.Equation Sheet

$T(^0C) = \frac{5}{9}\,[T(^0F) - 32]$; $T(^0F) = \frac{9}{5}\,T(^0C) + 32$; $T(K) = [T(^0C) + 273]$ $\rho = \frac{m}{V}$; $A_{circle} = \pi r^2$

$1\ m = 100\ cm$ $V_{cube} = a^3$ $V_{sphere} = \frac{4}{3}\pi R^3$ $V_{cyl} = \pi r^2 L$ $1m = 100\ cm$ $1\ kg = 1000\ g$

Heat: $Q = mc(T - T_0)$, $Q = mL_F$, L - latent heat heat lost = heat gained

$c_{water} = 4186 \frac{J}{kg \cdot {}^0C}$; $L_F = 3.35x10^5 \frac{J}{kg}$; $c_{ice} = 2100 \frac{J}{kg \cdot {}^0C}$

$Q = kA\frac{T_1 - T_2}{L}t$ $Q = kA\frac{T_1 - T_2}{\sum R_i}t$ $R = L/k$ $\frac{Q}{t} = e\sigma A(T^4 - T_0^4)$ $\sigma = 5.67x10^{-8}\ W/m^2K^4$

Thermodynamics: $\Delta U = \Delta Q + W$ $W = P\Delta V$ $Q_h = W + Q_c$ $e = \frac{W}{Q_h}$ $e = 1 - \frac{T_c}{T_h}$

$COP = \frac{Q_c}{W}$ $COP = \frac{T_c}{T_h - T_c}$

Harmonic Motion

$x = A\cos(\omega t)$ $v = -\omega A\sin(\omega t)$ $\omega = 2\pi f$ $\omega = \frac{2\pi}{T}$ $F = -kx$ period: $T_{spring} = 2\pi\sqrt{\frac{m}{k}}$;

$T_{pend} = 2\pi\sqrt{\frac{L}{g}}$ $\omega = \sqrt{\frac{k}{m}}$ $f = \frac{1}{T}$ $v_{max} = A\omega$ $E = ½\ mv^2 + ½\ kx^2$; $Us = ½\ kx^2$;

$E = ½\ kA^2$; $v = \omega\ (A^2 - x^2)^{1/2}$

$E = ½\ m(v_m)^2$ waves: $v = \lambda \cdot f$ linear mass $\mu = \frac{m}{L}$ $v = \sqrt{\frac{F}{\mu}}$

standing waves on string: $n = 1, 2, 3.$, $f = \frac{v}{2L}n$ $\lambda = \frac{2L}{n}$

Sound:

$v = \left(331\ \frac{m}{s}\right)\sqrt{\frac{T}{273\ K}}$ $v = \sqrt{\frac{Y}{\rho}}$ $v = \sqrt{\frac{B}{\rho}}$ $\beta = 10\log\left(\frac{I}{I_o}\right)$