Kinetic Theory:

The relationship between energy and temperature (for monatomic ideal gas)

$$\Delta p_x = 2mv_x$$

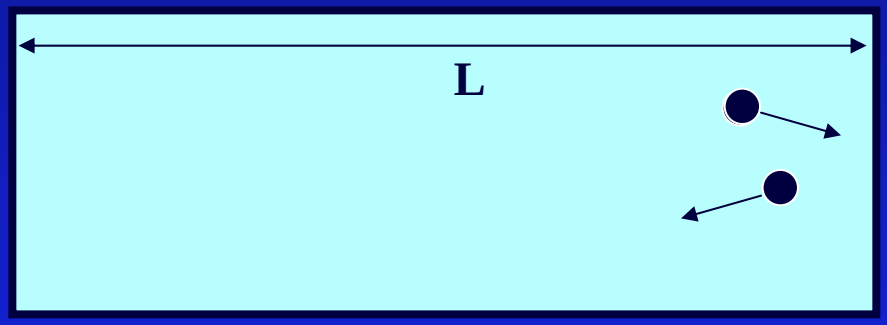
$$\Delta t = 2\frac{L}{v_x}$$

$$F_{avg} = \frac{\Delta p_x}{\Delta t} = \frac{mv_x^2}{L}$$

For N molecules, multiply by N

$$P = \frac{F}{A} = \frac{Nmv_x^2}{V}$$

Note KE = $\frac{1}{2}$ m v^2 = 3/2 m v_x^2



$$P = \frac{2}{3}\frac{N}{V}\langle K_{tr}\rangle$$

Using PV = NkT

$$\langle K_{tr}\rangle = \frac{3}{2}kT$$

⟨⟩ means *average*.

kT/2 energy per degree of freedom = equipartition theorem