NOTES FOR SCIENCE—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)	9.80 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)	9.0×10^9 $N{\bullet}m^2/C^2$
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} $N{\bullet}m^2/kg^2$
Permeability of free space (μ_0)	$4\pi \times 10^{-7}$ T•m/A
Avogadro's number	6.02×10^{23}

Angle (θ)	$\sin\theta$	$\cos\theta$	$\tan\theta$
30°	0.500	0.866	0.577
45°	0.707	0.707	1.00
60°	0.866	0.500	1.73

FORMULAS

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

Description	Formula
Constant acceleration	$v_f = v_i + at$
	$x_f = x_i + v_i t + \frac{1}{2}at^2$
	$v_f^2 - v_i^2 = 2a(x_f - x_i)$
	$v_{avg} = \frac{v_i + v_f}{2}$
Circular motion	$a_c = \frac{v^2}{r}$
	$\theta_f = \theta_i + \omega_i t + \frac{1}{2}\alpha t^2$
	$\omega_f = \omega_i + \alpha t$
	$v = r\omega$
	$a = r\alpha$
	$\tau = I\alpha$
	$F = \frac{Gm_1 m_2}{r^2}$
Spring	$F = -kx$
	$U_S = \frac{1}{2}kx^2$
	$T = 2\pi\sqrt{\frac{m}{k}}$
	$\omega = \sqrt{\frac{k}{m}}$
Pendulum	$T = 2\pi\sqrt{\frac{L}{g}}$
Relativity	$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$
	$v' = \frac{u + v}{1 + \frac{uv}{c^2}}$

FORMULAS (continued)

Description	Formula
Speed of a wave	$v = f\lambda$
Speed of waves in a string	$v = \sqrt{\dfrac{T}{\mu}}$
Standing wave condition for a string fixed at both ends	$2L = n\lambda$, n is an integer
Standing wave condition for a string fixed at one end	$4L = n\lambda$, n is odd
Optics	$n_1 \sin \theta_1 = n_2 \sin \theta_2$
	$n = \dfrac{c}{v}$
	$\dfrac{1}{f} = \dfrac{1}{d_i} + \dfrac{1}{d_o}$
Thermodynamics	$T_k = T_c + 273$
	$\Delta U = nc_v \, \Delta T$
	$Q = mc \, \Delta T$
	$PV = nRT$
	$\dfrac{1}{2} m\overline{v^2} = \dfrac{3}{2} kT$
Fluids	$P = \rho gh + P_0$
Electrostatics	$F = \left\lvert \dfrac{k_e q_1 q_2}{r^2} \right\rvert$
	$F = qE$
	$U_E = qV$
	$V = \dfrac{k_e q}{r}$

FORMULAS (continued)

Description	Formula
Magnetism	$\mathbf{F} = q\mathbf{v} \times \mathbf{B}$
	$F = qvB \sin \theta$
	$\mathbf{F} = I\boldsymbol{\ell} \times \mathbf{B}$
	$F = I\ell B \sin \theta$
	$\mathcal{E}_{\text{avg}} = -\frac{\Delta \phi}{\Delta t}$
	$\phi = B_{\perp} A$
Circuits	$V = IR$
	$P = IV$
	$C = \frac{Q}{V}$
	$U_C = \frac{1}{2} QV = \frac{1}{2} CV^2$
	$\mathcal{E} = -L \frac{dI}{dt}$
	$\omega_0 = \frac{1}{\sqrt{LC}}$
Photoelectric effect	$eV_s = hf - \phi$
Wave-particle relations	$\Delta p \Delta x \geq \frac{h}{4\pi}$
	$E = hf$
	$\lambda = \frac{h}{p}$