Physics Formula Sheet for NEET Exam

Some of the topicwise Physics formulas, which can solve questions directly in NEET exam, have been provided below:

Kinematics Formula

Average and Instantaneous Vel. and Accel.:

$$\vec{v}_{\text{av}} = \Delta\vec{r}/\Delta t, \qquad \vec{v}_{\text{inst}} = d\vec{r}/dt$$
$$\vec{a}_{\text{av}} = \Delta\vec{v}/\Delta t \qquad \vec{a}_{\text{inst}} = d\vec{v}/dt$$

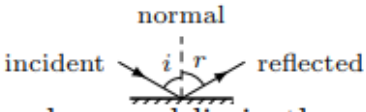
Motion in a straight line with constant a:

$$v = u + at, \quad s = ut + \tfrac{1}{2}at^2, \quad v^2 - u^2 = 2as$$

Relative Velocity: $\vec{v}_{A/B} = \vec{v}_A - \vec{v}_B$

Reflection of light

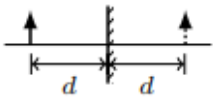
Laws of reflection:



(i)

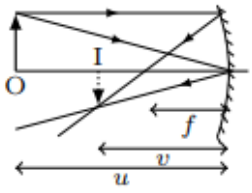
Incident ray, reflected ray, and normal lie in the same plane (ii) $\angle i = \angle r$

Plane mirror:



(i) the image and the object are equidistant from mirror (ii) virtual image of real object

Spherical Mirror:



1. Focal length $f = R/2$
2. Mirror equation: $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$
3. Magnification: $m = -\frac{v}{u}$

Specific Heat Capacity

Specific heat: $s = \frac{Q}{m\Delta T}$

Latent heat: $L = Q/m$

Specific heat at constant volume: $C_v = \frac{\Delta Q}{n\Delta T}\Big|_V$

Specific heat at constant pressure: $C_p = \frac{\Delta Q}{n\Delta T}\Big|_p$

Relation between C_p and C_v: $C_p - C_v = R$

Ratio of specific heats: $\gamma = C_p/C_v$

Relation between U and C_v: $\Delta U = nC_v\Delta T$

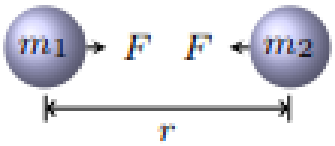
Specific heat of gas mixture:

$$C_v = \frac{n_1C_{v1} + n_2C_{v2}}{n_1 + n_2}, \quad \gamma = \frac{n_1C_{p1} + n_2C_{p2}}{n_1C_{v1} + n_2C_{v2}}$$

Molar internal energy of an ideal gas: $U = \frac{f}{2}RT$,
$f = 3$ for monatomic and $f = 5$ for diatomic gas.

Gravitation

Gravitational force: $F = G\frac{m_1 m_2}{r^2}$



Potential energy: $U = -\frac{GMm}{r}$

Gravitational acceleration: $g = \frac{GM}{R^2}$

Variation of g with depth: $g_{\text{inside}} \approx g\left(1 - \frac{2h}{R}\right)$

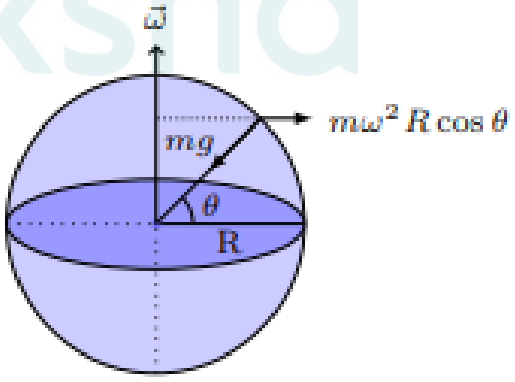
Variation of g with height: $g_{\text{outside}} \approx g\left(1 - \frac{h}{R}\right)$

Effect of non-spherical earth shape on g:

$g_{\text{at pole}} > g_{\text{at equator}}$ $(\because R_{\text{e}} - R_{\text{p}} \approx 21 \text{ km})$

