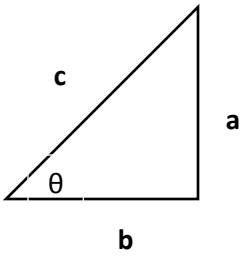
Equations and Constants

Equations:

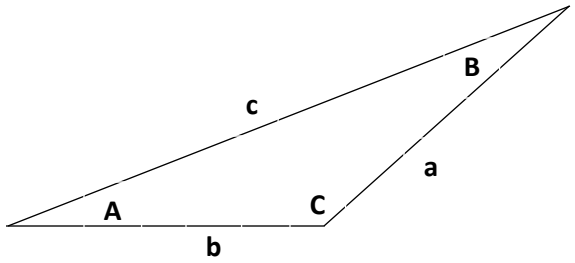


Sinθ = a/c, cosθ = b/c, tanθ = a/b, $c = \sqrt{a^2 + b^2}$

$c^2 = a^2 + b^2 - 2ab\cos C$

Where A, B and C are the angles

A, b and c are the opposite sides



$$s = \left(\frac{v+u}{2}\right)t, \quad v = u + at \ , \quad s = ut + \frac{1}{2}at^2, \ v^2 = u^2 + 2as \ , \ h = \frac{1}{2}gt^2,$$

Weight = mg, $\sum F = ma$ **,** $f = \mu N$ **,** $f = \mu mg$

Work = Force x Distance, **Kinetic Energy:** $K.E = \frac{1}{2}mv^2$ **,** $E_f = E_i$ **and** $E = mgh + \frac{1}{2}mv^2$

Potential Energy: $P.E = mgh$ **,** **Power:** $P = \frac{Energy}{time}$ **, P = F.v**

Density: $\rho = \frac{mass}{volume}$ **,** $Specific \ \ Gravity : S.G = \frac{Density \ \ of \ \ substance}{Density \ \ of \ \ pure \ \ water}$

F = k.x, $Y = \frac{F/A}{\Delta L / L_0}$ **,** $B = \frac{P}{\Delta V / V_0}$ **,** $G = \frac{F}{A\varphi}$

$\text{Pressure} = \frac{Force}{Area}$, $P = \rho g h$, $P = P_0 + h\rho g$,

Hydraulic Amplifiers: $\frac{F_1}{A_1} = \frac{F_2}{A_2}$

Flow rate: Q = Volume/time, Q = Velocity x Area, $v_1 A_1 = v_2 A_2$

Bernoulli's theory: $P_1 + mgh_1 + \frac{1}{2}\rho v_1^2 = P_2 + mgh_2 + \frac{1}{2}\rho v_2^2$

K = ^{o}C + 273, ^{o}F = (^{o}C x 9/5) +32, ^{o}C = (^{o}F – 32)5/9

$\Delta Q = mc\Delta T$, $m_1 c_1 (T_1 - T_f) = m_2 c_2 (T_f - T_2)$, $Q = mL_f$, $Q = mL_v$

$L = L_0(1 + \alpha\Delta T)$, $\alpha = \frac{\Delta L / L_0}{\Delta T}$, $V = V_0(1 + \gamma\Delta T)$, $\gamma = \frac{\Delta V / V_0}{\Delta T}$

$\Delta Q = kAt\frac{(T_2 - T_1)}{L}$, $T + A + R = 1$, $E_{tot} = \sigma(T^4 - T_0^4)$, $\lambda_m T = 2.9x10^{-3} m.K$

<u>Constants:</u>

1 cal = 4.186 J, c_w = 4183 J/kg.K, L_f = 3.35x10^5 J/kg for ice, g = 10 m/s^2, ρ_W =1000 kg/m^3, 1 tonne = 1000 kg, 1 km/h = (1/3.6) m/s, 1 m = 100 cm = 1000 mm, 1 m^2 = 10^4 cm^2 = 10^6 mm^2, 1 m^3 = 10^6 cm^3 = 10^9 mm^3, 1 m^3 = 1000 liters, 1 hPa = 100 Pa, 1 mb = 100 Pa, P_0 = 1.01x^5 Pa, $\sigma = 5.67x10^{-8} W/m^2K^4$ **Area of a circle = πr^2, Surface area of a sphere = 4πr^2, Volume of a sphere =** $\frac{4}{3}\pi r^3$