Formulas

$\sum F_x = 0$	$\sum F_y = 0$	$\sum F_z = 0$
$\sum \tau = 0$	$F = k\,\Delta L$	$\frac{F}{A} = E\frac{\Delta L}{L_0}$
$\frac{F}{A} = G\frac{\Delta L}{L_0}$	$\Delta P = -B\frac{\Delta V}{V_0}$	stress=$\frac{F}{A}$
strain=$\frac{\Delta L}{L_0}$	$\rho = m/V$	$P = F/A$
$P = P_0 + \rho g h$	$\frac{F_{\text{out}}}{A_{\text{out}}} = \frac{F_{\text{in}}}{A_{\text{in}}}$	$F_{\text{B}} = \rho_{\text{F}} g V$
SG=$\frac{\rho}{\rho_{\text{water}}}$	$Q = vA$	$Q_1 = A_1 v_1 = A_2 v_2 = Q_2$
$P_1 + \rho g y_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho g y_2 + \frac{1}{2}\rho v_2^2$	$F = \eta A \frac{v}{\ell}$	$Q = \frac{\pi(P_1 - P_2)R^4}{8\eta\ell}$
$\gamma = \frac{F}{\ell} = \frac{W}{\Delta A}$	$F = -kx$	$f = \frac{1}{T}$
$T = \frac{1}{f}$	PE=$\frac{1}{2}kx^2$	$E_{\text{tot}} = \frac{1}{2}kA^2 = \frac{1}{2}mv_0^2$
$E_{\text{tot}} = \frac{1}{2}kx^2 + \frac{1}{2}mv^2$	$v = \pm v_0\sqrt{1 - x^2/A^2}$	$T = 2\pi\sqrt{\frac{m}{k}}$
$f = \frac{1}{2\pi}\sqrt{\frac{k}{m}}$	$\omega = \sqrt{\frac{k}{m}}$	$x = A\cos\omega t$
$x = A\cos 2\pi f t$	$x = A\cos\frac{2\pi t}{T}$	$v = -v_0 \sin\omega t$
$v = -v_0 \sin 2\pi f t$	$v = -v_0 \sin\frac{2\pi t}{T}$	$T = 2\pi\sqrt{\frac{L}{g}}$
$f = \frac{1}{2\pi}\sqrt{\frac{g}{L}}$	$v = \lambda f$	$v = \sqrt{\frac{\text{elastic force factor}}{\text{inertia factor}}}$
$v = \sqrt{\frac{F_{\text{T}}}{m/L}} = \sqrt{\frac{F_{\text{T}}}{\mu}}$	$v = \sqrt{\frac{E}{\rho}}$	$v = \sqrt{\frac{B}{\rho}}$
$I = \frac{\text{power}}{\text{area}}$	$I = \frac{P}{4\pi r^2}$	$I \propto \frac{1}{r^2}$
$\frac{I_2}{I_1} = \frac{r_1^2}{r_2^2}$	$I = 2\pi^2 v\rho f^2 A^2$	$A \propto \frac{1}{r}$
$\frac{A_2}{A_1} = \frac{r_1}{r_2}$	$n\frac{\lambda_n}{2} = L$	$f_n = \frac{v}{\lambda_n}$
$f_1 = \frac{v}{2L}$	$f_n = n \times f_1$	$f_n = \frac{n}{2L}\sqrt{\frac{F_T}{\mu}}$
$\frac{\sin\theta_2}{\sin\theta_1} = \frac{v_2}{v_1}$ $I = \frac{P}{\text{Area}}$	$I = 2\pi^2 \rho v f^2 A^2$	$\beta = 10\log\frac{I}{I_0}$
$v = \lambda f$	$v = \frac{\lambda}{T}$	$T = 1/f$
$f_{\text{beat}} = \lvert f_2 - f_1 \rvert$	$T(^\circ\text{C}) = \frac{5}{9}[T(^\circ\text{F}) - 32]$	$T(^\circ\text{F}) = \frac{9}{5}T(^\circ\text{C}) + 32$
$\Delta L = \alpha L_0 \Delta T$	$\Delta x = 0, \lambda, 2\lambda, ...$ construc.	$\Delta x = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}, ...$ destruc.
Open Tube: $f_1 = \frac{v}{2L}$,	$f_n = nf_1$,	$f_1, f_2, f_3, f_4 ... = f_1, 2f_1, 3f_1, 4f_1 ...$
Closed Tube: $f_1 = \frac{v}{4L}$,	$f_{2n-1} = (2n-1)f_1$,	$f_1, f_3, f_5, f_7 ... = f_1, 3f_1, 5f_1, 7f_1 ...$
source moves: $f' = \frac{f}{\left(1 \pm \frac{v_{\text{S}}}{v}\right)}$	observer moves: $f' = \left(1 \pm \frac{v_{\text{O}}}{v}\right) f$	$\alpha\Delta T = \frac{1}{E}\frac{F}{A}$
$T(\text{K}) = T(^\circ\text{C}) + 273$	$T(^\circ\text{C}) = T(\text{K}) - 273$	$PV = nRT$
$PV = NkT$	$\overline{\text{KE}} = \frac{1}{2}m\overline{v^2} = \frac{3}{2}kT$	$v_{\text{rms}} = \sqrt{\frac{3RT}{(MM)}}$
$J = DA\frac{C_1 - C_2}{\Delta x}$	$U = \frac{3}{2}nRT = \frac{3}{2}NkT$	$Q = mc\Delta T$
	Relative Humidity $= \frac{\text{partial pressure of H}_2\text{O}}{\text{saturated vapor pressure of H}_2\text{O}} \times 100\%$	
$Q = mL$	$\frac{\Delta Q}{\Delta t} = kA\frac{T_1 - T_2}{\ell}$	$R = \frac{\ell}{k}$
$\frac{\Delta Q}{\Delta t} = e\sigma A T^4$	$\left[\frac{\Delta Q}{\Delta t}\right]_{\text{net}} = e\sigma A(T_1^4 - T_2^4)$	$\frac{\Delta Q}{\Delta t} = (1000\text{W/m}^2)eA\cos\theta$
$\Delta U = Q - W$	$W = P\Delta V$	$e = \frac{\text{net Work performed}}{\text{Heat absorbed}}$

