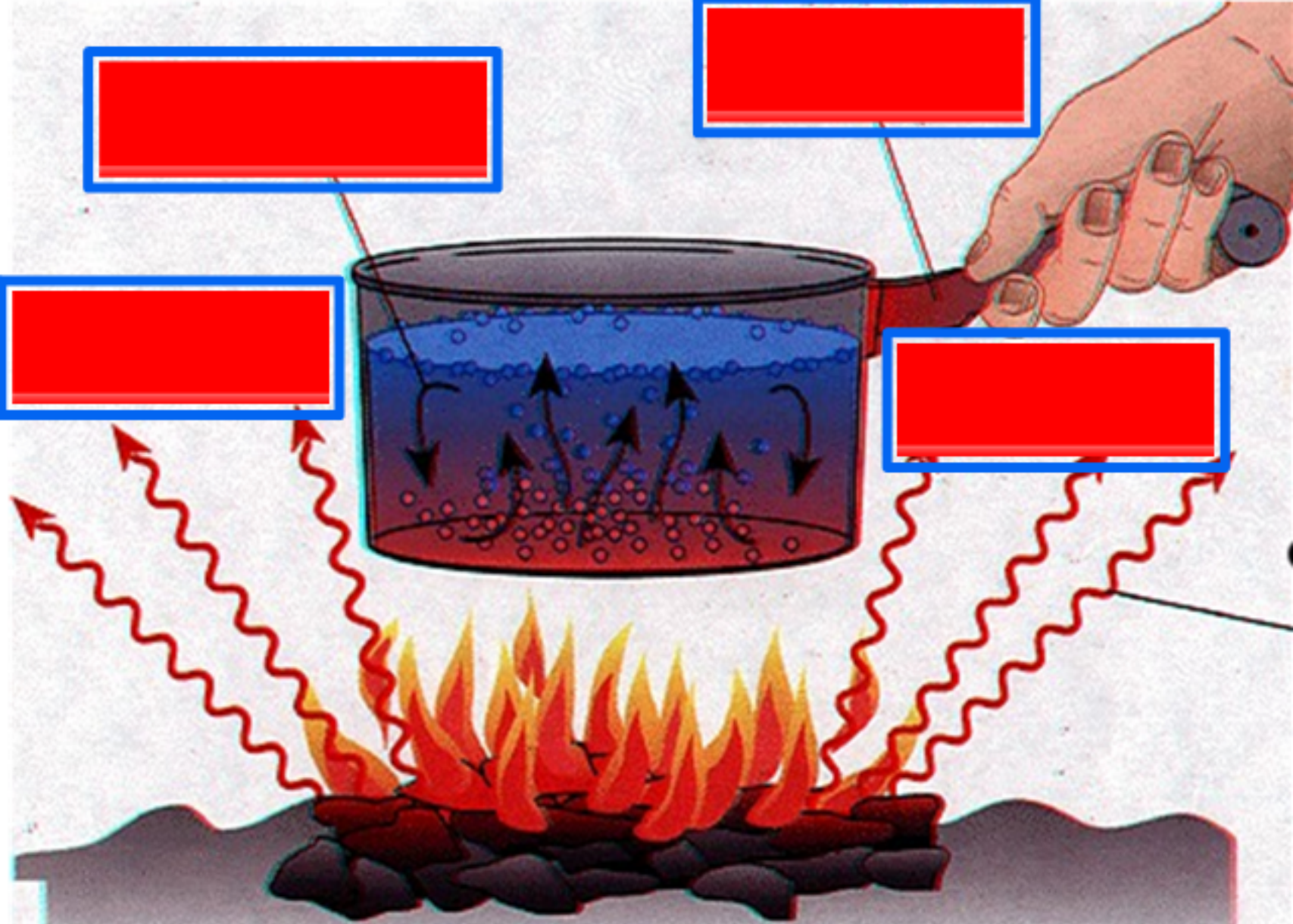




# Qwizdoms

## Questions #1-4





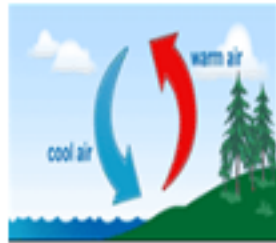


Drag the pictures to the proper Heat Transfer Mechanism(if more than one, place on the line!!):

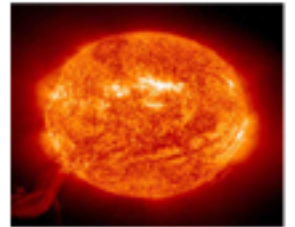
## Conduction



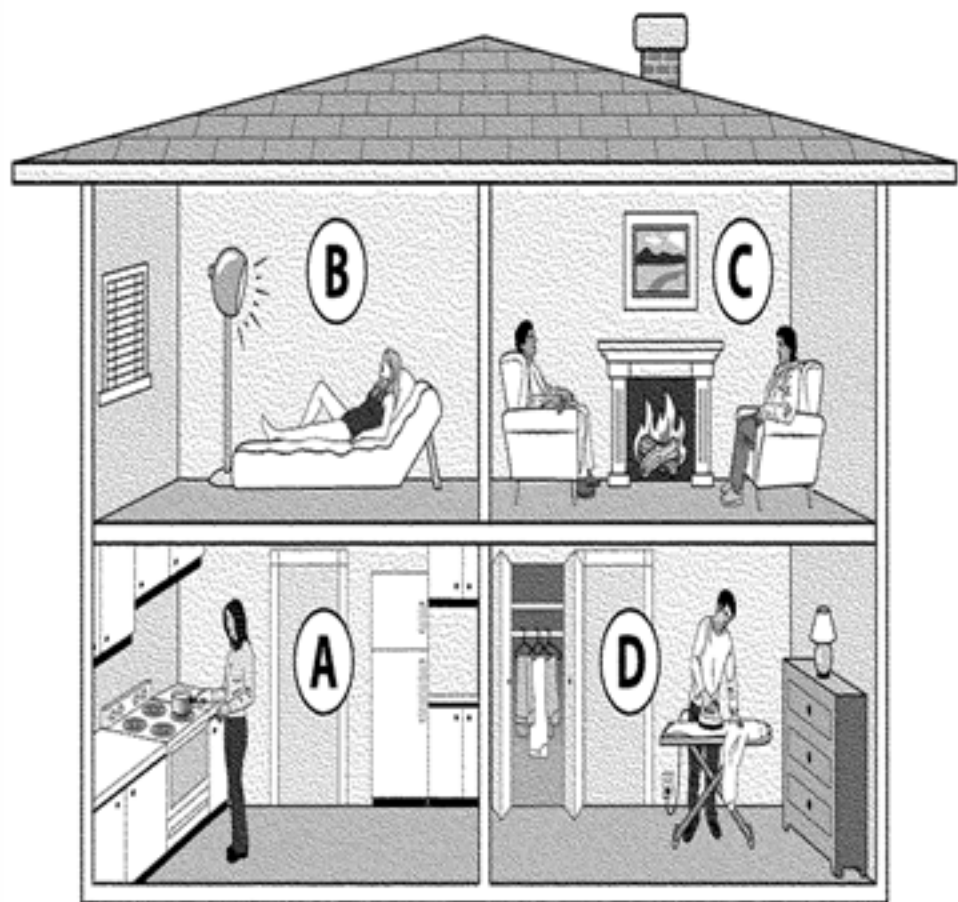
## Convection



## Radiation



How is the heat transferred to the sunbather in Room B?

