Daily Practice Problems

Q1) Check the correctness of the equation, $s= ut + at^2/2$, where u is the initial velocity, v is the final velocity, a is acceleration, s is the displacement and t is time in which the change occurs

Q2) Check the correctness of the equation, $F=mv^2/r$ where f is the centripetal force acting on a body of mass m performing uniform circular motion along a circle of radius r with linear speed v

Q3) Check the correctness of the equation, Check the correctness of the equation, When the frequency of vibration 'n' of a string of length 'l' having mass per unit length 'm' kept under tension 'F' is given by

$$n = \frac{1}{2l}\sqrt{\frac{F}{m}}$$

Q4) Check the correctness of the equation, When the rate of flow of a liquid having a coefficient of viscosity 'η' through a capillary tube of length 'l' and radius 'a' under true pressure head 'p' is given by

$$\frac{dV}{dt} = \frac{\pi p a^4}{8l\eta}$$

Q5) Check the correctness of the equation, When the periodic time 'T' of Vibration of the magnet of the moment of inertia 'I', magnetic moment, 'M' vibrating in magnetic induction 'B' is given by

$$T = 2\pi\sqrt{\frac{I}{MB}}$$

Q6) Check the correctness of the equation, When the terminal velocity 'v' of a small sphere of radius 'a' and density 'ρ' falling through a liquid of density 'σ' and coefficient of viscosity 'η' is given by

$$v = \frac{2ga^2(\sigma - \rho)}{9\eta}$$

Q7) Check the correctness of the equation, A force 'F' is given by $F = at + bt^2$, where 't' is the time. Find the dimensional formula of 'a' and 'b'.

Q8) Check the correctness of the equation, In an equation $\{P + a/V^2\} (V - b) = RT$, where P is the pressure, V is the volume, T is the temperature and 'a', 'b' and 'R' are constants.

What is the dimensional formula of a/b?

Q9) A force is given in terms of distance x and time t by F = A sin Ct = B cos Dx. Then what are the dimensions of A/B and C/D?

Q10) A man walking briskly in rain with speed v must slant his umbrella forward making an angle θ with the vertical. A student derives the following relation between θ and v: tan θ = v and checks that the relation has a correct limit: as v → 0, θ →0, as expected. (We are assuming there is no strong wind and that the rain falls vertically for a stationary man). Do you think this relation can be correct? If not, guess the correct relation.