



# Temperature

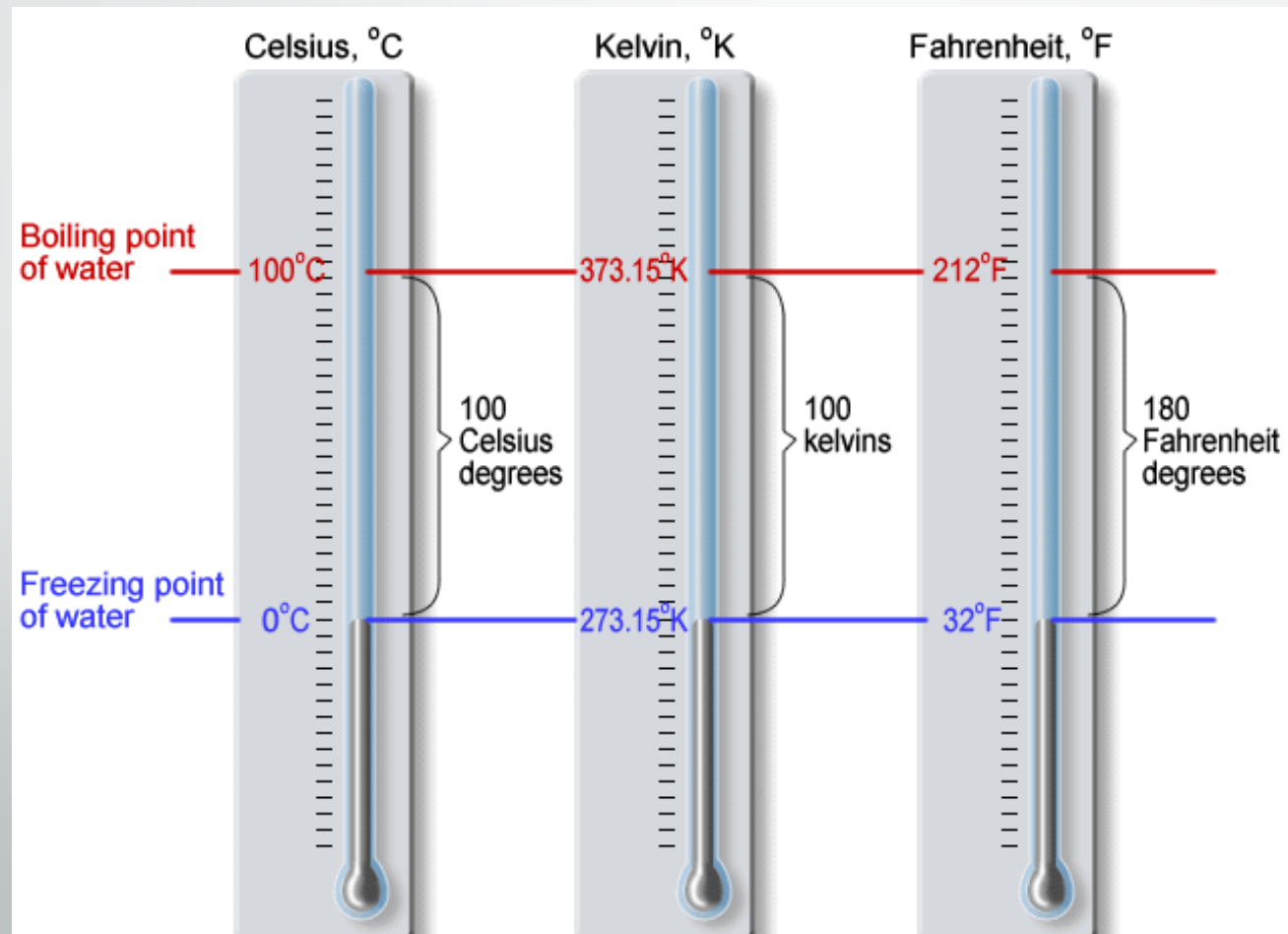
Temperature is a measure of how hot or cold something is.



# How to measure temperature

Temperature is measured by using a thermometer, most thermometers are thin glass tubes filled with mercury. A change in temperature causes a change in volume of the liquid so the liquid expands in the tube of the thermometer.

