i.e

Derivation of gas laws

PV = Constant

or $P \propto \frac{1}{V}$ at constant Temperature T

this is Boyle's law

2. Derivation of Charle's Law from Kinetic gas Equation -

We know,

$$PV = \frac{2}{3} RT$$

or $$V = \frac{2}{3 \cdot P} RT$$

$$V = \frac{2R}{3P} \cdot T \quad \text{——}$$

If Pressure P is constant,

then $V \propto T$

3. Avagadoo's Law Derivation :

When two gases have the same Pressure and Volume,

then $P_1 V_1 = P_2 V_2$

We know from Kinetic gas eq^n $PV = \frac{1}{3} mnc^2$

Applying Kinetic gas eq^n

$$\frac{1}{3} m_1 n_1 c_1^2 = \frac{1}{3} m_2 n_2 c_2^2$$

$$\frac{2}{3} \cdot \frac{1}{2} m_1 n_1 c_1^2 = \frac{2}{3} \cdot \frac{1}{2} m_2 n_2 c_2^2$$

or $$\frac{1}{2} m_1 n_1 c_1^2 = \frac{1}{2} m_2 n_2 c_2^2 \quad \text{——} (1)$$

When the temperature of these two gases is also the same, then their Kinetic energy per mole will also be the same

i.e $$\frac{1}{2} m_1 c_1^2 = \frac{1}{2} m_2 c_2^2 \quad \text{——} (2)$$

Dividing equation (1) by (2)

we get, $n_1 = n_2$

Thus the equal volumes of all gases under the same conditions of temperature and Pressure have the same number of moles.

This is Avagradro's Law.