

CHAPTER EIGHT

GRAVITATION

Acceleration due to gravity (g):

“The acceleration possessed by a body due to gravitational pull is called acceleration due to gravity”.

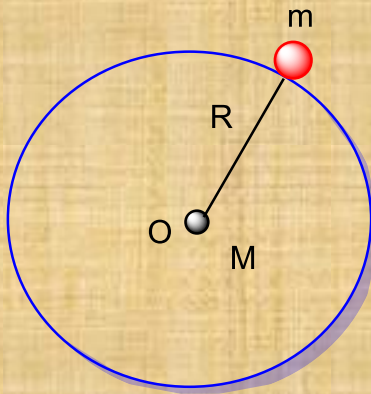
Its value on earth’s surface $g = 9.8 \text{ m/s}^2$

Distinction between G and g is as follows:

Universal Gravitational Constant(G)	Acceleration due to gravity(g)
1. It’s a proportionality constant	It’s a physical quantity
2. Its value $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{Kg}^2$	Its value $g = 9.8 \text{ m/s}^2$
3. Scalar	Vector
4. Remains same every where	Changes from place to place
5. DF: $\text{M}^{-2}\text{L}^3\text{T}^{-2}$	DF: LT^{-2}

Relationship between g and G:

Let us consider a small mass 'm' is on the surface of earth of mass 'M', Radius 'R'.



According to Newton's gravitational law, force between then,

$$F = G \frac{m_1 m_2}{r^2}$$

We know that $F = mg$

$$\therefore mg = G \frac{Mm}{R^2}$$

$$\Rightarrow \boxed{g = \frac{GM}{R^2}}$$