

3 Further Mechanics – Part 1 — Answers

Answers

3.1 Gravity acts only vertically, so the horizontal velocity stays constant while the vertical motion is free fall; the two are independent and share the same time.

3.2 $\text{range} = \frac{30^2 \sin 60^\circ}{10} = \frac{900 \times 0.866}{10} = 77.9 \text{ m}.$

3.3 $v = r\omega = 3 \times 4 = 12 \text{ m s}^{-1}.$

3.4 $a = r\omega^2 = 3 \times 4^2 = 48 \text{ m s}^{-2}.$

3.5 Towards the centre of the circle.

3.6 Vertically, $20 = \frac{1}{2}(10)t^2$, so $t^2 = 4$ and $t = 2 \text{ s}$. Horizontally (constant speed), distance $= 15 \times 2 = 30 \text{ m}.$