Edukado Hub
DPP-3
Dimensional Analysis

Conversion of unit:

n1u1=n2u2

Example: e = 2 gm / cm3 convert int Mks system?

Q1.Convert 1 joule into different unit having base unit of mass, length and time as 10 gm,5m and 20

Q2. Force applied by water stream depends on density of water (p), velocity of the stream (v) and cross- sectional area of the stream (A). The expression of the force can be
pAv
pAv^2
p 2Av
pA^2 v

Q3. Planck's constant h, speed of light c and gravitational constant G are used to from a unit of length L and a unit of mass M. Then the correct options(s) is (are)
[JEE(Advanced) 2015]
$M \propto \sqrt{c}$
$M \propto \sqrt{G}$
$L \propto \sqrt{h}$
$L \propto \sqrt{G}$

Limitations of Dimensional Analysis-
1. Dimensional analysis doesn't give information about the "some number": the dimensional constant
2. This method is useful only when a physical quantity depends on other quantities by multiplication and power relations.
(I.e. f = xaybzc)
3. It fails if a physical quantity depends on sum or difference of two quantities
(i.e f = x + y - z)
ie we cannot get the relation
S= ut + ½ at2 from dimensional analysis.
4. This method will not work if a quantity depends on another quantity as sine or cosine, logarithmic or exponential function. The method works only if the dependence is by power function
5. We equate the powers of M,LT hence we get only three equations. So we can have only three variable(only three dependent quantities)
6. So dimensional analysis will work only if the quantity depends only on three parameters, not more than that.

To check dimensional correctness of the formula-

KE= 1/9 mv^2. —> dimensionally correct

Q5.Choose the correct statement(s) :
A dimensionally correct equation may be correct.
A dimensionally correct equation may be incorrect.
A dimensionally incorrect equation may be correct.
A dimensionally incorrect equation must be incorrect.

Q6.A man grows into a giant such that his linear dimensions increase by a factor of 9. Assuming that his density remains same, the stress in the leg will change by factor of : **[JEE (Main) 2017].**
(1) 1/81
(2) 9
(3) 1/9
(4) 81