

Question Number	Answer	Mark
14(a)	<p>Resolves velocity into horizontal and vertical components. (1)</p> <p>Use of $s = u t$ for horizontal displacement (1)</p> <p>Use of $s = u t + \frac{1}{2} a t^2$ with $a = g$ for vertical displacement (1)</p> <p>Height after 30 m = 0.91 m (1) Or decrease in height = 1.99 m</p> <p>Comparison and conclusion consistent with student's calculation. (1)</p> <p>A method that calculates horizontal displacement in time taken to fall 2.9 m can score full marks. <i>e.g.</i> Resolves velocity into horizontal and vertical components. (1)</p> <p>Use of <i>suvat</i> equations to calculate total time in flight (1)</p> <p>Use of $s = u t$ for horizontal displacement (1)</p> <p>Total distance = 32.7 m (1)</p> <p>Comparison and conclusion consistent with student's calculation. (1)</p> <p><u>Example calculation</u> $v_H = 25 \text{ m s}^{-1} \times \cos 10^\circ = 24.6 \text{ m s}^{-1}$ $v_V = 25 \text{ m s}^{-1} \times \sin 10^\circ = 4.34 \text{ m s}^{-1}$ $30 \text{ m} = 24.61 \text{ m s}^{-1} \times t$ $\rightarrow t = 30 \text{ m} \div 24.6 \text{ m s}^{-1} = 1.22 \text{ s}$ $s = 4.34 \text{ m s}^{-1} \times 1.22 \text{ s} - 0.5 \times 9.81 \times 1.22^2 = -1.99 \text{ m}$ Height = 2.9 m – 1.99 m = 0.91 m 0.91 m > 0.00 m \therefore success</p>	5
14(b)	<p>Either</p> <p>Use of $E_K = \frac{1}{2} m v^2$ (1)</p> <p>Use of $\Delta W = F \Delta s$ (1)</p> <p>$F = 3.88 \times 10^2 \text{ N}$ (1)</p> <p>Or</p> <p>Use of $v^2 = u^2 + 2as$ or combination of <i>suvat</i> equations to find deceleration. (1)</p> <p>Use of $F = m a$ (1)</p> <p>$F = 3.88 \times 10^2 \text{ N}$ (1)</p> <p><u>Example of calculation</u> $E_K = \frac{1}{2} \times 63 \times 23^2 = 1.67 \times 10^4 \text{ J}$ $1.67 \times 10^4 \text{ J} = F \times 43$ $F = 1.67 \times 10^4 \text{ J} / 43 = 3.88 \times 10^2 \text{ N}$</p>	3
Total for question 14		8