

VIDYA BHAVAN, BALIKA VIDYAPEETH
SHAKTI UTTHAN ASHRAM, LAKHISARAI, PIN:-811311

SUBJECT:- PHYSICS

CLASS:- IXTH

DATE:08/10/XX

SUBJECT TEACHER:- MR. NEEL NIRANJAN

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

Q1. A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate

- (i) the maximum height to which it rises,
- (ii) the total time it takes to return to the surface of the earth.

Ans. (i) Initial velocity = 49 m/s

Final velocity = 0 m/s

$a = g = -9.8 \text{ m/s}^2$

Height = Distance = $s = ?$

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

$0^2 - (49)^2 = 2(-9.8) \times s$

$$\therefore s = \frac{(49) \times -(49)}{2(-9.8)} = 122.5 \text{ m}$$

(ii) Time take $t = ?$

$v = u + gt$

$\therefore 0 = 49 + (-9.8) \times t$

$$\therefore t = \frac{-49}{-9.8} = 5 \text{ s}$$

Total time taken to return the surface of the earth by the ball is $5 \text{ s} + 5 \text{ s} = 10 \text{ s}$.

Q2. 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 $u = 0 \text{ m/s}$

$v = ?$

$h = s = 19.6 \text{ m}$

$g = 9.8 \text{ m/s}^2$ (falling down)

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

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

$$v = 19.6 \text{ m/s}$$

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

Q3. A stone is thrown vertically upward with an initial velocity of 40 m/s. Taking $g = 10 \text{ m/s}^2$, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

Ans. $u = 40 \text{ m/s}$

$$g = -10 \text{ m/s}^2 \text{ (going against gravity)}$$

$$h = s = ?$$

$$v = 0$$

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

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

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

$$\therefore s = 80 \text{ m}$$

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

Total distance covered by stone = 80 m + 80 m

(up) (down)

$$= 160 \text{ m}$$

Q4. The earth and the moon are attracted to each other by gravitational force. Does the earth attract the moon with a force that is greater or smaller or the same as the force with which the moon attracts the earth? Why?

Ans. The value of F is same for earth and the moon. Both bodies will exert the same amount of force on each other.

As per universal law of gravitation, every body attracts the other body with some force and this force is same for both the bodies called gravitational force.