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SUBJECT:- PHYSICS CLASS:- IXTH DATE :- 05/08/XXI

SUBJECT TEACHER:- MR. NEEL NIRANJAN

CHAPTER 3. (GRAVITATION)(BASED ON NCERT PATTERN)

Q14. A stone is released from the top of a tower of height 19.6 m. Calculate its final velocity just before touching the ground?

Ans. Data u = 0 m/s

v = ?

h = s = 19.6 m

g = 9.8 m/s^2 (falling down)

$v^2 - u^2 = 2gs$

$v^2 - (0)^2 = 2 \times 9.8 \times 19.6$

v = 19.6 m/s

The final velocity just before touching the ground is 19.6 m/s.

Q15. A stone is thrown vertically upward with an initial velocity of 40 m/s. Taking g = 10 m/s^2, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

Ans. u = 40 m/s, g = −10 m/s^2 (going against gravity)

h = s = ?, v = 0

$v^2 - u^2 = 2gs$

$(0)^2 - (40)^2 = 2\,(-10) \times s$

$$\therefore s = \frac{-(40 \times 40)}{2(-10)}$$

$\therefore s = 80$ m

Net displacement of the stone = 0 (As the stone falls, back to the same point.)

Total distance covered by stone = 80 m + 80 m= 160 m

Q17. A stone is allowed to fall from the top of a tower 100 m high and at the same time another stone is projected vetically upwards from the ground with a velocity of 25 m/s. Calculate when and where the two stones will meet.

Ans. h = 100 m

time t = ? g = 10 m/s^2

Height covered by the falling stone = s^1

$$\therefore s_1 = ut + \frac{1}{2}gt^2$$

$$\therefore s_1 = 0 \times t + \frac{1}{2}(10)t^2$$

$$\therefore s_1 = 5t^2$$

The distance covered by the stone thrown upward = s_2

g = –10 m/s

u = 25 m/s

Total height given = 100 m

$\therefore s_1 + s_2 = 100m$

$5t^2 + (25t - 5t^2) = 100$ m

$\therefore 25t = 100$ m

$$t = \frac{100}{25} = 4 \text{ seconds} \qquad \text{...(3)}$$

Putting the value of (3) in equation (1), we get

$\therefore s1 = 5t^2$

$= 5 \times (4)^2 = 80$ m

$\therefore$ The two stones will meet after 4 seconds when the falling stone has covered a distance of 80 m