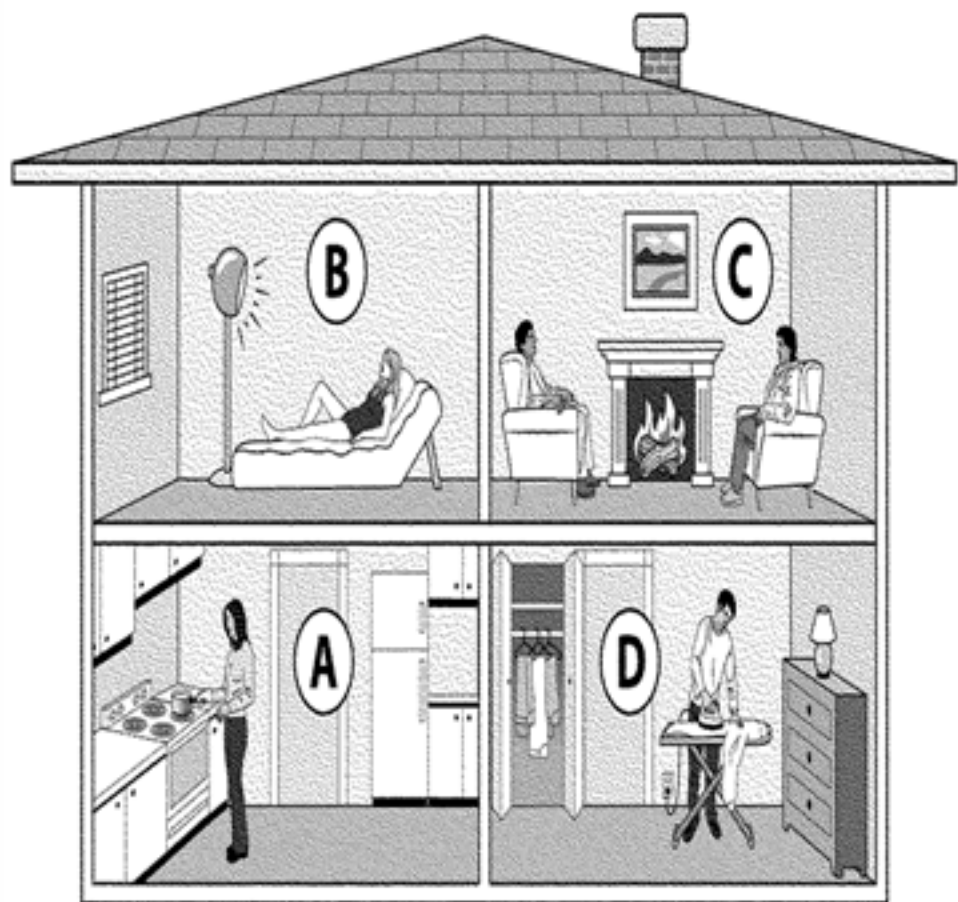


Radiation

Convection

Conduction

How is the heat transferred to the woman's hand in Room A?

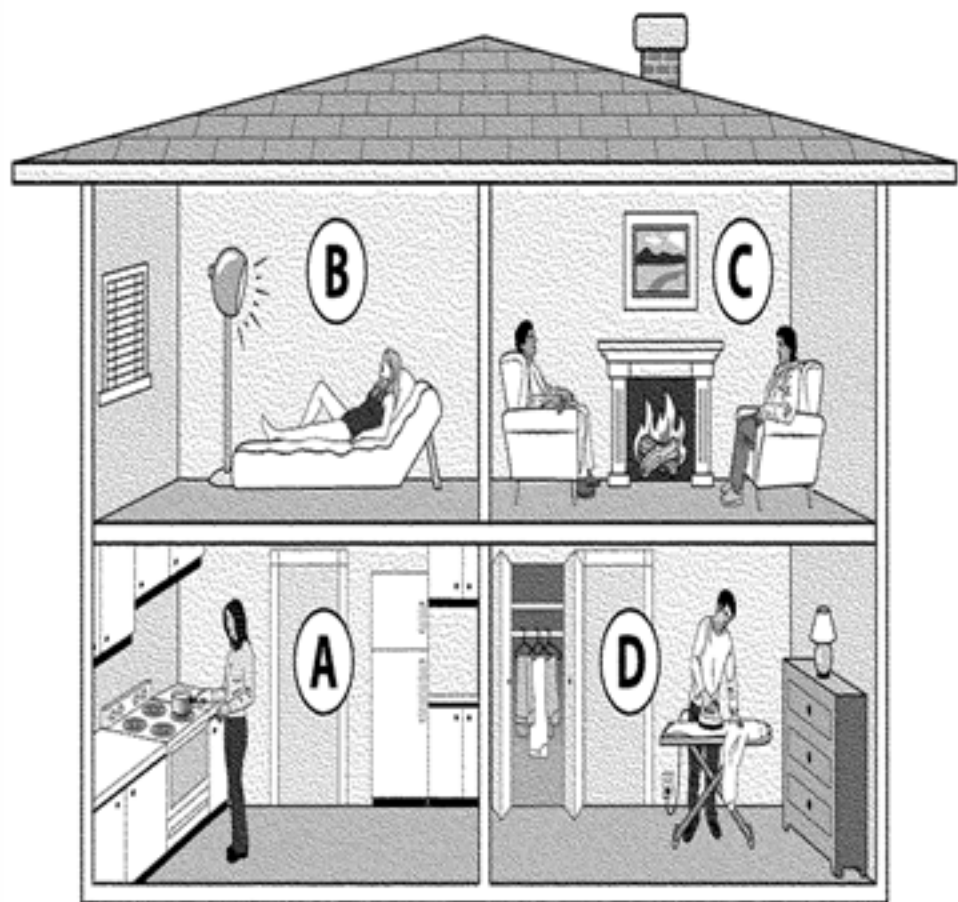


Radiation

Convection

Conduction

How is the heat transferred to the people in room C?

