H.W
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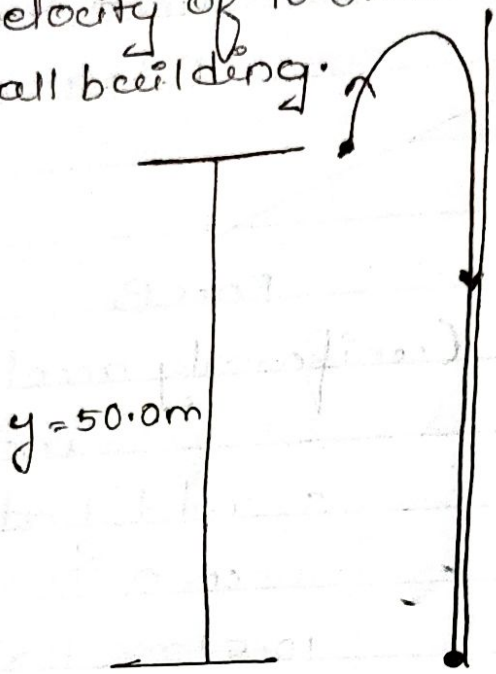
1. A ball is thrown upward with an initial velocity of 10.0 m/s from the top of a 50.0 m tall building.



a) With what velocity will the ball strike the ground?

Ans⇒ Given $y = -50.0\,m$

a) $v^2 = u^2 - 2gy$

$= (10\,m/s)^2 - 2(9.8\,m/s^2)(-50.0\,m)$

$= 1.08 \times 10^3\,m^2/s^2$

so, $v = \sqrt{1.08 \times 10^3\,m^2/s^2} = 32.9\,m/s$

But as the ball will fall downwards, its velocity will be negative. i.e, $v = -32.9\,m/s$

b) From $v = u - gt$, we have

$$t = \frac{u - v}{g} = \frac{(10.0\,m/s - (-32.9\,m/s)}{9.8\,m/s^2}$$

$$= \frac{42.9\,m/s}{9.8\,m/s^2} = 4.38s$$

2. A stone is dropped freely in the river from a bridge. It takes 5s to touch the water surface in the river. Calculate:

i) the height of the bridge from the water level.

Ans⇒ Given,

$u = 0 m/s$

$t = 5 sec$

distance travelled = height of bridge = h m

So,

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

$= \frac{1}{2} \times 9.8 \times 5 \times 5$

$= 122.5 m$

ii) the distance covered by stone in the last second ($g = 9.8 m s^{-2}$)

Ans⇒ Distance covered in 4sec

$= \frac{1}{2} \times 9.8 \times 16$

$= 78.4 m$

distance covered in last sec

= distance covered in 5s - distance covered in 4s.

$= 122.5 - 78.4$

$= 44.1\,m$

3. A tennis ball is struck with a racket, firing it straight upward at 22 meters per second. After how much time will it be falling at 15 meters per second?

Ans→ Case 1:

given,

$u = 22\,m/s,\ v = 0,\ g = -9.8$

To find t_1

→ $v = u + gt_1$

→ $0 = 22 + (-9.8) \times t_1$

→ $0 = 22 - 9.8 \times t_1$

→ $9.8t_1 = 22$

→ $t_1 = 2.24$ secs

Case 2:

given,

$u = 0,\ v = 15\,m/s,\ g = 9.8$

To find t_2

→ $v = u + gt_2$

→ $15 = 0 + 9.8t_2$

→ $15 = 9.8t_2$

→ $t_2 = 1.53$ secs

So, $t = t_1 + t_2 = (2.24 + 1.53)$ secs $= 3.77 = 3.8$ secs.