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QUESTION WORKBOOK

Motion graphs and the SUVAT equations

Mechanics · Year 12

AQA 3.4.1.3 · CIE 2.1 · OCR A 3.1.1, 3.1.2

10 questions · 31 marks

NAVY SCREEN EDITION

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SECTION A · Warm-up

A1 Distinguish between the average velocity and the instantaneous velocity of a moving object. [2]

A2 A car starts from rest and accelerates uniformly at 2.0 m s^{-2} for 6.0 s. Calculate its final velocity. [2]

A3 State what the gradient and the area under a velocity–time graph each represent. [2]

SECTION B · Standard

B1 A car travelling at 8.0 m s^{-1} accelerates uniformly at 1.5 m s^{-2} for 4.0 s. Calculate (a) its final velocity and (b) the distance travelled in this time. [4]

B2 A car travelling at 20 m s^{-1} brakes uniformly and stops in a distance of 40 m. Calculate (a) its deceleration and (b) the time taken to stop. [4]

B3 An object accelerates uniformly from rest to 15 m s^{-1} in 5.0 s, then travels at a constant 15 m s^{-1} for a further 10 s. Using the area under the velocity–time graph, calculate the total distance travelled. [3]

B4 A stone is dropped from rest and falls freely. Taking g = 9.81 m s^{-2}, calculate its velocity and the distance fallen after 2.0 s. [3]

SECTION C · Stretch

C1 A train starts from rest and accelerates uniformly at 0.50 m s^{-2} for 20 s. Calculate (a) the velocity reached and (b) the distance travelled during this acceleration. [4]

C2 A ball is thrown vertically upwards at 15 m s^{-1}. Taking g = 9.81 m s^{-2} and ignoring air resistance, calculate (a) the maximum height reached and (b) the time taken to reach it. [4]

C3 The velocity–time graph of a journey is a straight line sloping upwards from a non-zero starting velocity. Explain how you would find the acceleration and the displacement from this graph. [3]