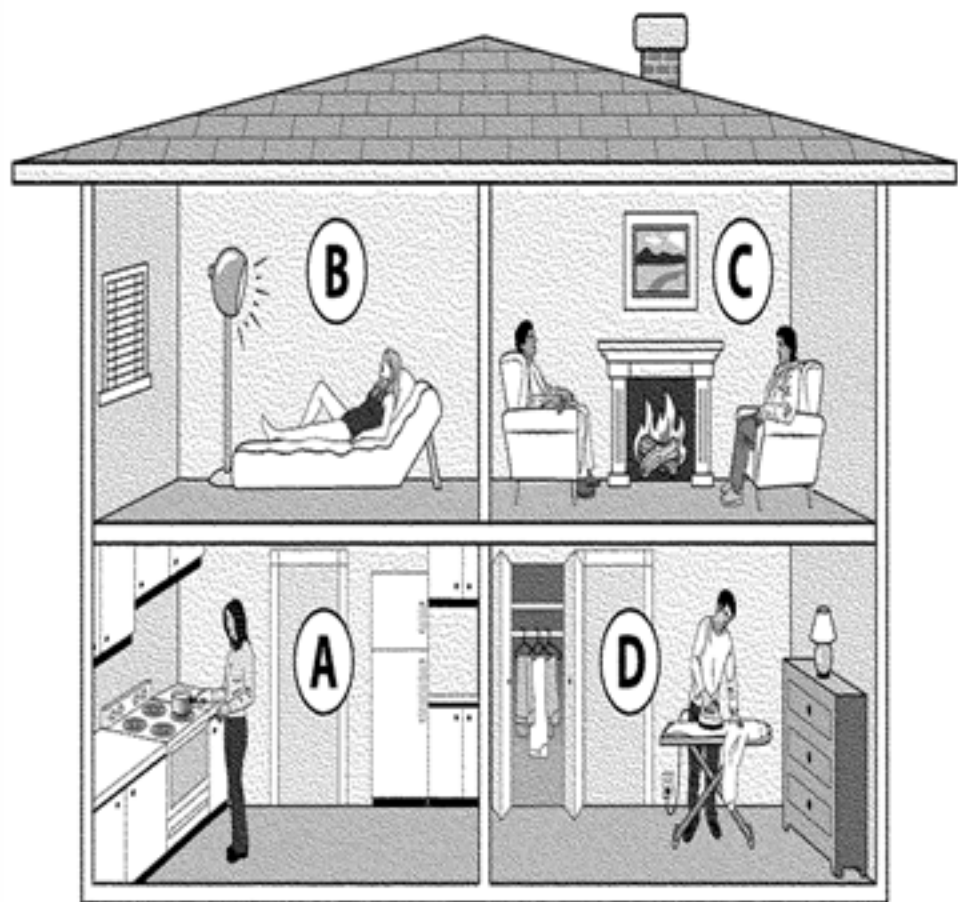


Radiation

Convection

Conduction

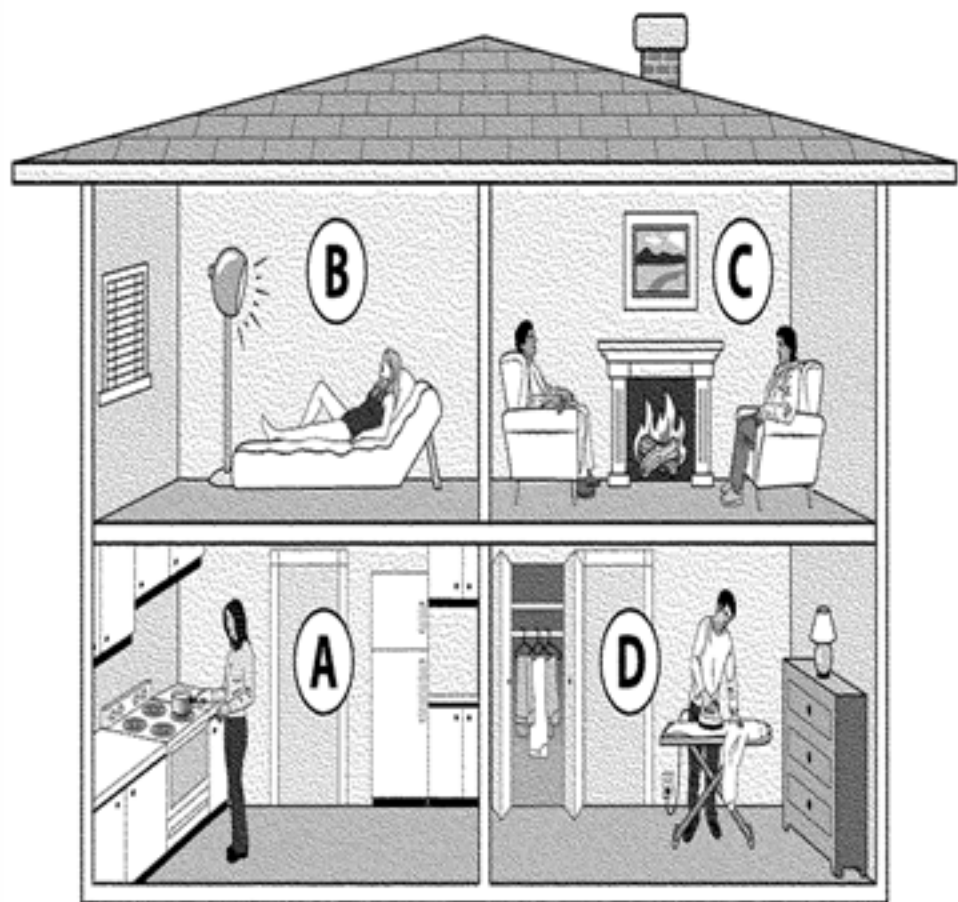
Where does most of the heat in room C go?



In the room

Up the Chimney

How is the heat transferred to the shirt in room D?

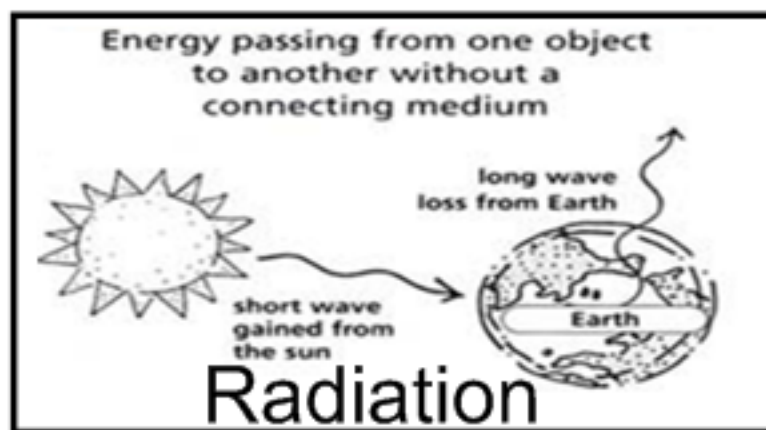
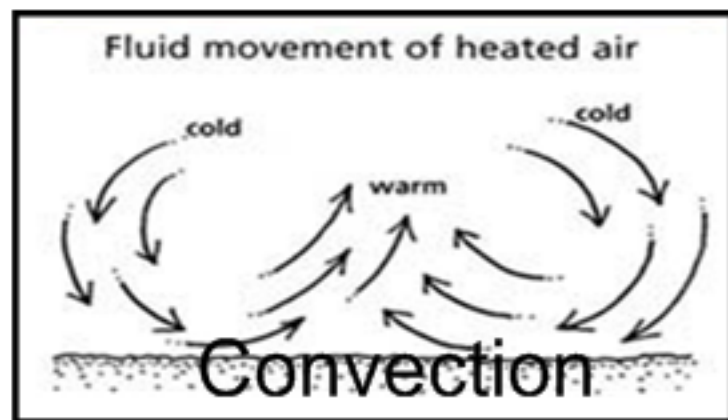
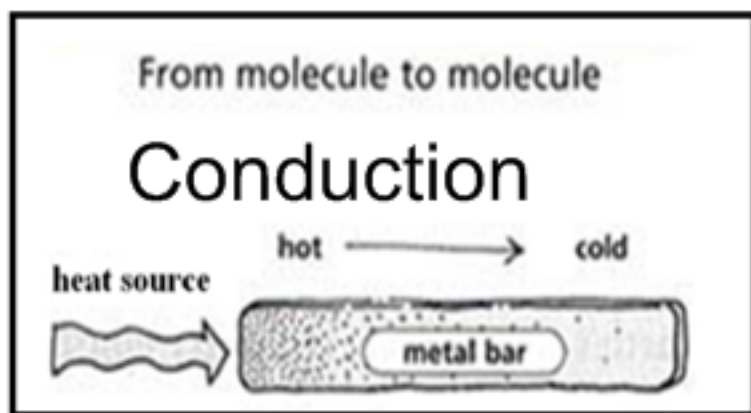


Radiation

Convection

Conduction

Match the following pictures with their correct term!!



When you add or remove  
heat from a substance, one  
of two things will happen, but  
never at the same time!!

