

# Home Assignment

Q. A ball is thrown vertically upwards.

$$u = 10 \text{ m/s}$$

$$h = 50 \text{ m (height of a building)}$$

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

$$v = 0 \text{ m/s}$$

$$v^2 - u^2 = -2g$$

$$v^2 - u^2 = 2as$$

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

$$\Rightarrow s = \frac{u^2}{2g} = \frac{100}{2g} = 50 \text{ g}$$

In, Downward Motion

$$u = 0$$

$$v = ?$$

$$s = 50 + s_1 = 50 + \frac{50}{g}$$

$$a = g$$

$$v^2 - u^2 = 2g s_2$$

$$\Rightarrow v^2 = 2g \left( 50 + \frac{50}{g} \right)$$

$$= 100g + 100$$

$$= 9.8 \times 100 + 100$$

$$= 980 + 100$$

$$= 1080$$

$$v = \sqrt{1080} = 32.8 \text{ m/s with}$$

So, the ball will strike the ground ~~at~~ the

velocity of 32.8 m/s.

Q

$$\begin{aligned} \text{(i)} \quad v &= u + at \\ 32.8 &= 0 + 9.8 \times t \\ t &= \frac{32.8}{9.8} \\ &= \frac{328}{10} \times \frac{10}{98} \\ &= 3.34 \text{ secs.} \end{aligned}$$

So, it takes 3.34 seconds to ~~the~~ ball to strike the ground.

$$\begin{aligned} \text{2(i)} \quad \text{Given,} \\ u &= 0 \text{ m/s} \\ t &= 5 \text{ secs} \\ s &= ? \end{aligned}$$

$$s = ut + \frac{1}{2}at^2 = 0 \times 5 + \frac{1}{2} \times 9.8 \times 5 \times 5 = 4.9 \times 25$$

So, the height of the bridge is 122.5 m

$$\begin{aligned} \text{(ii)} \quad \text{Distance in } 4 \text{ sec} &= \frac{1}{2} \times 9.8 \times 4 \times 4 \\ (t=4) &= 16 \times 4.9 \\ &= 78.4 \end{aligned}$$

$$\begin{aligned} \text{Distance travelled in last second} &= S_5 - S_4 \\ &= 122.5 - 78.4 \text{ m} \\ &= 44.1 \text{ m} \end{aligned}$$

So, the distance travelled in last second is 44.1 m.

Q1

3. In case of upward motion

$$u = 22 \text{ m/s}$$

$$v = 0 \text{ m/s}$$

$$t = ?$$

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

$$v = u + at$$

$$0 = 22 + (-9.8)t$$

$$9.8t = 22$$

$$t_1 = \frac{22}{9.8} \text{ seconds}$$

~~Down~~ In case of Downward motion

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

$$v = 15 \text{ m/s}$$

$$t_2 = ?$$

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

$$v = u + at$$

$$15 = 0 + 9.8t$$

$$t_2 = \frac{15}{9.8} \text{ seconds}$$

$$\text{Time} = \frac{22 + 15}{9.8} = \frac{37}{9.8} = \frac{370}{98} = 3.8 \text{ seconds}$$

the tennis ball

So, it will be falling after 3.8 seconds.