1.1 - Physical Quantities

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- (1999) Mention two applications and two limitations of dimensional analysis.
- (1999) The frequency f of a note produced by a taut wire stretched between two supports depends on the distance l between the supports, the mass per unit length of the wire,μ , and the tension T . Use dimensional analysis to find how f is related to l , μ, and T .
- (1999) The period T of vibrations of a tuning fork may be expected to depend on the density D , Young's Modulus Y of the material of which it is made and the length a of its prongs. Using dimensional analysis deduce an expression for T in terms of D , Y and a.
- (2000) The speed v of a wave is found to depend on the tension T in the string and the mass per unit length u (linear mass density). Using dimensional analysis derive the relationship between v, T and u .
- (2007) Mention two(2) uses of dimensional analysis.
- (2007) The frequency f of a note given by an organ pipe depends on the length, l , the air pressure P and the air density D . Use the method of dimensions to find a formula for the frequency.
  - What will be the new frequency of a pipe whos original frequency was 256 Hz if the air density falls by 2% and the pressure increases by 1% ?
- (2010) Mention two uses of dimensional analysis.
- (2010) The critical velocity of a liquid flowing in a certain pipe is 3 m/s, assuming that the critical velocity v depends on the density ρ of the liquid. its viscosity mu, and the diameter d . of the pipe.
  - Use the method of dimensional analysis to derive the equation of the critical velocity of the liquid in a pipe of half the diameter.
  - Calculate the value of critical velocity.
- (2014) What is the importance of dimensional analysis inspite of its drawbacks?
- (2015) State the law of dimensional analysis.
- (2015) The largest mass, m of a stone that can be moved by the flowing river depends on the velocity of flow v, the density ρ of water, and the acceleration due to gravity g . Show that the mass, m varies to the sixth power of the velocity of flow.
- (2016) Define the term dimension of a physical quantity.

- (2016) Give two basic rules of dimensional analysis.
- (2016) The frequency, f of a vibrating string depends upon the force applied, F , the length, l , of the string and the mass per unit length,μ . Using dimension show how f is related to F , l and μ .
- (2016) What is meant by least count of a measurement?
- (2017) Define the term dimensions of a physical quantity.
- (2017) Identify two uses of dimensional equations.
- (2017) What is the basic requirement for a physical relation to be correct?
- (2017) List two quantities whose dimension is [ML^2T^{-1}]
- (2017) The frequency f of vibration of a stretched string depends on the tension F , the length l and the mass per unit length $\mu$of the string. Derive the formula relating the physical quantities by the method of dimensions.
- (2017) Use dimensional analysis to prove the correctness of the relation, $\rho = \frac{3g}{4\pi RG}$ where by ρ = density of the earth, g = acceleration due to gravity, R = radius of the earth and G = gravitational constant.
- (2018) State the law of dimensional analysis.
- (2018) If the speed v of the transverse wave along a wire of tension, T and mass, m is given by, $V = \sqrt{T/m}$. Apply dimensional analysis to check whether the given expression is correct or not.
- (2019) Identify two basic rules of dimensional analysis.
- (2019) The frequency n of vibration of a stretched string is a function of its tension F , the length, l and mass per unit length m . Use the method of dimensions to derive the formula relating the stated physical quantities.