

1.1 Movement and position

Name: _____ Class: _____ Date: _____

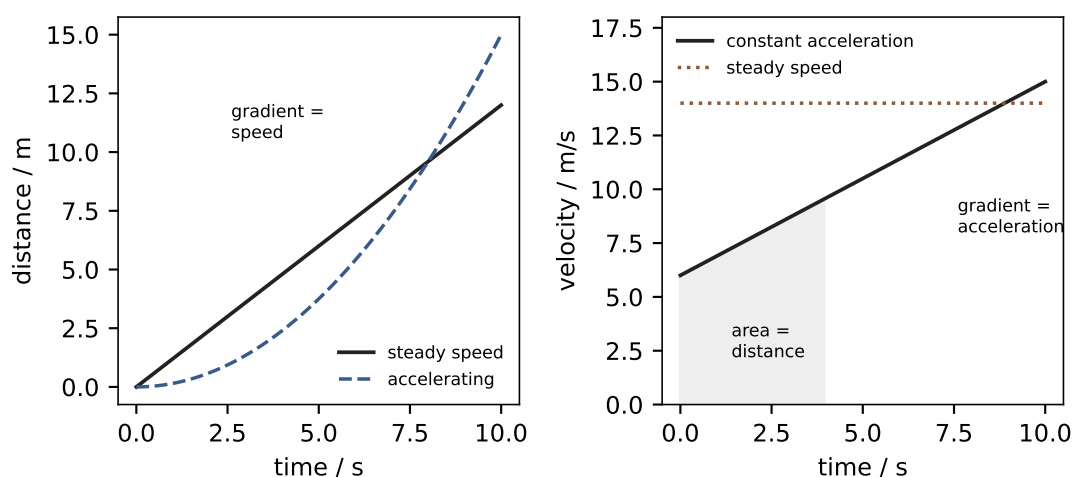
Total: 28 marks

Objective

Cover movement and position (1.3–1.10): distance-time and velocity-time graphs, average speed, acceleration, and $v^2 = u^2 + 2as$. Original IGCSE-level practice.

1 Key knowledge and worked examples

■ Two graphs, two gradients



Distance-time: gradient = **speed**; flat = at rest; curve = accelerating. Velocity-time: gradient = **acceleration**; flat = constant velocity; **area under the line = distance**.

Worked check. From the area rule, a line rising $4 \rightarrow 16$ m/s over 6 s covers $\frac{1}{2}(4 + 16) \times 6 = 60$ m; by $v^2 = u^2 + 2as$: $s = (256 - 16)/(2 \times 2) = 60$ m ✓.

2 Practice

2.1 State what the gradient of each graph represents: distance-time; velocity-time. [2]

2.2 A train travels 15 km in 12 minutes. Calculate the average speed in m/s. [3]

2.3 A ball rolls from 2 m/s to 8 m/s in 3 s. Calculate the acceleration. [2]

2.4 Use $v^2 = u^2 + 2as$ to find the distance a car needs braking from 20 m/s at 4 m/s². [3]

2.5 Describe the motion shown by a velocity-time graph that is flat at 12 m/s. [1]

3 Exam-style questions

3.1 Sketch and describe the distance-time graph for a car that speeds up steadily from rest, then travels at constant speed. [3]

3.2 A velocity-time graph rises from 0 to 25 m/s in 10 s, stays flat for 20 s, then falls to 0 in 5 s. Calculate the acceleration in each stage and the total distance travelled. [6]

3.3 A stone dropped down a well accelerates at 10 m/s^2 and hits water after 2 s. Calculate its final speed and the depth to the water. [4]

3.4 A bus travels the first 300 m of its route at a steady 10 m/s , then 450 m at a steady 15 m/s . Calculate the total time and the average speed for the whole journey. [4]
