Second Semester Equations Sheet AP Physics B

1	Speed of Light	$c = f\lambda$
2	Speed of a wave on a string	$v = \sqrt{\frac{F}{\mu}}$
3	Harmonic wave equation	$y(x,t) = y_o\sin[2\pi((t/T) + (x/\lambda))]$
4	Harmonic frequencies for strings	$f_n = \frac{n}{2L}\sqrt{\frac{F}{\mu}}$
5	Harmonic frequencies for open air columns	$f_n = \frac{n}{2L}v$
6	Harmonic frequencies for closed air columns	$f_n = \frac{n}{4L}v$
7	Doppler effect	$f' = f\left(\frac{v \pm v_R}{v \pm v_S}\right)$
8	Beat frequency	$f_b = f_2 - f_1$
9	Law of reflection	$\theta_i = \theta_R$
10	Index of refraction	$n = c/v$
11	Snell's law (1)	$n_1\sin\theta_i = n_2\sin\theta_R$,
12	Snell's law (2)	$\lambda_2\sin\theta_i = \lambda_1\sin\theta_R$,
13	Critical angle for total internal reflection	$\sin\theta_c = n_2/n_1$
14	Optics equation	$1/f = 1/d_o + 1/d_i$
15	Spherical mirror equation	$f = R/2$
16	Magnification	$M = -[d_i/d_o]$
17	Lensmaker's equation	$1/f = [(n/n_{fluid} - 1)(1/R_1 - 1/R_2)]$
18	Double slit constructive equation	$Y_m = (m\lambda L/d)$
19	Single slit destructive equation	$Y_m = (m\lambda L/a)$
20	Thin film in air (constructive)	$2t = (m+1/2)\lambda_{film}$
21	Diffraction grating (constructive)	$d\sin\theta = m\lambda$
22	Coulomb's Law	$F = kqq/r^2$
23	Electric field	$E = kq/r^2$
24	Change in electric potential energy	$\Delta U = qed$
25	Electric potential difference	$\Delta V = \Delta U/q$
26	Electric potential difference (uniform field)	$\Delta V = -Ed$
27	Electric potential difference (circuit)	$V_{AB} = V_A - V_B$
28	Work done by electric field	$W = -\Delta U$
29	Capacitance	$C = Q/V$
30	Parallel plate capacitor	$C = \varepsilon_o A/d$
31	Capacitors in series	$1/C_{eq} = 1/C_1 + 1/C_2 + \ldots$
32	Capacitors in parallel	$C_{eq} = C_1 + C_2 + \ldots$
33	Dielectric constant	$K = C/C_o$
34	Current	$I = Q/t$
35	Drift velocity	$v_d = I/(nqa)$
36	Ohm's law	$V = IR$

37	Resistivity	$R = \rho L/A$
38	Electrical power	$P = IV$
39	Resistors in series	$R_{eq} = R_1 + R_2 + \ldots$
40	Resistors in parallel	$1/R_{eq} = 1/R_1 + 1/R_2 + \ldots$
41	Capacitive time constant	$\tau = RC$
42	Capacitive energy storage	$E = ½\ CV^2$
43	Magnetic force on a charged particle	$F_B = qvB\sin\theta$
44	Charged particle path in a B-field	$r = mv/qB$
45	Accelerating voltage	$qV = \lvert 1/2\ mv^2 \rvert$
46	Crossed field undeflected beam	$v = E/B$
47	Magnetic force on a conductor	$F = BIL\sin\theta$
48	Torque on a loop	$\tau = NBIA\sin\theta$
49	B-Field around a conductor	$B = \mu_o I/2\pi r$
50	Magnetic flux	$\Phi = BA\cos\theta$
51	Faraday's law of induction	$\xi = -N(\Delta\Phi/\Delta t)$
51	Quantized energy	$E_n = nhf$
53	Momentum of a photon	$p = h/\lambda$
54	Photoelectric effect (1)	$K_{max} = hf - \varphi$
55	Photoelectric effect (2)	$qV_o = hf - \varphi$
56	Bohr's assumption	$mvr = nh/2\pi$
57	Electron radius in hydrogen (Bohr)	$r = n^2 a_o$
58	Electron energy level in hydrogen (Bohr)	$E_n = -13.6ev/n^2$
59	Emission/absorption wavelength (Bohr)	$1/\lambda = R(1/n_f^2 - 1/n_i^2)$
60	Debroglie wavelength	$\lambda = h/mv$
61	X-ray production	$\lambda_{min} = hc/eV$
62	mass defect	$\Delta E = \Delta mc^2$