Equations

$ax^2 + bx + c = 0 \quad \text{and} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	Quadratic Equation
$PV = nRT$	Ideal Gas Law
$P_T = \sum_i P_i$	Dalton's law of partial pressures
$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$	van der Waals equation
$Z = 1 + \frac{B}{V_m} + \frac{C}{V_m^2} + \frac{D}{V_m^3} + \cdots$	Virial Equation
$Z = 1 + B'P + C'P^2 + D'P^3 + \cdots$	Virial Equation
$\overline{E}_{trans} = \frac{3}{2}\frac{RT}{N_A} = \frac{3}{2}k_BT$	Average kinetic energy
$v_{rms} = \sqrt{\frac{3k_BT}{m}} = \sqrt{\frac{3RT}{\mathcal{M}}}$	Root-mean-square velocity
$\frac{dN}{N} = 4\pi c^2 \left(\frac{m}{2\pi k_BT}\right)^{3/2} e^{-mc^2/2k_BT} dc$	Maxwell speed distribution
$\overline{c} = \sqrt{\frac{8k_BT}{\pi m}} = \sqrt{\frac{8RT}{\pi\mathcal{M}}}$	Average or mean speed
$c_{mp} = \sqrt{\frac{2k_BT}{\pi m}} = \sqrt{\frac{2RT}{\pi\mathcal{M}}}$	most probable speed
$Z_1 = \sqrt{2}\pi d^2 \overline{c} \frac{N}{V}$	Collision frequency
$Z_{11} = \frac{\sqrt{2}}{2}\pi d^2 \overline{c} \left(\frac{N}{V}\right)^2$	Binary collision frequency
$\lambda = \frac{1}{\sqrt{2}\pi d^2 (N/V)}$	Mean free path
$\eta = \frac{m\overline{c}}{3\sqrt{2}\pi d^2}$	Gas viscosity
$\frac{r_1}{r_2} = \sqrt{\frac{\mathcal{M}_2}{\mathcal{M}_1}}$	Graham's laws of diffusion and effusion
$\frac{N_2}{N_1} = e^{-\Delta E/k_BT}$	Boltzmann distribution law
$w = -\int pdV$	expansion work
$w = -nRT \ln \frac{V_2}{V_1} = -nRT \ln \frac{P_1}{P_2}$	work of isothermal, reversible ideal gas expansion
$\Delta U = q + w$	First law of Thermodynamics
$dU = đq + đw$	First law of Thermodynamics
$H = U + PV$	Definition of Enthalpy
$C_v = \left(\frac{\partial U}{\partial T}\right)_v$	Heat capacity at constant volume
$C_p = \left(\frac{\partial U}{\partial T}\right)_p$	Heat capacity at constant pressure
$P_1V_1^\gamma = P_2V_2^\gamma$	Adiabatic, reversible expansion of an ideal gas
$P = F/A$	pressure
$p = mv$	momentum