



QUESTION WORKBOOK

Centres of mass of plane figures and frameworks

Further Mechanics 2 · Year FM

6 questions · 20 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** State the centre of mass of a uniform triangular lamina and of a uniform rectangular one, and say how to use symmetry to save work. [2]

- A2** A uniform lamina is made of a 6 by 2 rectangle with corners $(0, 0)$ and $(6, 2)$, and a 2 by 4 rectangle with corners $(0, 2)$ and $(2, 6)$. Find its centre of mass. [3]

SECTION B · Standard

- B1** A uniform disc of radius 4 centred at the origin has a disc of radius 2 centred at $(2, 0)$ removed. Find the centre of mass of what is left. [4]

- B2** A uniform wire framework consists of three rods forming three sides of a rectangle: from $(0, 0)$ to $(6, 0)$, from $(6, 0)$ to $(6, 4)$, and from $(0, 0)$ to $(0, 4)$. Find its centre of mass. [4]

- B3** Explain why a triangular lamina and a triangular wire framework of the same shape have different centres of mass. [3]

SECTION C · Stretch

- C1** A uniform triangular lamina has vertices at $(0, 0)$, $(4, 0)$ and $(0, 3)$. Find its centre of mass and compare it with the wire framework of the same triangle, whose centre is at $(1.5, 1)$. [4]