Effect of earth rotation on apparent weight:

$$mg'_\theta = mg - m\omega^2 R\cos^2\theta$$



Orbital velocity of satellite: $v_o = \sqrt{\frac{GM}{R}}$

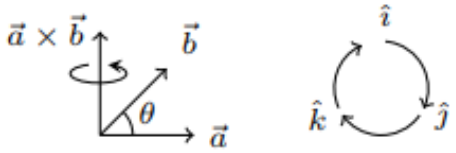
Vectors

Notation: $\vec{a} = a_x\,\hat{\imath} + a_y\,\hat{\jmath} + a_z\,\hat{k}$

Magnitude: $a = |\vec{a}| = \sqrt{a_x^2 + a_y^2 + a_z^2}$

Dot product: $\vec{a}\cdot\vec{b} = a_x b_x + a_y b_y + a_z b_z = ab\cos\theta$

Cross product:

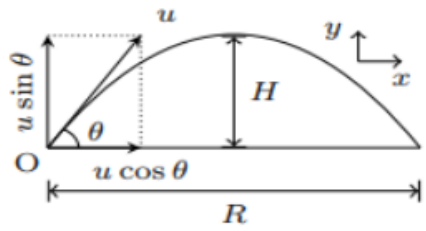


$$\vec{a}\times\vec{b} = (a_y b_z - a_z b_y)\hat{\imath} + (a_z b_x - a_x b_z)\hat{\jmath} + (a_x b_y - a_y b_x)\hat{k}$$

$$|\vec{a}\times\vec{b}| = ab\sin\theta$$

Projectile Motion

Projectile Motion:



$$x = ut\cos\theta, \quad y = ut\sin\theta - \tfrac{1}{2}gt^2$$

$$y = x\tan\theta - \frac{g}{2u^2\cos^2\theta}x^2$$

$$T = \frac{2u\sin\theta}{g}, \quad R = \frac{u^2\sin 2\theta}{g}, \quad H = \frac{u^2\sin^2\theta}{2g}$$

Work, Power and Energy

Work: $W = \vec{F} \cdot \vec{S} = FS\cos\theta, \quad W = \int \vec{F} \cdot \mathrm{d}\vec{S}$

Kinetic energy: $K = \frac{1}{2}mv^2 = \frac{p^2}{2m}$

Potential energy: $F = -\partial U/\partial x$ for conservative forces.

$$U_{\text{gravitational}} = mgh, \quad U_{\text{spring}} = \frac{1}{2}kx^2$$

Work done by conservative forces is path independent and depends only on initial and final points: $\oint \vec{F}_{\text{conservative}} \cdot \mathrm{d}\vec{r} = 0$.

Work-energy theorem: $W = \Delta K$

Mechanical energy: $E = U + K$. Conserved if forces are conservative in nature.

Power $P_{\text{av}} = \frac{\Delta W}{\Delta t}, \quad P_{\text{inst}} = \vec{F} \cdot \vec{v}$

Heat and Temperature

Temp. scales: $F = 32 + \frac{9}{5}C, \quad K = C + 273.16$

Ideal gas equation: $pV = nRT, \quad n$: number of moles

van der Waals equation: $\left(p + \frac{a}{V^2}\right)(V - b) = nRT$

Thermal expansion: $L = L_0(1 + \alpha\Delta T)$,
$A = A_0(1 + \beta\Delta T)$, $V = V_0(1 + \gamma\Delta T)$, $\gamma = 2\beta = 3\alpha$

Thermal stress of a material: $\frac{F}{A} = Y\frac{\Delta l}{l}$

Photoelectric effect

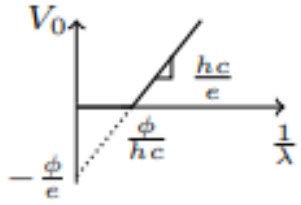
Photon's energy: $E = h\nu = hc/\lambda$

Photon's momentum: $p = h/\lambda = E/c$

Max. KE of ejected photo-electron: $K_{\max} = h\nu - \phi$

Threshold freq. in photo-electric effect: $\nu_0 = \phi/h$

Stopping potential: $V_o = \frac{hc}{e}\left(\frac{1}{\lambda}\right) - \frac{\phi}{e}$



de Broglie wavelength: $\lambda = h/p$