



QUESTION WORKBOOK

Kinematics with constant acceleration

Mechanics · Year 12–13

8 questions · 36 marks

PRINT EDITION

SECTION A · Warm-up

A1 List the five suvat quantities, and name the equation that leaves out s. [2]

A2 A car accelerates uniformly from rest at 2 m s^{-2} for 6 s. Find its final speed and the distance it covers. [4]

SECTION B · Standard

B1 A car brakes uniformly from 30 m s^{-1} to rest over a distance of 150 m. Find the deceleration and the time taken. [4]

- B2** A stone is dropped from rest down a well and hits the water 2.5 s later. Taking $g = 9.8 \text{ m s}^{-2}$, find the depth of the well and the speed of the stone as it hits the water. [4]

- B3** A ball is thrown vertically upwards from ground level with speed 14 m s^{-1} . Taking $g = 9.8 \text{ m s}^{-2}$, find the greatest height it reaches and the total time it spends in the air before returning to the ground. [4]

- B4** A ball is thrown vertically upwards from ground level with speed 14 m s^{-1} . Taking $g = 9.8 \text{ m s}^{-2}$, find the times at which the ball is 5 m above the ground, and explain why there are two of them. [5]

SECTION C · Stretch

- C1** A ball is projected vertically upwards from ground level with speed 14 m s^{-1} . Exactly 1 s later a second ball is projected vertically upwards from the same point with the same speed. Taking $g = 9.8 \text{ m s}^{-2}$, find the time after the first projection at which the two balls are at the same height, and find that height. [6]

- C2** A car travelling along a straight road at a constant 20 m s^{-1} passes a stationary motorcycle. The motorcycle sets off immediately, accelerating uniformly at 2.5 m s^{-2} until it reaches 30 m s^{-1} , after which it maintains that speed. Find the time, from the moment the car passed, at which the motorcycle draws level with the car, and the distance it has travelled by then. [7]