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Chapter 1 (Dimension law, conversion of unit and measurement)

1- A certain brand of house paint claims a coverage of 500 ft^2 / gal (1 ft = 30.48 cm; 1 gal = 3.78 liter). Express this quantity in m^2/liter. (A: 12.3)

2- Speed of sound is 330 m/s. Express this in miles per hour (1 mile = 1609 m). (A: 738 mile/h)

3- The average radius of a nucleus is R = 10.0 fm. Find the density of the nucleus which has a mass of 15u [1 fm = 10^{-15} m, 1 u = 1.66×10^{-27} kg. (A: 5.94×10^{15} kg/m^3)

4- Allowed speed of car is 120 km/h. Express this in meter per second. (A: 33.3 m/s)

5- The standard kilogram is a platinum-iridium cylinder 39 mm in height and 19.5 mm in radius. What is the density of the material? (A: 21 g/cm^3)

6- The second equation of motion in a straight line with constant acceleration is [$x - x_0 = v_0 t + a\ t^2/2$]. Check the validity of this equation using dimension law?

7- During a short interval of time the velocity v in m/s of an automobile is given by $v = at^2 + bt^3$, where the time t is in seconds. The units of a and b are respectively: (A: m/s^3; m/s^4)

8- Suppose A = $B^n\ C^m$, where A has dimensions LT, B has dimensions L^{2}T^{-1}, and C has dimensions LT^2. Then the exponents n and m have the values: (A: 1/5; 3/5)

9- The speed a moving particle as a function of time is given by: $v = \dfrac{1}{2}at + \dfrac{c}{b+t}$ where v is the speed, t is the time

and a, b, c are constants. The dimensions of the constants, a, b and c are respectively. (A: $\dfrac{L}{T^2}$, T, and L)

Summary of Chapter 1 topics

1- What are the basic SI unit?
2- Difference between dimensions and units?
3- Memorization of the Power of tens? …, mega-, kilo-, deci-, centi-, milli-, micro-, nano-, peco-, …
4- Understanding the unit conversion?
5- Understanding the related dimension and unit problems?
6- Remember the formulae of the following shapes:

Density, Circumference of a circle, Area of a circle, Surface area of a sphere, Volume of a sphere, Volume of a cylinder, etc.