First Semester Equations Sheet AP Physics B

1	Average Speed	$v_{ave} = \Delta x/\Delta t$
2	Average Acceleration	$a_{ave} = \Delta v/\Delta t$
3	Kinematic Velocity Equation	$v = v_o + at$
4	Kinematic Displacement Equation	$\Delta x = v_o t + ½ at^2$
5	Kinematic Velocity Squared Equation	$v^2 = v_o^2 + 2a\Delta x$
6	Initial Velocity in the Y-Direction	$v_{o,y} = v_o \sin\theta$
7	Initial Velocity in the X-Direction	$v_{o,x} = v_o \cos\theta$
8	Projectile Y-Velocity	$v_y = v_{o,y} + gt$
9	Projectile X-Velocity	$v_x = v_{o,x}$
10	Projectile Y-Displacement	$\Delta y = v_{o,y}t + ½ gt^2$
11	Projectile X-Displacement	$\Delta x = v_{o,x}t$
12	Centripetal Acceleration	$a_\perp = v^2/r$
13	Tangential Speed	$v = 2\pi r/T$
14	Newton’s Second Law	$\Sigma F = ma$
15	Static Frictional Force	$F_f \leq \mu_s N$
16	Kinetic Frictional Force	$F_f = \mu_k N$
17	Work	$W = FS\cos\theta$
18	Work-Energy Theorem	$W = \Delta K$
19	Kinetic Energy	$K = ½ mv^2$
20	Gravitational Potential Energy	$U_g = mgh$
21	Elastic Potential Energy	$U_e = ½ kx^2$
22	Hooke’s Law	$F_s = kx$
23	The Law of Conservation of Energy	$K_1 + U_1 + W_o = K_2 + U_2$
24	Power	$P = W/t$
25	Momentum	$p = mv$
26	Impulse	$J = F\Delta t = \Delta p$
27	Torque	$\tau = F\ell$
28	Lever Arm	$\ell = r\sin\theta$
29	Relation Between Linear and Angular Speed	$v = r\omega$
30	Radian Measure	$\theta = S/R$
31	Kinematic Angular Velocity Equation	$\omega = \omega_o + \alpha t$
32	Kinematic Angular Displacement Equation	$\Delta\theta = \omega_o t + ½ \alpha t^2$
33	Kinematic Angular Velocity Squared Equation	$\omega^2 = \omega_o^2 + 2\alpha \Delta\theta$
34	Rotational Inertia for an Orbiting Point Mass	$I = mr^2$
35	Rotational Inertia for a Hollow Cylinder	$I = mr^2$
36	Rotational Inertia for a Solid Cylinder	$I = ½ mr^2$
37	Rotational Inertia for a Solid Sphere	$I = 2/5 mr^2$
38	Angular Momentum	$L = I \omega$
39	Position in SHM	$x = A\cos(\omega t + \varphi)$
40	Velocity in SHM	$v = - \omega A\sin(\omega t + \varphi)$

41	Acceleration in SHM	$a = -(\omega^2)x$
42	Period and Frequency	$T = 1/f$
43	Angular Frequency in SHM	$\omega = \sqrt{\frac{k}{m}}$

44	Frequency in SHM	$f = \omega/2\pi$
45	Period of a Simple Pendulum (Approx. SHM)	$T = 2\pi\sqrt{\frac{L}{g}}$
46	Universal Law of Gravitation	$F_g = G\frac{m_1 m_2}{r^2}$
47	Gravitational Field Magnitude	$g = \frac{GM}{r^2}$
48	Linear Thermal Expansion	$\Delta L = L_o \alpha \Delta T$
49	Area Thermal Expansion	$\Delta A = A_o \gamma \Delta T$
50	Volume Thermal Expansion	$\Delta V = V_o \beta \Delta T$
51	Equation of State for an Ideal Gas	$PV = nRT$
51	Average Kinetic Energy (per particle) for an Ideal Gas	$K_{avg} = \frac{3}{2}k_B T$
53	Root-Mean-Square Speed for an Ideal Gas	$V_{rms} = \sqrt{\frac{3k_B T}{m_o}}$
54	Molar Mass and Particle Mass	$M = m_o N_A$
55	Relation Between k and R	$k = R/N_A$
56	Heat and Temperature Change (No Phase Change)	$Q = mc\Delta T$
57	Latent Heat of Fusion	$Q = mL_f$
58	Latent Heat of Vaporization	$Q = mL_v$
59	Isobaric Heat and Temperature Change	$Q = nC_p\Delta T$
60	Isochoric Heat and Temperature Change	$Q = nC_v\Delta T$
61	Thermal Conductivity (Heat Flow Rate)	$\frac{Q}{t} = k\frac{A\Delta T}{L}$
62	Internal Energy of an Ideal Gas	$\Delta U = (3/2)nR\Delta T$
63	Work Done for an Isobaric process	$W = -P\Delta V$
64	The First law of Thermodynamics	$\Delta U = Q + W$
65	Efficiency Equation for a Heat Engine	$e = 1 - \frac{\lvert Q_c \rvert}{Q_H}$
66	Work Done (per Cycle) for a Heat Engine	$W = Q_H - \lvert Q_C \rvert$
67	Coefficient of Performance for a Refrigerator	$C.O.P. = Q_C/W$
68	Efficiency for a Carnot Engine	$e = 1 - (T_C/T_H)$
69	Change in Entropy	$\Delta S = \left(\frac{\Delta Q}{T}\right)_R$
70	Mass Density	$\rho = m/v$
71	Pressure in a Hydrostatic Fluid	$P_2 = P_1 + \rho g h$
72	Equation of Continuity	$A_1 V_1 = A_2 V_2$
73	Bernoulli's Equation	$P + \rho g h + \frac{1}{2}\rho v^2 = const.$