

# PHYSICS FORMULAS

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$$\begin{aligned} v_f &= v_o + at \\ v_f^2 &= v_o^2 + 2ad \\ d &= \frac{1}{2} at^2 + v_o t \end{aligned}$$

**Motion**

$$\begin{aligned} F &= ma \\ F &= mv^2/r \\ F &= G \frac{(m_o m_p)}{r^2} \end{aligned}$$

**Planets**

$$\tau = rF$$

**Torque**

$$\begin{aligned} W &= Fd \\ W &= \Delta KE \\ W &= P\Delta t \end{aligned}$$

**Work**

$$\begin{aligned} P &= IV = i^2 R \\ P &= \text{watt} = \frac{J}{s} = \frac{W}{s} = \frac{E}{s} \end{aligned}$$

**Power**

$$\begin{aligned} E_T &= U + KE \\ KE &= \frac{1}{2} mv^2 \\ U &= mgh \\ F_f &= \mu N \end{aligned}$$

**Energy**

$$\begin{aligned} J &= I = \Delta mv = F\Delta t \\ m_1 v_1 + m_2 v_2 \dots &= m_1 v_1' + m_2 v_2' \dots \end{aligned}$$

**Collisions**

$$\frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 \dots = \frac{1}{2} m_1 v_1'^2 + \frac{1}{2} m_2 v_2'^2 \dots$$

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

$$N = c/v$$

$$m = \lambda / v$$

	+	-
F	Convergent	divergent
I	Real	virtual
O	Always	never
M	Erect	inverted

**Light**

$$1/f = 1/o + 1/i$$

	Lens	Mirrors
Convergent	convex ⊙	concave ⌋
Divergent	concave ⊘	convex ⌌

$$C \propto A/d$$

$$C = Q/V$$

**Capacitance**

$$\begin{aligned} \Delta G &= -NFE = -RT \ln K_{eq} \\ \Delta S &= \Delta S_{products} - \Delta S_{reactants} \\ \Delta H &= H_{products} - H_{reactants} \end{aligned}$$

**Thermodynamics**

$$\begin{aligned} E &= hf \\ f &= 1/T \\ v &= f\lambda \\ \lambda &= 2L/N \\ \lambda &= 4L/N \\ v_{\text{sound}} &= 330 \text{ m/s} \\ f_{\text{observed}} &= f_{\text{actual}} \frac{v \pm v_{\text{detector}}}{v \mp v_{\text{source}}} \end{aligned}$$

**Waves**

$$\begin{aligned} \beta &= \frac{m_o i}{2\pi r} \text{ Linear} \\ & \text{Wire} \end{aligned}$$

$$\begin{aligned} \beta &= \frac{m_o i}{2r} \text{ Circular} \\ & \text{Wire} \end{aligned}$$

$$F = iLB \sin \theta$$

$$F = qVB \sin \theta$$

$$U = k \frac{qQ}{r}$$

$$V = k \frac{Q}{r}$$

$$F = k \frac{q_1 q_2}{r^2}$$

$$V = Ed$$

$$V = U/q$$

$$E = F/q$$

$$i = \frac{\Delta q}{\Delta t}$$

**Electrics & Magnetism**

$$Y = \frac{\text{stress}}{\text{strain}}$$

**Young's**

$$V = iR$$

$$R_{\text{series}} = R_1 + R_2 \dots$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \dots$$

$$R_{\text{parallel}} = \frac{R_1 R_2}{R_1 + R_2}$$

$$C_{\text{parallel}} = C_1 + C_2 \dots$$

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$C_{\text{series}} = \frac{C_1 C_2}{C_1 + C_2}$$

$$\omega = \sqrt{g/l} = 2\pi f$$

$$\omega = \sqrt{k/m} = 2\pi f$$

$$F = -kx$$

$$U = \frac{1}{2} kx^2$$

$$v_{\text{light}} = 3 \times 10^8 \text{ m/s}$$

$$U = \pm Q \pm W$$

$$A_1 V_1 = A_2 V_2$$

$$F_{\text{bouyant}} = \rho v g$$

$$\rho_1 + \frac{1}{2} \rho v^2 + \rho g h = \rho_2 + \frac{1}{2} \rho v^2 + \rho g h$$

$$P_H = \rho g h + P_o$$

$$P = F/A$$

**Springs & Pendulums**

**Fluids**

$$\begin{aligned} \alpha, \beta, \beta(\text{positron}), \gamma \\ \% \text{ remaining} &= 1/2^n \end{aligned}$$

**Radioactive Decay**

**Newton's Three Laws**

- 1) Inertia: a body in motion stays in motion unless acted upon by an outside force
- 2)  $F = ma$
- 3) Every action has an equal and opposite reaction