# Thermometric Scales

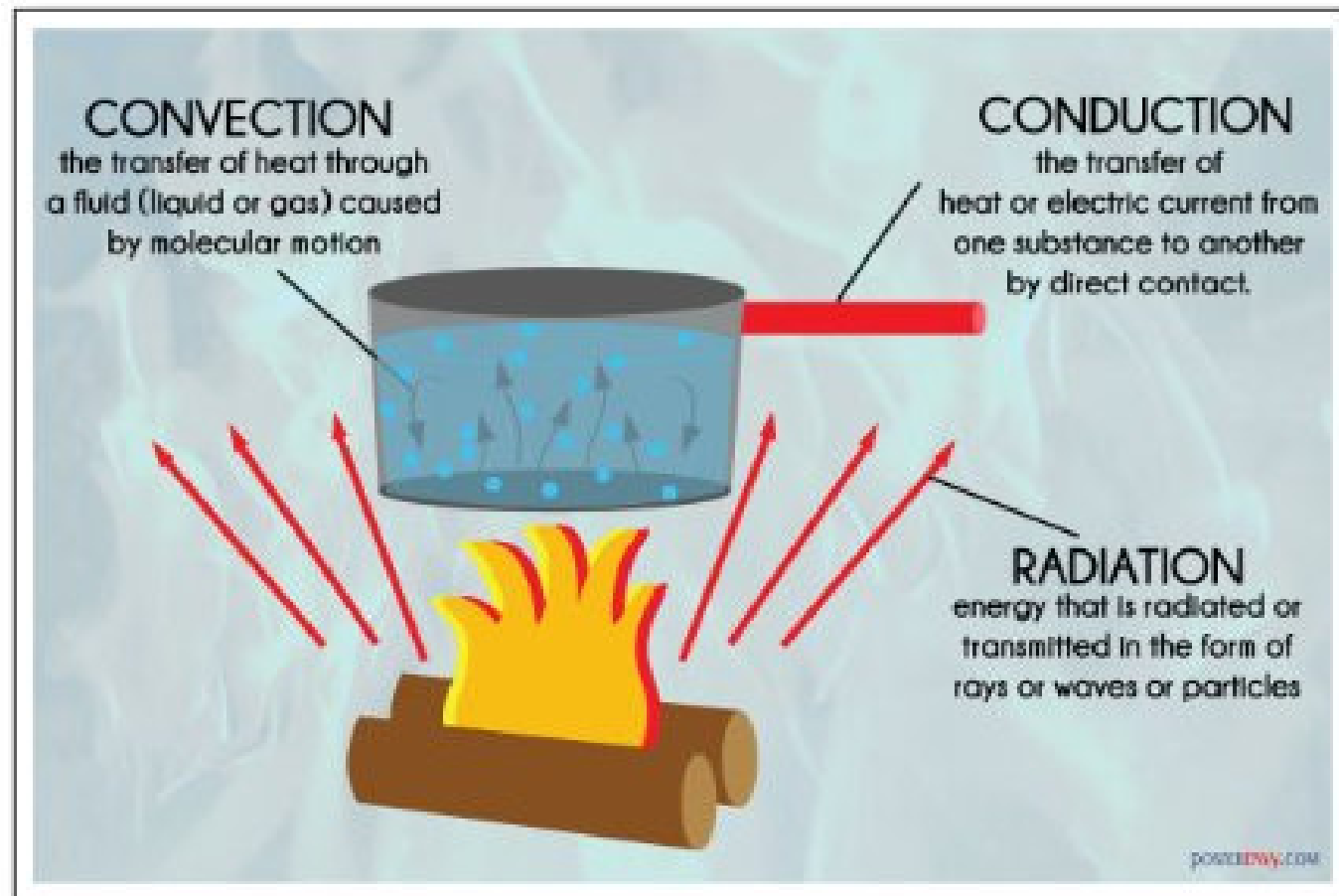




# Heat

Heat is the transfer of energy from a hot object to a colder object.

# Heat transfer



# Thermal motion

Atoms and molecules in a solid, for instance, constantly oscillate around its equilibrium point. The kind of excitation is called thermal motion. When a substance is heated, its constituent particles begin moving more, thus maintaining a greater average separation with their neighboring particles.

The degree of expansion divided by the change in temperature is called the material's coefficient of thermal expansion; it generally varies with temperature.

# Thermal expansion

Thermal expansion is the tendency of matter to change in volume in response to a change in temperature.  
There are two types of expansion:

