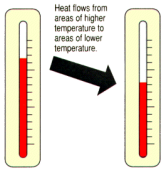
TOPIC 3 - Thermal Physics

Temperature → we can think of temperature as
- the degree of "hotness" or "coldness"
- measure with a thermometer => calibrated in °C or K
  - °F
  - 0°C → melting/freezing
  - 100°C → boiling/condensation
- SI unit is the kelvin (K)

Transfer of heat (thermal energy)

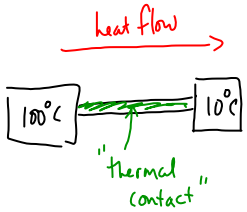


Temperature determines the direction of the thermal energy transfer between two objects

↑ Another way to define temperature.

* It is ONLY temperature that determines the direction of thermal transfer. The direction of thermal transfer is NOT determined by the amount of internal energy in a body.

* The direction of thermal transfer is determined by temperature alone => high temp to low temp. (heat flow)



Two bodies are in "thermal contact" if thermal energy can be exchanged between them

The direction of heat flow does not depend on:
- the mass of the bodies
- the internal energy of the bodies
- the size of the bodies

Heat flow only depends on temperature!!

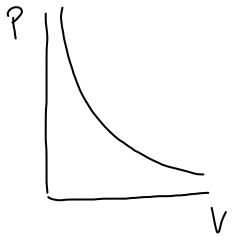
Thermal Equilibrium

Two bodies are in thermal equilibrium if, when they are in thermal contact, there is no transfer of thermal energy between them.

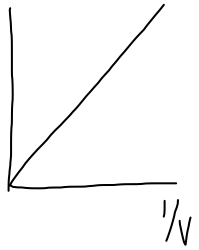
Since thermal energy flows between two bodies when they are at different temperatures then the two bodies must be at the same temperature if they are in thermal equilibrium.

Kelvin & Celsius Temperature Scales

Boyle's Law - the pressure of a fixed mass of gas at a constant temperature is inversely proportional to its volume.



$P \propto \frac{1}{V}$



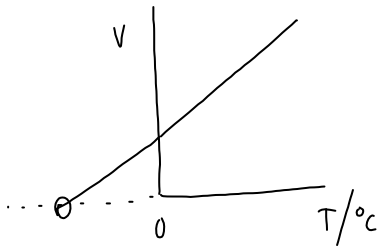
Isothermal Process - a process which is done at constant temperature.

ie. Boyle's law would not apply to a bicycle pump since it gets warm when compressing the air inside. (OK if done very slowly)

↓

obey Boyle's Law.

Charles's Law - the volume of a fixed mass of gas at a constant pressure depends linearly on its temperature (°C).



Gay-Lussacs Law (Pressure Law) - the pressure of a fixed mass of gas at a constant volume depends linearly on its temperature (°C).