

Question#18998

(take $g = 10 \text{ m/s}^2$ in this question)

A ball moves in a vertical straight line under gravity. Air resistance is negligible. The ball is projected from a point 2m above the ground with an upward speed of 3 m/s

A Find the time taken for the ball to reach its greatest height above the ground.

B show that this maximum height above the ground is 2.45m.

Solution:

Let:

$$H_0 = 2 \text{ m}$$

$$V_0 = 3 \text{ m/s}$$

$$g = 10 \text{ m/s}^2$$

$$t = ?, H_{max} = ?$$

A.

$$V = V_0 - gt, \quad V = 0, \quad V_0 = gt, \quad t = \frac{V_0}{g}$$

$$t = \frac{3}{10} = 0.3 \text{ s}$$

B.

$$H_{max} = H_0 + \frac{1}{2}gt^2$$

$$H_{max} = 2 + \frac{1}{2}10 * 0.3^2 = 2.45 \text{ m}$$