1. Substance will change phase.
2. Substance will change temperature.



# Match the Phase Changes:

Solid to liquid

Liquid to gas

Solid to gas

Gas to liquid

Liquid to solid

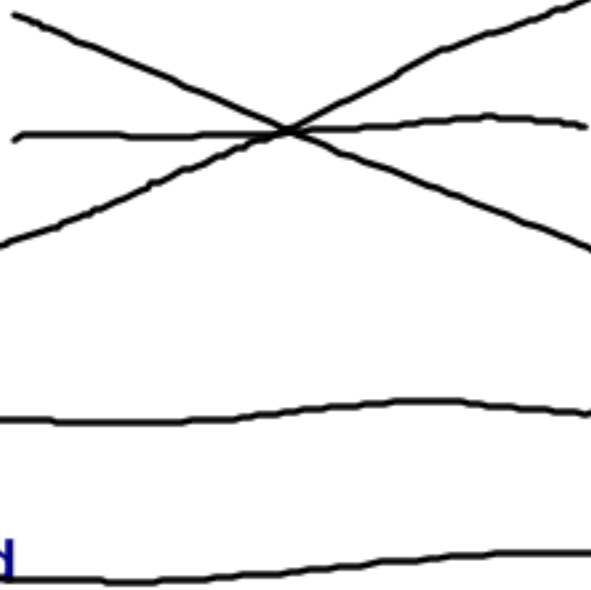
Sublimation

Vaporization

Melting

Condensation

Freezing

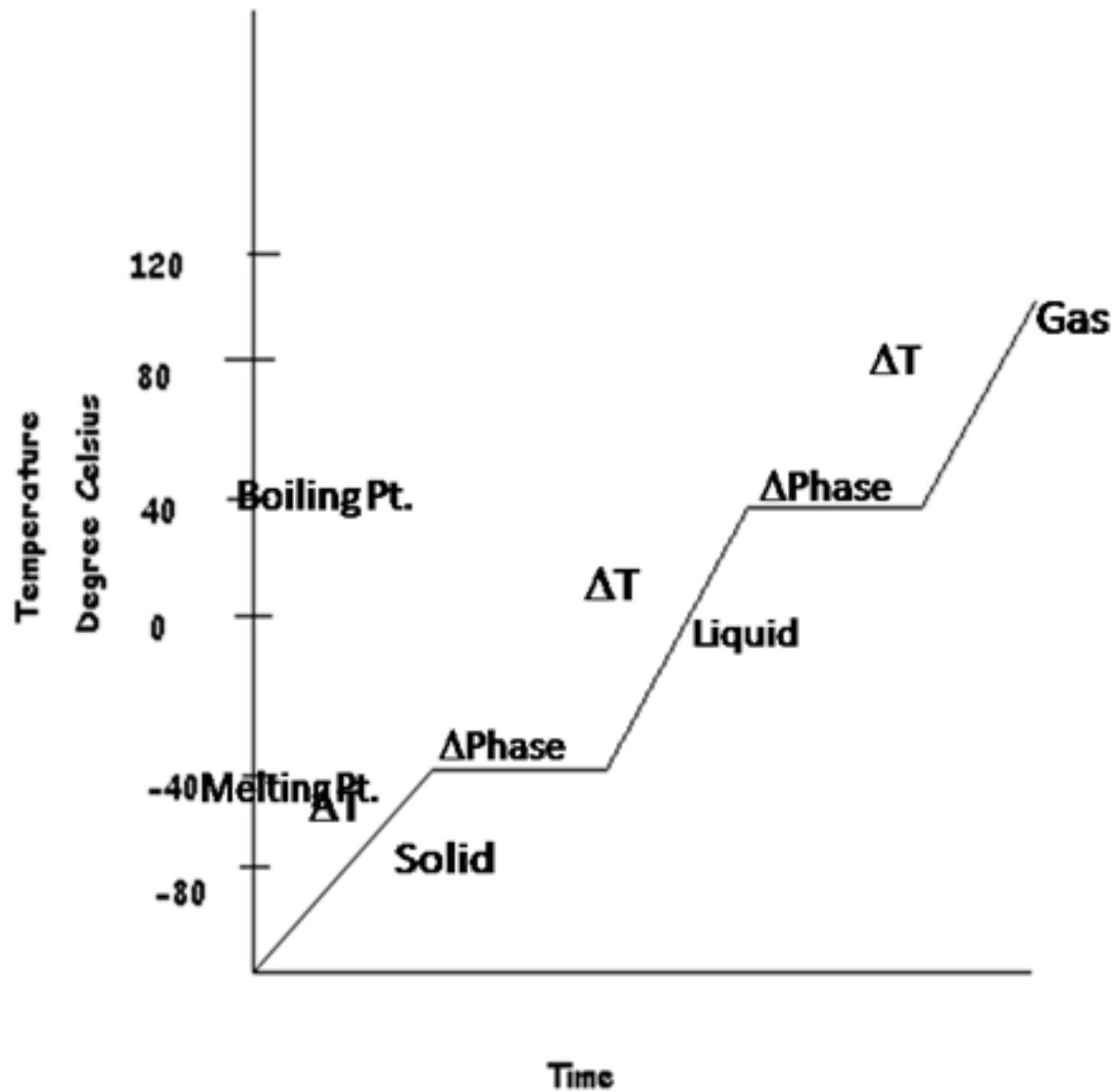


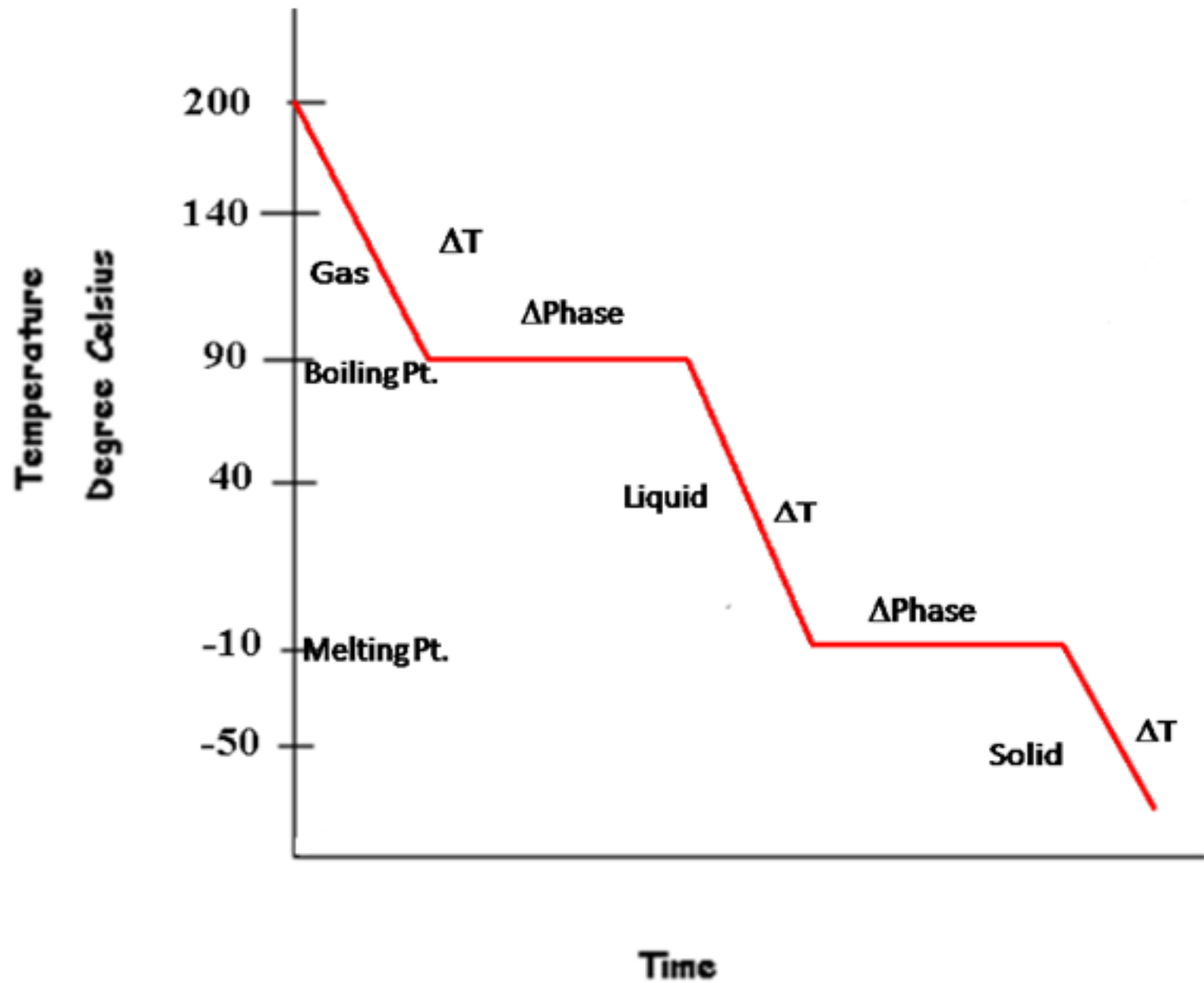
Substances that do not allow heat to flow through them are called insulators.

