

Solu-1 (a) i) Pressure = $[ML^{-1}T^{-2}]$

Energy per unit volume = $[ML^{-1}T^{-2}]$

So, the first one is correct

(b) The dimensional formula of angle = $[M^0L^0T^0]$

The SI unit of angle is Radian

(c) \therefore Dimensions of k

$$[K] = \frac{[F]}{[v^2]}$$

$$= \frac{M^1L^1T^{-2}}{[LT^{-1}]^2}$$

$$= \frac{M^1L^1T^{-2}}{M^0L^2T^{-2}}$$

$$= [M^1L^{-1}]$$

$$(d) \text{ Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$= \frac{5.74}{1.2}$$

$$= 4.783 \text{ g/cm}^3$$

\therefore The least significant figure is 2.

(e) i) The method can't be considered to derive composite relations. Eg. $s = ut + \frac{1}{2} at^2$ and $2as = v^2 - u^2$

ii) The method can't be ~~use~~ used to derive the relationship between more than three quantities

Solu 2 (a) Let,

$$v^2 = u^2 + 2as$$

$$[LT^{-1}]^2 = [LT^{-1}]^2 + [LT^{-2}][L]$$

$$[L^2T^{-2}] = [L^2T^{-2}] + [L^2T^{-2}]$$

(C) 1. Significant digit = ~~2, 0, 6~~ 2, 0, 6

~~No.~~ of Significant digit = 3

2. Significant digit = ~~1, 0, 3~~ 1, 0, 3

3 Significant digit = 6, 2 and 3

4 Significant digit = 7

Solu 3. (d) Given,

Time period T

$$T \propto P^a \rho^b E^c$$

$$T = k P^a \rho^b E^c \dots \dots \textcircled{1}$$

\therefore k is a constant of proportionality and dimensionless quantity.

The dimensions of Time, pressure, density and Energy is ~~equation~~ eq. ①

$$[T] = [ML^{-1}T^{-2}]^a [ML^{-3}]^b [ML^2T^{-2}]^c$$

Equating power of M, L, T on both side
we get

$$0 = a + b + c \dots \textcircled{2}$$

$$0 = -a - 3b + 2c \dots \textcircled{3}$$

$$1 = -2a - 2c \dots \textcircled{4}$$

By solving $\textcircled{2}, \textcircled{3}, \textcircled{4}$

$$a = -\frac{5}{6} \quad b = \frac{1}{2} \quad \text{and} \quad c = \frac{1}{3}$$