Now, simplifying equation (1) in dimensional form, we get,

$$[M^1L^1T^{-2}] = [\mathrm{A}] = [\mathrm{C}]$$

Next,

Since, $[Bx] = [M^0L^0T^0]$

Or $[B]\,[x] = [M^0L^0T^0]$

Or $[B] = \frac{[M^0L^0T^0]}{[M^0L^1T^0]}$; x is displacement

$\therefore [B] = [M^0L^{-1}T^0]$

And

Since, $[Dt] = [M^0L^0T^0]$

Or $[D]\,[t] = [M^0L^0T^0]$

Or $[D] = \frac{[M^0L^0T^0]}{[M^0L^0T^1]}$; t is time

$\therefore [D] = [M^0L^0T^{-1}]$

Finally,

$$\left[\frac{D}{B}\right] = \frac{[M^0L^0T^{-1}]}{[M^0L^{-1}T^0]} = [M^0L^1T^{-1}]$$

The corresponding unit is ms^{-1} and the corresponding quantity is speed or velocity.

Check Yourself:

1. The velocity v of a particle depends on time t as $v = At^2 + Bt + C$ where v is in m/s and t is in second. What are the units of A , B and C?
2. If y $= a + bt + ct^2$, where y is displacement and t is time. What are the dimensions of a , b and c?
3. Van der Waal's equation of state is: $\left(\mathrm{P} + \frac{a}{V^2}\right)(V - b) = RT$ where P is pressure, V is volume, T is temperature and R is universal gas constant. Find the dimensions of Vander Waal's constants a and b. Also prove that the dimensions of $\frac{a}{b}$ are same as those of work.
4. Find the dimension of a and b in equation $p = ae^{bt}$, where, p is pressure, and t is time.
5. The force F is given in terms of time (t) and the displacement (x) by the equation:

   $F = AcosBx + CsinDt$. Find the dimension of $\frac{D}{B}$ and $\frac{A}{C}$.

Uses (or application) of dimensional analysis:

1. *To convert one system of units into another system.*
2. *To check the correctness of a physical relation (checking a formula).*
3. *To establish the relation between various physical quantities (finding a formula).*
4. *To find the dimension of constants in a given relation.*

Uses 1:

To convert one system of units into another system.

Dimensional analysis is used to find the relationship between two units of a physical quantity in two different systems.

For example, the SI unit of force is Newton N, and the CGS unit of force is dyne.