Substances that do allow heat to flow through them are called conductors.

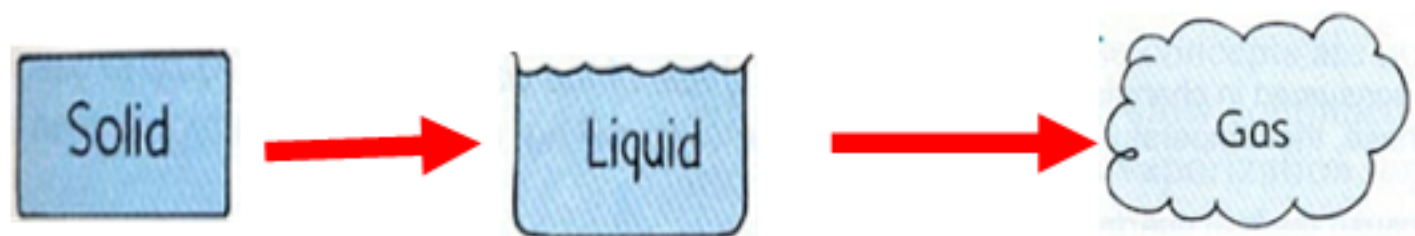
Most non metals make good insulators!!

Most metals make good conductors!!

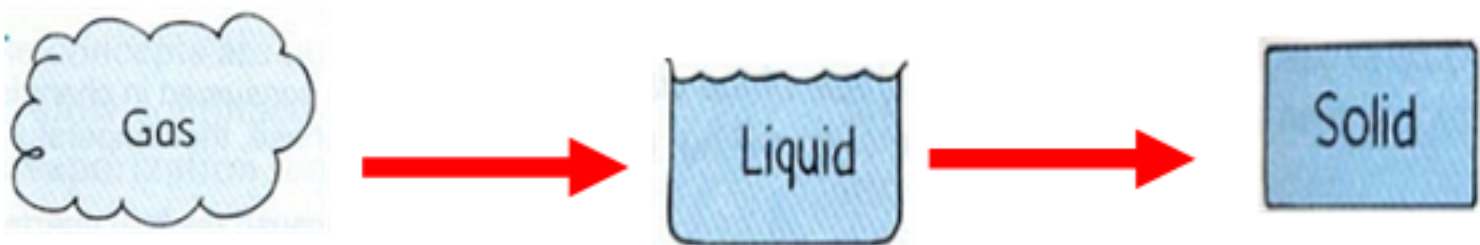




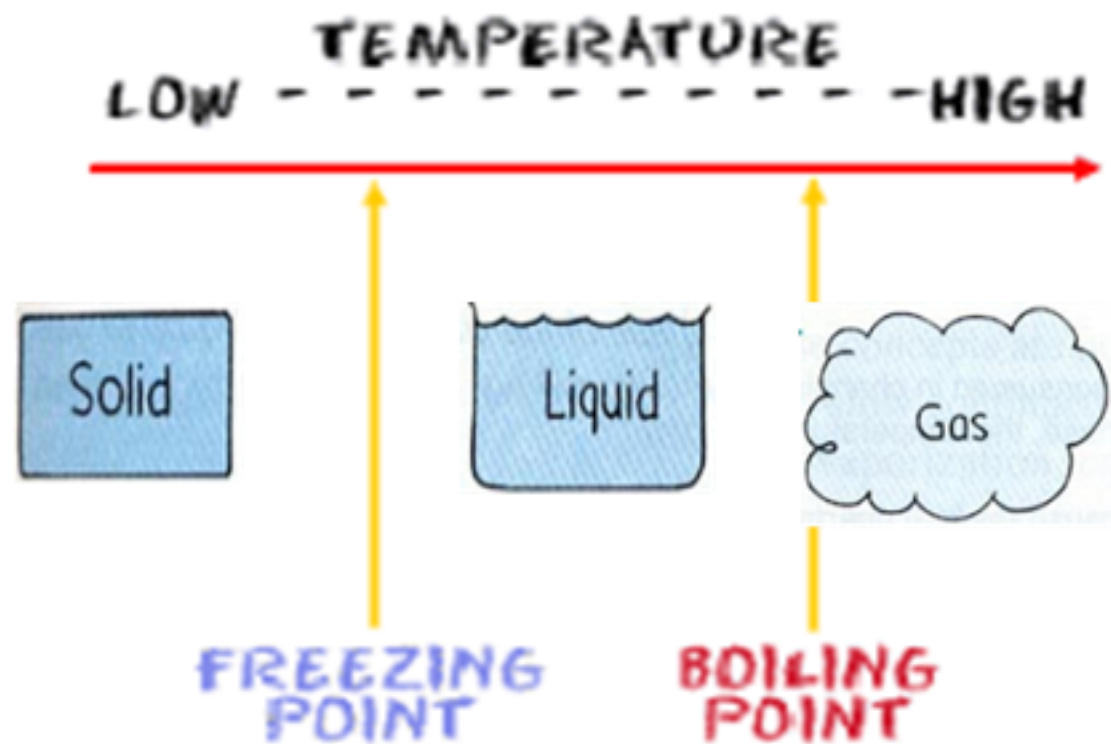
Energy is absorbed when change of phase is in this direction.....



Energy is released when change of phase is in this direction.....



Place the phases of matter on the correct "x"!!



The following substances are heated to 100 degrees Celsius. Place them in order from fastest to slowest!!!

Substance	Specific Heat in J/g °C
Water	4.18
Iron	.450
Lead	.13
Silver	.245
Copper	.390
Aluminum	.900

Fastest  Slowest

Lead | Silver | Copper | Iron | Aluminum | Water



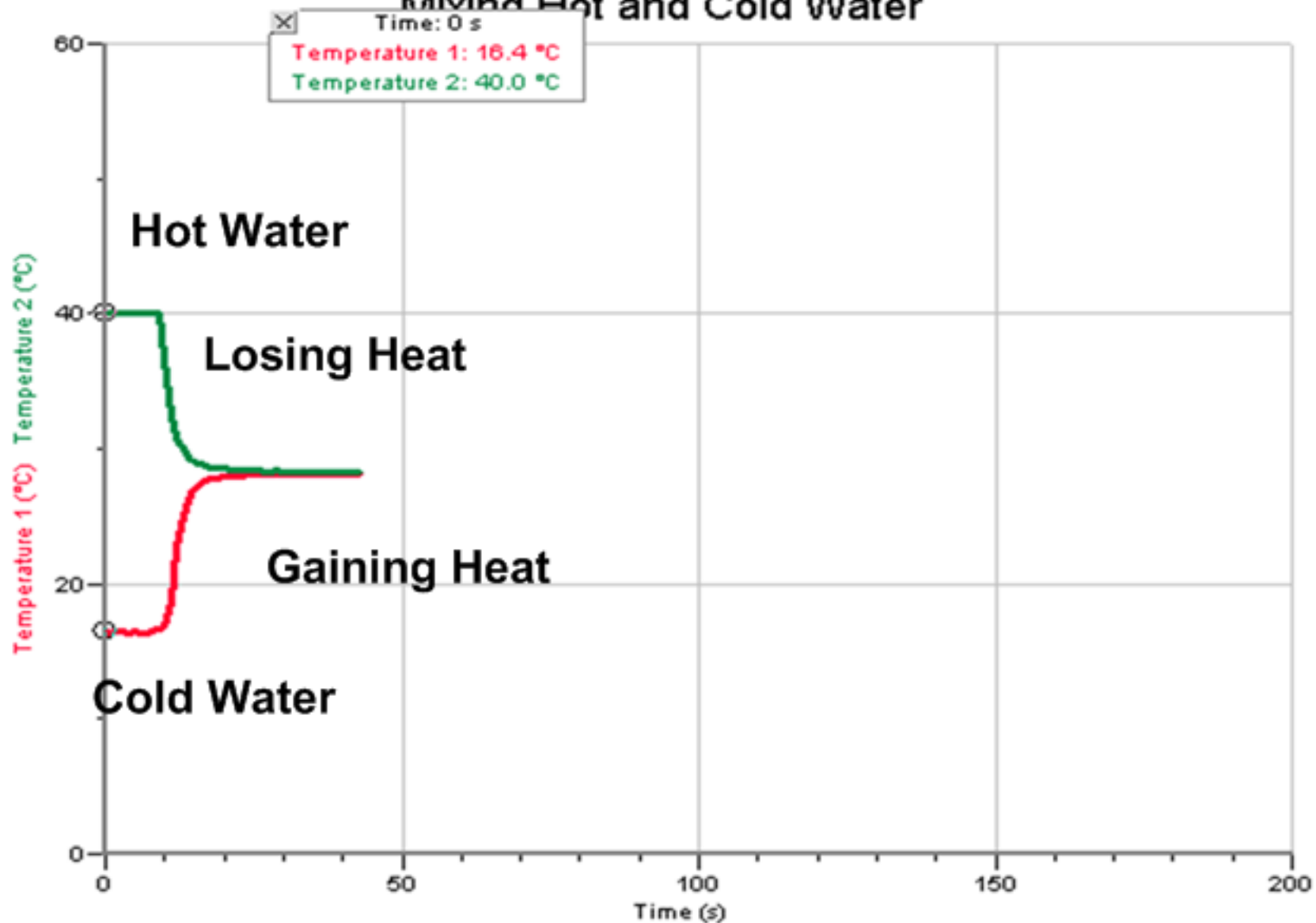
The following substances are cooled to 10 degrees Celsius. Place them in order from fastest to slowest!!!

