Formulas and constants: (Giancolli)

$v = v_0 + at$	$x = x_0 + v_0 t + \frac{1}{2}at^2$	$v^2 = v_0^2 + 2a(x - x_0)$
$a_{\rm R} = \dfrac{v^2}{r} = \omega^2 r$	$a_t = r\alpha$	$T = \dfrac{2\pi r}{v} = \dfrac{2\pi}{\omega} = \dfrac{1}{f}$
$\vec{F} = m\vec{a}$	$f_{s,\max} = \mu_s F_{\rm N}$	$f_k = \mu_k F_{\rm N}$
$F = -kx$	$\dfrac{F}{A} = E\dfrac{\Delta L}{L_0}$	
$K = \frac{1}{2}mv^2$	$U_g = mgy$	$U_s = \frac{1}{2}kx^2$
$W = \vec{F}\cdot\vec{d} = Fd\cos\theta$	$W_{\rm net} = \Delta K$	$\Delta U = -W$
$E_{\rm mec} = K + U$	$W_{\rm NC} = \Delta K + \Delta U = -F_{\rm fr}d$	
$\overline{P} = \dfrac{W}{t} = F\bar{v}$	$P = \dfrac{\Delta E}{\Delta t}$	$x_{\rm CM} = \dfrac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$
$\vec{p} = m\vec{v}$	$\vec{F} = \dfrac{\Delta\vec{p}}{\Delta t}$	
$\vec{P}_i = \vec{P}_f$	$\vec{p}_{1i} + \vec{p}_{2i} = \vec{p}_{1f} + \vec{p}_{2f}$	Impulse $= \vec{F}\Delta t = \Delta\vec{p}$
$l = r\theta$	$v = r\omega$	
$K_r = \frac{1}{2}I\omega^2$	$I = \sum m_i r_i^2$	
$\tau_{\rm net} = rF_\perp = r_\perp F = rF\sin\theta$	$\tau_{\rm net} = I\alpha$	$W = \tau\Delta\theta$
$L = I\omega$	$\vec{\tau} = \dfrac{\Delta\vec{L}}{\Delta t}$	$I_i\omega_i = I_f\omega_f$
$P = \dfrac{F}{A}$	$\rho = \dfrac{M}{V}$	$P = P_A + P_G$
$P = \rho g h$	$W = Mg$	$F_B = \rho_F V_{\rm d} g$
$\rho_1 A_1 v_1 = \rho_2 A_2 v_2$	$P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$	$\gamma = \dfrac{F}{L}$
$x = A\cos(\omega t + \phi)$	$v = \lambda f$	$v = \sqrt{\dfrac{F_T}{m/L}}$
$T = 2\pi\sqrt{\dfrac{m}{k}}$	$T = 2\pi\sqrt{\dfrac{L}{g}}$	
$f' = \dfrac{f}{1 \pm \frac{v_s}{v}}$	$f' = \left(1 \pm \dfrac{v_o}{v}\right) f$	
$PV = nRT = Nk_BT$	$k_B = 1.38\times10^{-23}$ (J/K)	$R = 8.315$ (J/mol $\cdot$ K) $= 0.0821$ (L $\cdot$ atm/mol $\cdot$ K)
$N_A = 6.02\times10^{23}$	1 atm $= 1.013\times10^5$ N/m^2	1 cal $= 4.186$ J

$g = 9.80$ m/s^2; The density of ice is 0.917×10^3 kg/m^3 and that of water 1.00×10^3 kg/m^3.

The solutions of a quadratic equation $ax^2 + bx + c = 0$ are $x = \dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$.

$\vec{a} = a_x\hat{i} + a_y\hat{j} = (a\cos\theta)\hat{i} + (a\sin\theta)\hat{j}$	$a = \lvert\vec{a}\rvert = \sqrt{a_x^2 + a_y^2}$	$\theta = \tan^{-1}\dfrac{a_y}{a_x}$
$\vec{a}\cdot\vec{b} = ab\cos\theta$	$\vec{a}\times\vec{b} = ab\sin\phi\,\hat{u}_\perp$	