American Association of Physics Teachers
PHYSICSBOWL 2007

$x = v_0 t + \frac{1}{2}at^2$ $\quad v_f = v_0 + at$ $\quad \bar{v} = \frac{\Delta x}{\Delta t}$

$v_f^2 = v_0^2 + 2a\Delta x$ $\quad v_{0x} = v_0 \cos\theta$ $\quad v_{0y} = v_0 \sin\theta$

$a_c = \frac{v^2}{r}$ $\quad \sum \mathbf{F} = m\mathbf{a}$ $\quad F_g = mg$

$F_g = G\frac{m_1 m_2}{r^2}$ $\quad \mathbf{p} = m\mathbf{v}$ $\quad W = Fs\cos\theta = F_{||}s = Fs_{||}$

$E_k = \frac{1}{2}mv^2$ $\quad E_p = mgh$ $\quad E_p = \frac{1}{2}kx^2$

$P = \frac{W}{\Delta t} = Fv\cos\theta = F_{||}v$ $\quad \tau = RF\sin\theta = RF_{\perp} = R_{\perp}F$ $\quad \sum \tau = I\alpha$

$n = \frac{c}{v}$ $\quad v = f\lambda$ $\quad n_1 \sin\theta_1 = n_2 \sin\theta_2$

$n\lambda = d\frac{x_n}{L} = d\sin\theta_n$ $\quad \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ $\quad m = -\frac{d_i}{d_o}$

$Q = mc\Delta T$ $\quad Q = mL$ $\quad \Delta S = \Delta Q/T$ $\quad \Delta U = Q - W$

$pV = nRT$ $\quad W = p\Delta V$ $\quad F_e = k\frac{q_1 q_2}{r^2}$

$\mathbf{E} = \frac{\mathbf{F}}{q}$ $\quad V = \frac{W}{q}$ $\quad V = k\frac{q}{r}$

$V = Ed$ $\quad Q = CV$ $\quad V = RI$

$P = VI$ $\quad F = qvB\sin\theta = qvB_{\perp}$ $\quad F = ILB\sin\theta = ILB_{\perp}$

$B = \frac{\mu_0 I}{2\pi r}$ $\quad B = \mu_0 nI$ $\quad emf = BLv$

$E = mc^2$ $\quad E = hf$ $\quad p = \frac{h}{\lambda}$

Nuclear notation: ${}^{A}_{Z}X$ where A is the atomic mass number and Z is the nuclear charge.

You should use the following values in determining the answers on this test. If you use other values in calculating answers, you may obtain values that do not exactly match answer selections found on this test. You will then need to choose the answer on the test closest to your value.

acceleration due to gravity g = 10 m/s2

gravitational constant G = 6.7 x 10-11 N·m2/kg2

specific heat of water cw = 1.0 kcal/kg·K = 4.2 x 103 J/kg·K

atomic mass unit 1 u = 1.7 x 10-27 kg = 9.3 x 102 MeV/c2

electron volt 1 eV = 1.6 x 10-19 J

rest mass of electron me = 9.1 x 10-31 kg

rest mass of proton mp = 1.7 x 10-27 kg

electronic charge e = 1.6 x 10-19 C

Coulomb's constant k = 9.0 x 109 N·m2/C2

permittivity constant ε0 = 8.9 x 10-12 C2/N·m2

permeability constant μ0 = 4π x 10-7 T·m/A

speed of sound in air (20°C) vs = 340 m/s

speed of light in vacuum c = 3.0 x 108 m/s

Planck's Constant h = 6.6 x 10-34 J·s = 4.14 x 10-15 eV·s

Boltzmann Constant k = 1.38 x 10^{-23} J/K