Substance	Specific Heat in J/g °C
Water	4.18
Iron	.450
Lead	.13
Silver	.245
Copper	.390
Aluminum	.900

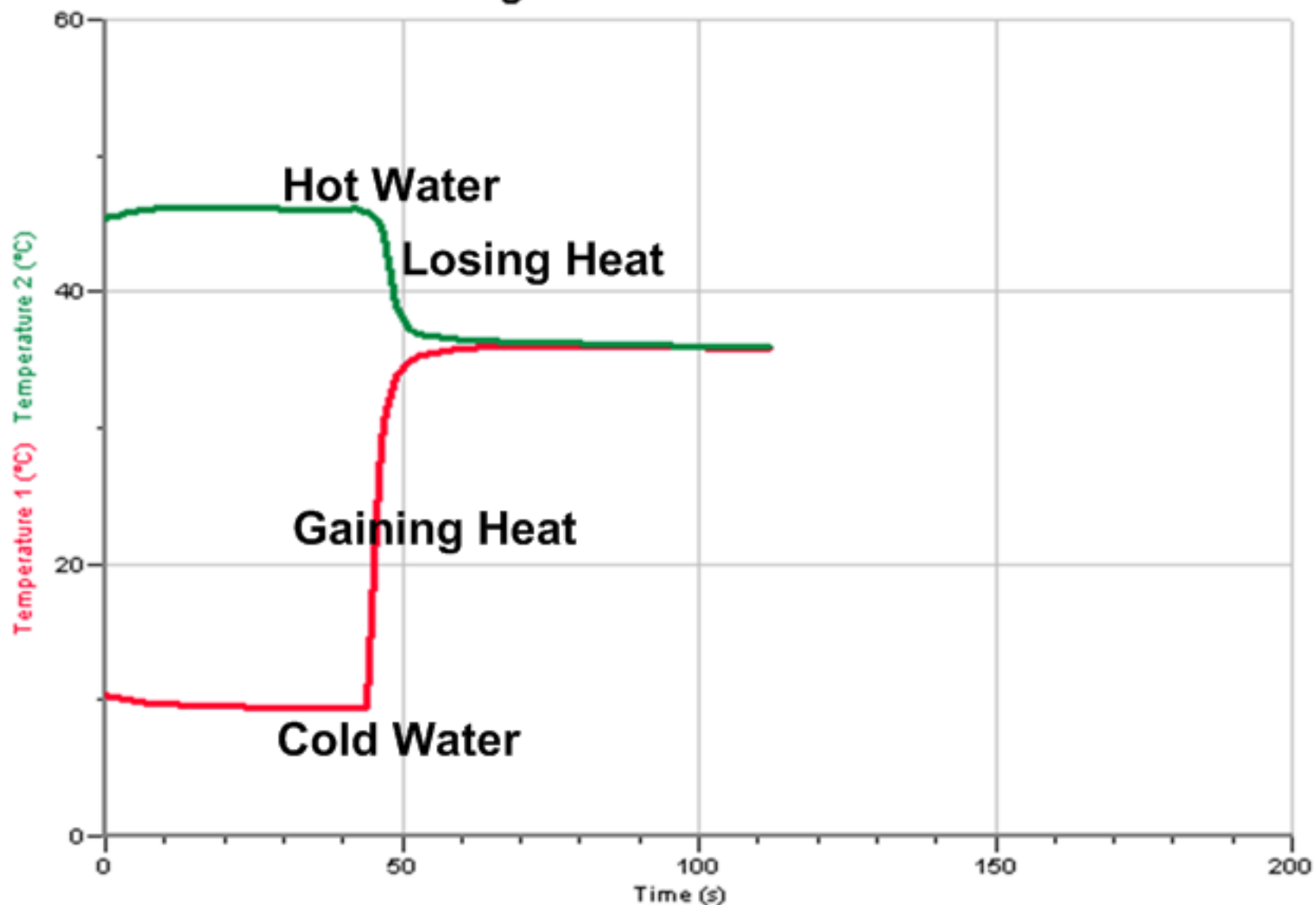
Fastest  Slowest



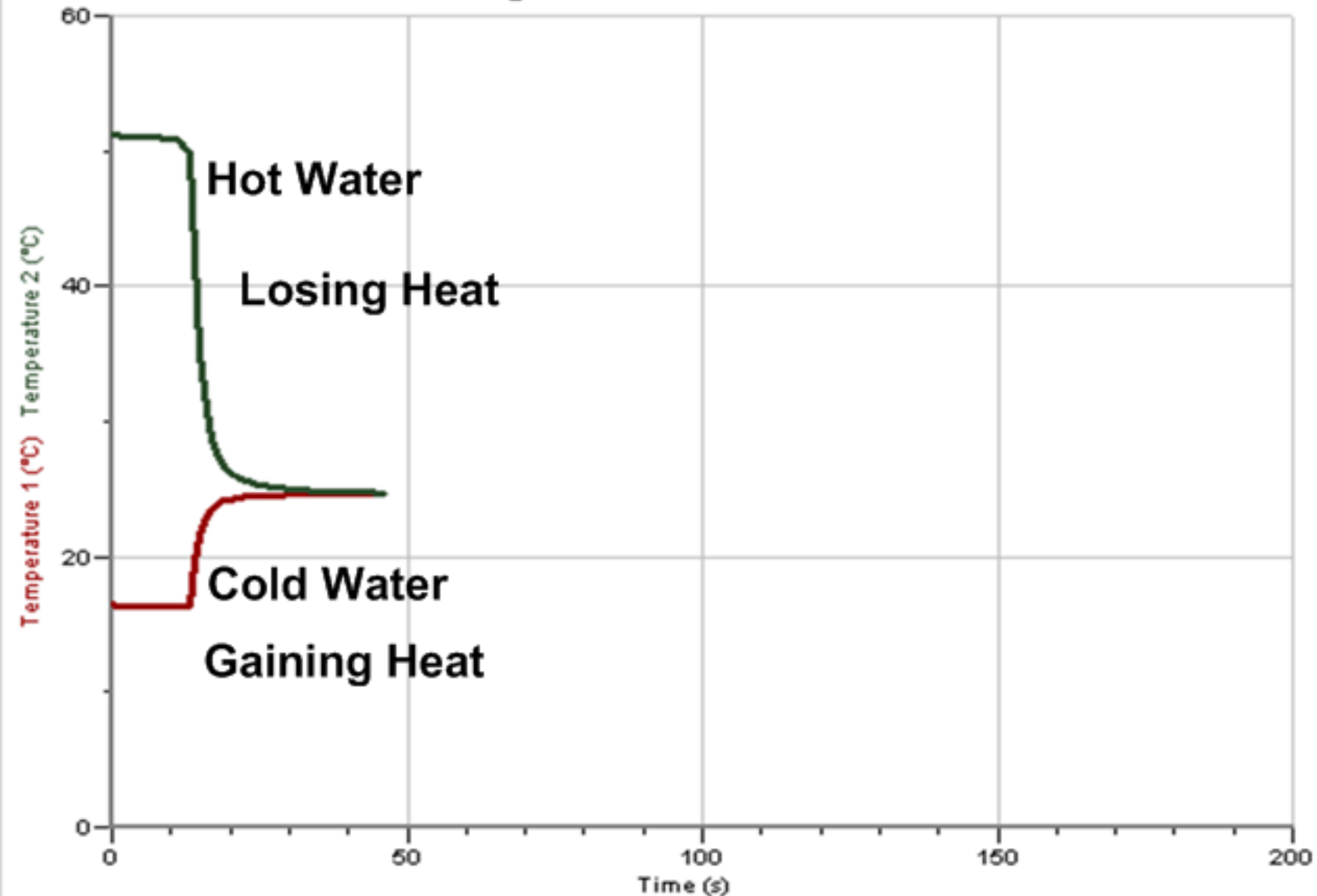
# Mixing Hot and Cold Water



# Mixing