Linear expansion

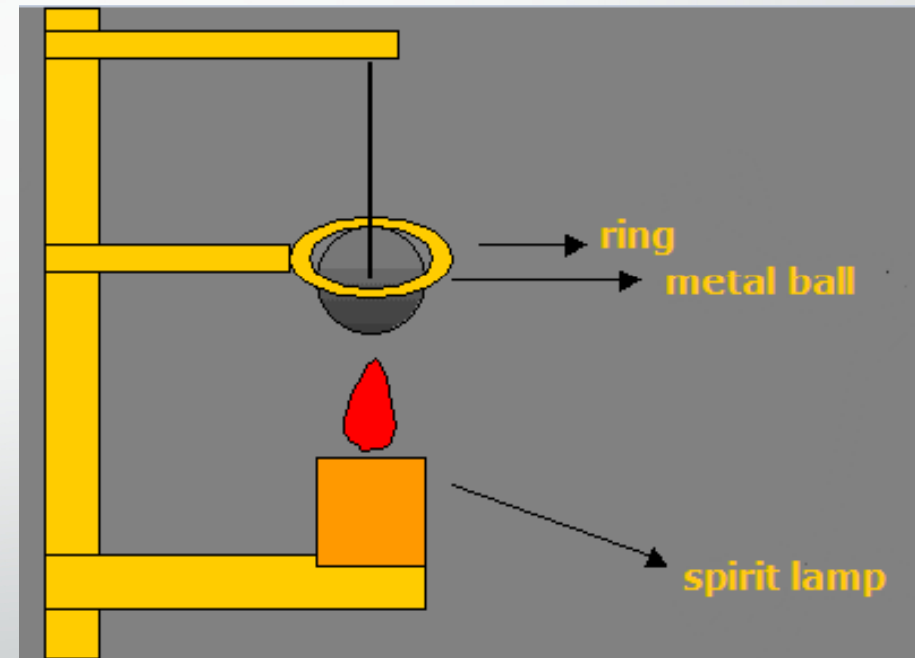
$$\Delta L = \alpha L_0 \Delta T$$

Volumetric expansion

$$V = V_0 (1 + \alpha \Delta T)$$

# Gravesande Ring

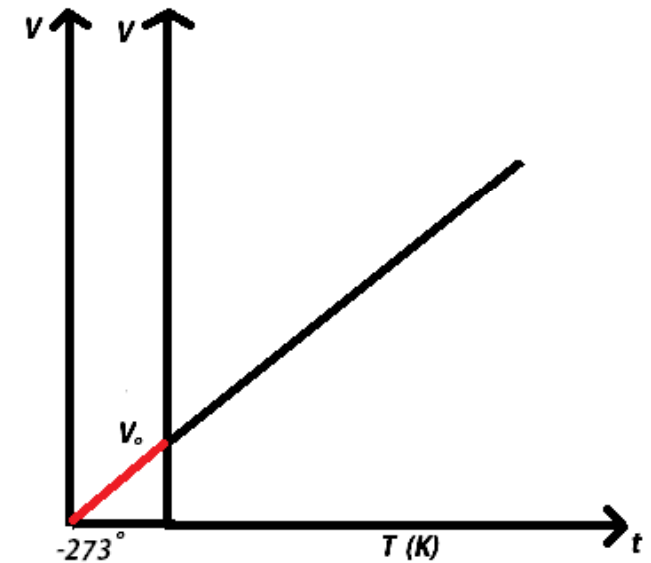
Gravesande ring is an experiment to demonstrate thermal expansion.





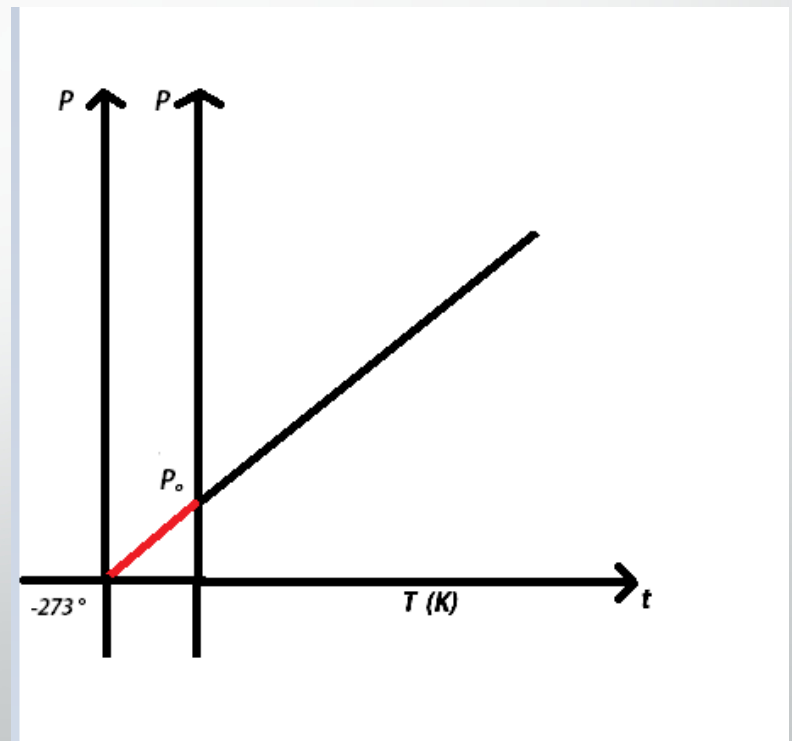
# First Gay-Lussac's law

At constant pressure a gas' volume is directly proportional to the initial volume ( $V_0$ ) and to the variation of temperature .



## Second Gay-Lussac's law

At constant volume the pressure of a gas is directly proportional to the initial pressure ( $P_0$ ) and to the temperature's variation.



# Boyle's law

Boyle's law is an experimental gas law which describes how the pressure of a gas tends to decrease as the volume of a gas increases.

