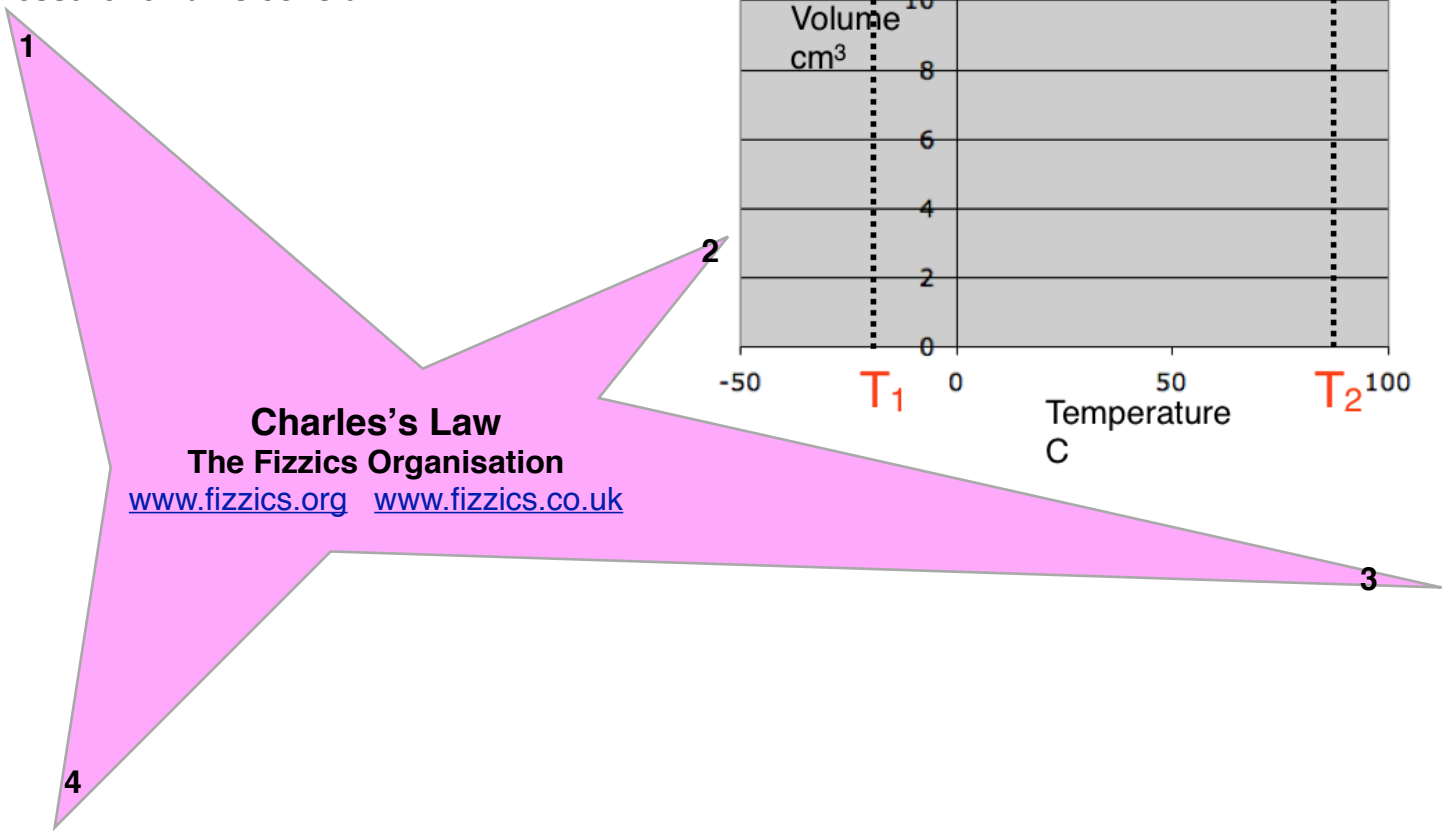
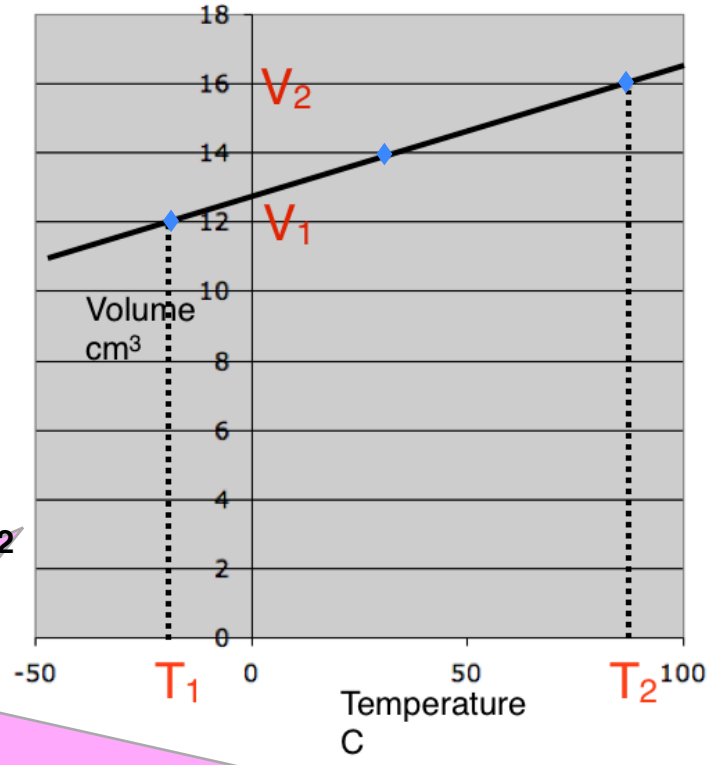
Charles's Law
Like Boyle's Law, when Charles's Law was written it was empirical. It states that:
The volume a a fixed mass of gas is directly proportional to the temperature providing that the pressure remains constant.





Careful experiments confirm that:
V α T or inserting a constant of proportionality
V = constant x T

since $\frac{V_1}{T_1}$ = constant

then $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ constant

When we use this equation the temperature must be in Kelvin.

The kelvin temperature is based on absolute zero.

The kelvin temperature equals the celcius temperature plus 273.

e.g.
0 °C = 273K
27 °C = 300K
100 °C = 373K

When a gas is heated the energy is contained in the increasing kinetic energy of the molecules. Those molecules hit the surfaces harder and therefore exert a greater force and a greater pressure. If the pressure is to be kept constant then the gas must expand so that the impacts are less frequent, therefore, at a constant pressure the volume is directly proportional to the rise in temperature.

This idea can be extended to estimate a value of absolute zero temperature - see further video and notes.