(.... continued)

Formulas (continued)

$e = \frac{W}{Q_\mathrm{H}}$	$Q_\mathrm{H} = W + Q_\mathrm{L}$	$e = 1 - \frac{Q_\mathrm{L}}{Q_\mathrm{H}}$
$e_\mathrm{ideal} = 1 - \frac{T_\mathrm{L}}{T_\mathrm{H}}$	$e \le e_\mathrm{ideal}$	$\mathrm{CP} = \frac{Q_\mathrm{L}}{W}$
$\mathrm{CP}_\mathrm{ideal} = \frac{T_\mathrm{L}}{T_\mathrm{H} - T_\mathrm{L}}$	$\Delta S = Q/T$ (isotherm)	$\Delta S_\mathrm{s} + \Delta S_\mathrm{env} \ge 0$
$F = k\frac{Q_1 Q_2}{r^2}$	$\vec{E} = \vec{F}/q$	$\vec{F} = q\vec{E}$
$E = k\frac{Q}{r^2}$	$V_a = \frac{\mathrm{PE}_a}{q}$	$V_{ba} = V_b - V_a = \frac{W_{ba}}{q}$
$\Delta\mathrm{PE} = \mathrm{PE}_b - \mathrm{PE}_a = qV_{ba}$	$V_{ba} = Ed$	$E = V_{ba}/d$
$V = k\frac{Q}{r}$	$\mathrm{PE} = k\frac{Q_1 Q_2}{r}$	$V = \frac{kQl\cos\theta}{r^2}$
$p = Ql$	$V = \frac{kp\cos\theta}{r^2}$	$Q = CV$
$C = \epsilon_0 \frac{A}{d}$	$C = K\epsilon_0 \frac{A}{d}$	$C = \epsilon\frac{A}{d}$
$\epsilon = K\epsilon_0$	$V = \frac{V_0}{K}$	$C = KC_0$
$U = \frac{1}{2}QV$	$U = \frac{1}{2}CV^2$	$U = \frac{1}{2}\frac{Q^2}{C}$
$I = \frac{\Delta Q}{\Delta t}$	$I = \frac{V}{R}$	$V = IR$
$R = V/I$	$R = \rho\frac{L}{A}$	$P = IV$
$P = I^2 R$	$P = \frac{V^2}{R}$	$V = V_0 \sin 2\pi f t$
$I = I_0 \sin 2\pi f t$	$\overline{P} = \frac{1}{2} I_0^2 R$	$\overline{P} = \frac{1}{2}\frac{V_0^2}{R}$
$I_\mathrm{rms} = \frac{I_0}{\sqrt{2}} = 0.707 I_0$	$V_\mathrm{rms} = \frac{V_0}{\sqrt{2}} = 0.707 V_0$	

Numbers **(Precision below is sufficient for full credit)**

$g = 10\,\mathrm{m/s^2}$	$1\ \mathrm{atm} = 10^5\,\mathrm{Pa}$	$1\,\mathrm{Pa} = 1\,\mathrm{N/m^2}$	$\rho_w = 1.0 \times 10^3 \mathrm{kg/m^3}$
$v_\mathrm{sound} = 300\,\mathrm{m/s}$ (in Air)	$I_0 = 1.00 \times 10^{-12} \mathrm{W/m^2}$	$\log_{10}(2) = 0.3$	$\log_{10}(3) = 0.5$
$N_\mathrm{A} = 10^{24}$ items/mole	$R = 10.0\,\mathrm{J/K}$	$k = 10^{-23}\,\mathrm{J/K}$ (Boltzmann)	$1\ \mathrm{kcal} = 4000\ \mathrm{J}$
$k = 9 \times 10^9 \mathrm{N \cdot m^2/C^2}$ (electrostatic)		$\epsilon_0 = 9 \times 10^{-12} \mathrm{F/m}$	$e = 2 \times 10^{-19}\,\mathrm{C}$
$1\ \mathrm{eV} = 1.6 \times 10^{-19}\,\mathrm{J}$			
$\cos(78^\circ) = 1/5$	$\sin(78^\circ) = 49/50$	$\cos(66^\circ) = 2/5$	$\sin(66^\circ) = 9/10$
$\cos(60^\circ) = 1/2$	$\sin(60^\circ) = \sqrt{3}/2$	$\cos(53^\circ) = 3/5$	$\sin(53^\circ) = 4/5$
$\cos(37^\circ) = 4/5$	$\sin(37^\circ) = 3/5$	$\cos(30^\circ) = \sqrt{3}/2$	$\sin(30^\circ) = 1/2$
$\cos(24^\circ) = 9/10$	$\sin(24^\circ) = 2/5$	$\cos(12^\circ) = 49/50$	$\sin(12^\circ) = 1/5$