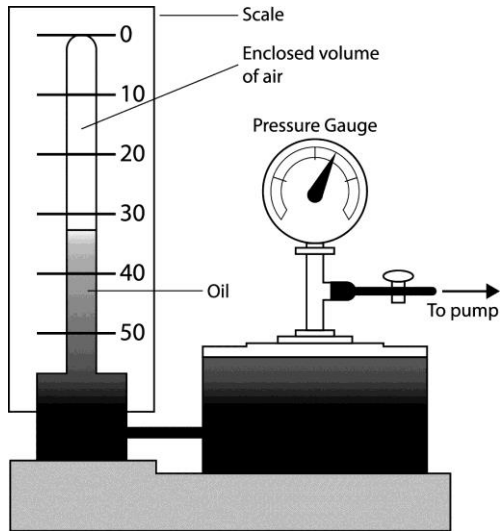


N5

## Relationship between Pressure and Volume of a Gas

Consider an experiment to determine the relationship between pressure and volume of a fixed mass and fixed volume of gas.



- As the pump varies the pressure, the volume of the enclosed gas is measured
- It is found that as the pressure increases, the volume decreases

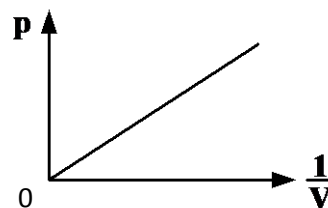
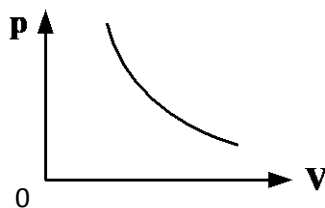
Boyle's law states that for a fixed mass of gas at a constant temperature, the pressure of a gas is inversely proportional to its volume:

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

$$p \times V = \text{constant}$$

$$p_1 V_1 = p_2 V_2$$

Graph



**Example**

The pressure of a gas enclosed in a cylinder by a piston changes from 80 kPa to 200 kPa.

If there is no change in temperature and the initial volume was 25 litres, calculate the new volume.

$$p_1 = 80 \text{ kPa}$$

$$p_1 V_1 = p_2 V_2$$

$$V_1 = 25 \text{ litres}$$

$$80 \times 25 = 200 \times V_2$$

$$p_2 = 200 \text{ kPa}$$

$$\underline{V_2 = 10 \text{ litres}}$$

$$V_2 = ?$$