NOTES FOR PHYSICS TEST

In questions on electricity and magnetism, the term *current* refers to "conventional current," which is the flow of charge from positive to negative, and the use of right-hand rules is assumed.

While attention has been paid to significant figures, no answer should be considered incorrect solely because of the number of significant figures unless specifically stated in the question.

CONSTANTS

Description	Value
Acceleration of gravity on Earth (g)	9.81 m/s^2
Speed of light in a vacuum (c)	3.00×10^8 m/s
Planck's constant (h)	6.63×10^{-34} J•s = 4.14×10^{-15} eV•s
Electron rest mass	9.11×10^{-31} kg
Proton rest mass	1.67×10^{-27} kg
Charge of electron	-1.60×10^{-19} C
Coulomb's constant (k_e)	9.00×10^9 $N•m^2/C^2$
Boltzmann's constant (k)	1.38×10^{-23} J/K
Gas constant (R)	8.31 J/(mol•K)
Gravitational constant (G)	6.67×10^{-11} $N•m^2/kg^2$
Permeability of free space (μ_0)	$4\pi \times 10^{-7}$ T•m/A
Avogadro's number	6.02×10^{23}

FORMULAS

Not all formulas necessary are listed, nor are all formulas listed used on this test.

Description	Formula
Constant acceleration	$v = v_i + at$
	$x = x_i + v_i t + \frac{1}{2}at^2$
	$v_f^2 - v_i^2 = 2a(x_f - x_i)$
	$\bar{v} = \frac{v_i + v_f}{2}$
Energy and momentum	$K = \frac{1}{2}mv^2$
	$\mathbf{p} = m\mathbf{v}$
	$\mathbf{J} = \mathbf{F}\Delta t = \Delta\mathbf{p}$
	$W = \mathbf{F} \cdot \mathbf{d} = Fd\cos\theta$
	$U_g = mgh$
Circular motion	$a_c = \frac{v^2}{r}$
	$\theta = \theta_i + \omega_i t + \frac{1}{2}\alpha t^2$
	$\omega = \omega_i + \alpha t$
	$v = r\omega$
	$a = r\alpha$
	$\boldsymbol{\tau} = I\boldsymbol{\alpha} = \mathbf{r} \times \mathbf{F} = rF\sin\theta$
	$F = \frac{Gm_1m_2}{r^2}$
Spring	$F = -kx$
	$U_S = \frac{1}{2}kx^2$
	$T = 2\pi\sqrt{\frac{m}{k}}$
	$\omega = \sqrt{\frac{k}{m}}$

FORMULAS (continued)

Description	Formula
Pendulum	$T = 2\pi\sqrt{\frac{L}{g}}$
Relativity	$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$
	$v' = \frac{u + v}{1 + \frac{uv}{c^2}}$
Waves	$v = \sqrt{\frac{\gamma RT}{M}}$ Sound speed in an ideal gas
	$v = \sqrt{\frac{T}{\mu}}$ Wave speed in a string
	$F = \frac{1}{T}$
	$v = f\lambda$
	Standing wave (string fixed at both ends)
	$2L = n\lambda$, n is an integer
	Standing wave (string fixed at one end)
	$4L = n\lambda$, n is odd
Optics	$n_1 \sin\theta_1 = n_2 \sin\theta_2$
	$n = \frac{c}{v}$
	$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$
Thermodynamics	$T_k = T_c + 273$
	$\Delta U = nc_v\Delta T$
	$Q = mc\Delta T$
	$PV = nRT$
	$\frac{1}{2}m\overline{v^2} = \frac{3}{2}kT$
Fluids	$P = \rho gh + P_0$

FORMULAS (continued)

Description	Formula
Electrostatics	$F = \frac{k_e q_1 q_2}{r^2}$
	$F = qE$
	$U_E = qV$
	$V = \frac{k_e q}{r}$
Magnetism	$\mathbf{F} = q\mathbf{v} \times \mathbf{B} = qvB \sin \theta$
	$\mathbf{F} = I\boldsymbol{\ell} \times \mathbf{B} = I\ell B \sin \theta$
	$\varepsilon_{\text{ave}} = -\frac{\Delta\phi}{\Delta t}$
	$\phi = B_{\perp} A$
Circuits	$V = IR$
	$P = IV$
	$C = \frac{Q}{V}$
	$U_C = \frac{1}{2}QV = \frac{1}{2}CV^2$
	$\varepsilon = -L\frac{\Delta I}{\Delta t}$
	$\omega_0 = \frac{1}{\sqrt{LC}}$
	$X_L = \omega L$
	$X_C = \frac{1}{\omega C}$
	$Z = \sqrt{(X_C - X_L)^2 + R^2}$
Photoelectric effect	$eV_s = hf - \phi$
Wave-particle relations	$\Delta p \Delta x \geq \frac{h}{4\pi}$
	$E = hf$
	$\lambda = \frac{h}{p}$