CHAPTER 3. (GRAVITATION)

Question 40:
A stone is dropped from a height of 20 m.
(i) How long will it take to reach the ground ?
(ii) What will be its speed when it hits the ground ? (g =10 m/s²)
Solution :

Height, s=20m
Initial velocity, u=0
Acceleration due to gravity, g=10m/s²
Final velocity, v=?
Time taken, t=?

(i) Using relation,

$$s = ut + \frac{1}{2}gt^2$$

$$20 = 0 \times t + \frac{1}{2} \times 10 \times t^2$$

$$20 = 0 + 5t^2$$

$$t^2 = \frac{20}{5} = 4$$

$$t = \sqrt{4} = 2s$$

(ii) For a freely falling body:
$v^2 = u^2 + 2gh$
$= (0)^2 + 2 \times (10) \times (20)$
So, $v^2 = 400$
$v = \sqrt{400} = 20\,m/s$

The speed of stone when it hits the ground will be 20m/s.

Question 41:
An object has mass of 20 kg on earth. What will be its (i) mass, and (ii) weight, on the moon ? (g on moon = 1.6 m/s²).
Solution :
(i) Its mass will be 20 kg as mass is a constant quantity.
(ii)Weight, W= m x g =20 x 1.6=32N