Hot and Cold Water



# Mixing Hot and Cold Water



(27.6, 41.2)

## Mixing Hot and Cold Water

In this Lab, Hot water and Cold water were mixed together!!

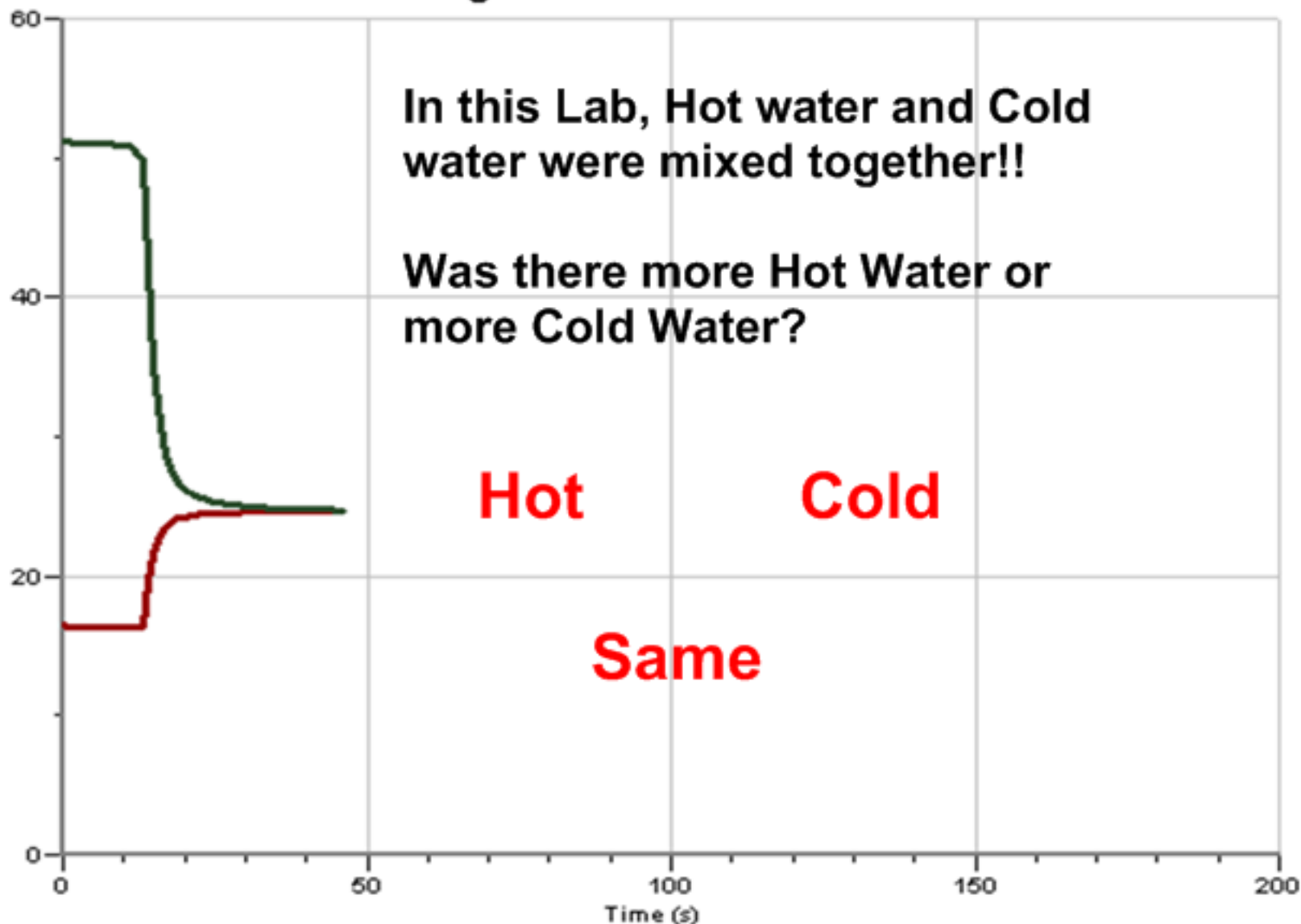
Was there more Hot Water or more Cold Water?

