



QUESTION WORKBOOK

Simple harmonic motion

Further Mechanics 2 · Year FM

6 questions · 28 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** Write down the defining equation of simple harmonic motion and say where the particle moves fastest and where its acceleration is greatest. [3]

- A2** A particle moves with simple harmonic motion of amplitude 0.4 m and $\omega = 5 \text{ rad/s}$. Find its maximum speed, its maximum acceleration and its period. [3]

SECTION B · Standard

- B1** A particle moving with simple harmonic motion has speed 1.6 m/s at a displacement of 0.3 m and speed 1.2 m/s at a displacement of 0.4 m. Find the amplitude and ω . [6]

- B2** For that motion, find the time taken to travel from the centre to a displacement of 0.25 m, and the next time it is at that displacement. [5]

- B3** Explain why the period of simple harmonic motion does not depend on the amplitude. [3]

SECTION C · Stretch

- C1** Starting from the equation of motion, derive $v^2 = \omega^2(a^2 - x^2)$. Hence show that a particle moving with simple harmonic motion spends one third of each period within half the amplitude of the centre. [8]