



QUESTION WORKBOOK

Further kinematics: acceleration as a function of x , t or v

Further Mechanics 2 · Year FM

6 questions · 22 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** State which form of the acceleration you would use if it depends on the displacement, and why the other form fails. [2]

- A2** A particle has acceleration $(6t - 2) \text{ m/s}^2$ and speed 1 m/s at $t = 0$. Find its speed at $t = 3$. [3]

SECTION B · Standard

- B1** A particle moving at 20 m/s decelerates at $0.02v^2 \text{ m/s}^2$. Find its speed after it has travelled 50 m . [4]

- B2** A particle moving at 15 m/s decelerates at $0.4v \text{ m/s}^2$. Find how long it takes for the speed to halve. [4]

- B3** A body has acceleration $(2 - 0.05v^2) \text{ m/s}^2$. Find its terminal speed. [3]

SECTION C · Stretch

- C1** A particle P moves along a straight line through a fixed point O . When P is x metres from O its acceleration is $6/x^2 \text{ m/s}^2$ directed towards O . At $x = 2$ the particle is moving away from O with speed 2 m/s . Find the speed of P when $x = 4$, and the greatest distance of P from O . [6]