

1 Equations of motion, free fall, and 2D motion – Part 2 —Answers

Answers

Work through these after you have tried the questions yourself.

2.1 $v = v_0 + at = 0 + 3.0 \times 5.0 = 15 \text{ m/s}$.

2.2 $\Delta x = v_0 t + \frac{1}{2}at^2 = 0 + \frac{1}{2} \times 3.0 \times 5.0^2 = 37.5 \text{ m}$.

2.3 $v = gt = 9.8 \times 1.5 = 14.7 \text{ m/s}$.

2.4 $v_x = 12 \cos 60^\circ = 6.0 \text{ m/s}$; $v_y = 12 \sin 60^\circ = 10.4 \text{ m/s}$.

2.5 both start with zero vertical velocity and fall with the same acceleration g ; horizontal motion does not affect the vertical fall, so both take the same time to reach the ground.

2.6 $v^2 = v_0^2 + 2a \Delta x \Rightarrow 8^2 = 20^2 + 2a(42) \Rightarrow 64 - 400 = 84a \Rightarrow a = \frac{-336}{84} = -4.0 \text{ m/s}^2$
(the minus sign shows it is slowing).