



QUESTION WORKBOOK

Areas with polar coordinates

Polar coordinates · Year FM

6 questions · 20 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Write down the formula for the area swept out by a polar curve $r = f(\theta)$ between $\theta = \alpha$ and $\theta = \beta$, and explain the $\frac{1}{2}$. [2]

- A2** Find the area swept by $r = 4$ as θ runs from 0 to $\pi/3$. [3]

SECTION B · Standard

- B1** Find the total area enclosed by the cardioid $r = 2(1 + \cos \theta)$. [4]

- B2** Find the area of one petal of the rose $r = 3 \cos 2\theta$, using the petal traced for $-\pi/4 \leq \theta \leq \pi/4$. [4]

- B3** The curve $r = 6 \sin \theta$ is a circle of radius 3. Verify its area using the polar formula with $0 \leq \theta \leq \pi$. [3]

SECTION C · Stretch

- C1** A student finds the area of one loop of $r = \cos 2\theta$ by integrating from 0 to $\pi/2$ and gets an answer double the correct $\pi/8$. Diagnose the error. [4]