Hot

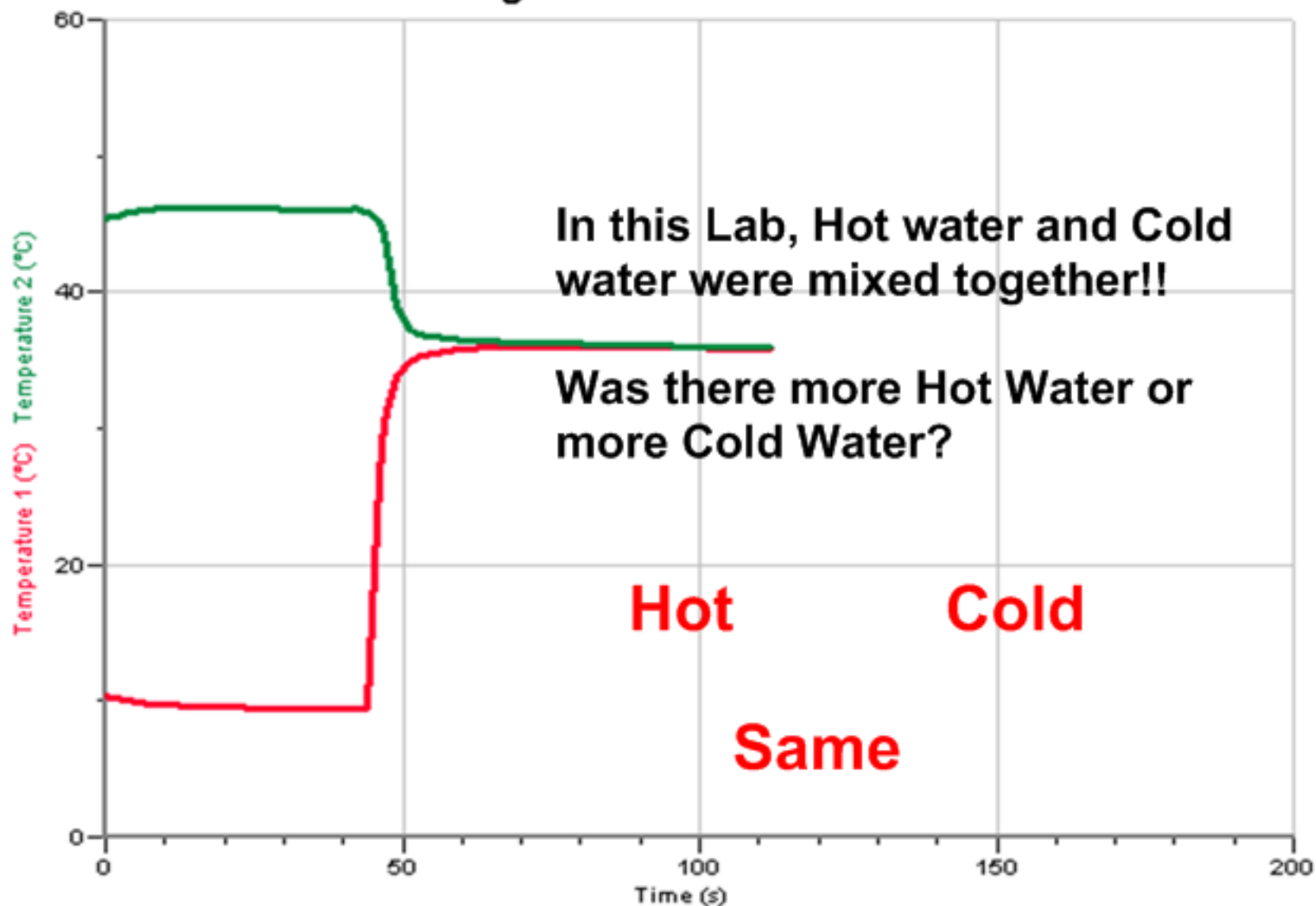
Cold

Same

Temperature 1 (°C) Temperature 2 (°C)



## Mixing Hot and Cold Water



## Mixing Hot and Cold Water

Time: 0 s  
Temperature 1: 16.4 °C  
Temperature 2: 40.0 °C

In this Lab, Hot water and Cold water were mixed together!!

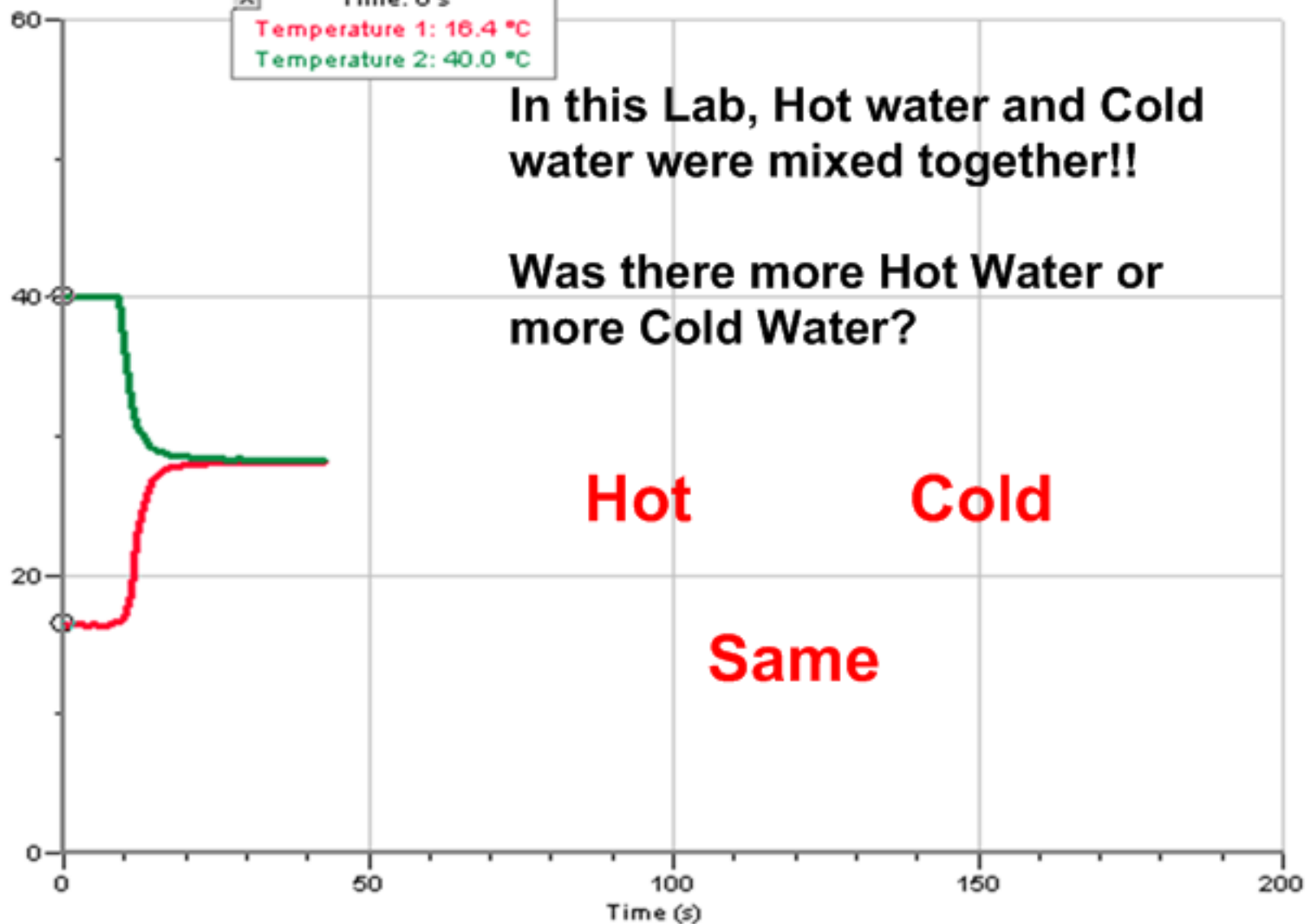
Was there more Hot Water or more Cold Water?

Temperature 1 (°C) Temperature 2 (°C)

Hot

Cold

Same





# Qwizdoms

## Questions #5-16





How much heat is required to raise the temperature of 245 g of aluminum from 20 degree Celsius to 90 degrees Celsius?

Substance	Specific Heat in J/g °C
Water	4.18
Iron	.450
Lead	.13
Silver	.245
Copper	.390
Aluminum	.900

$$Q = ? \quad Q = 245 (.900)$$

$$m = 245$$

$$c_p = .900$$

$$\Delta T = 70$$

$$Q = 15435 \text{ J}$$

55,000 J of heat is removed from a piece of silver from 120 degrees Celsius to 10 degrees Celsius. What is the mass of the silver?

$$Q = 55,000 \text{ J}$$

$$c_p = .245$$

$$\Delta T = 110^\circ \text{C}$$

$$m = ?$$

$$Q = m c_p \Delta T$$

$$m = \frac{Q}{c_p \Delta T}$$

$$m = \frac{55,000}{.245(110)}$$

$$m = 2040.8 \text{ g}$$

Substance	Specific Heat in $\frac{\text{J}}{\text{g}^\circ\text{C}}$
Water	4.18
Iron	.450
Lead	.13
Silver	.245
Copper	.390
Aluminum	.900



45,000 J of heat is removed from 180 g of an unknown substance as it cools from 200 degrees Celsius to 70 degrees Celsius. What is the specific heat of the unknown substance?

$$Q = 45,000 \text{ J}$$
$$m = 180 \text{ g}$$
$$\Delta T = 130$$
$$C_p = ?$$
$$Q = mc\Delta T$$
$$C_p = \frac{Q}{m\Delta T}$$
$$= \frac{45,000}{180(130)}$$
$$= 1.92$$

Substance	Specific Heat in J/g °C
Water	4.18
Iron	.450
Lead	.13
Silver	.245
Copper	.390
Aluminum	.900



# Qwizdoms

## Questions #17-18

