



QUESTION WORKBOOK

Arc length and surface area

Further Pure 2 · Year FM

7 questions · 32 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Find the length of the curve $y = (2/3)x^{3/2}$ from $x = 0$ to $x = 3$. [4]

A2 Find the length of $y = \cosh x$ from $x = 0$ to $x = 1$. [3]

SECTION B · Standard

B1 A curve has $x = t^2$, $y = t^3$ for $0 \leq t \leq 1$. Find its length. [5]

B2 Find the length of the polar curve $r = e^\theta$ from $\theta = 0$ to $\theta = \pi$. [4]

B3 The arc of $y = x^3$ from $x = 0$ to $x = 1$ is rotated once about the x -axis. Find the area of the surface generated. [5]

SECTION C · Stretch

C1 The arc of $y = \cosh x$ from $x = 0$ to $x = 1$ is rotated once about the x -axis. Find the area of the surface generated, in terms of $\sinh 2$. [5]

- C2** Find the total perimeter of the cardioid $r = 2(1 + \cos \theta)$. You may use the identity $1 + \cos \theta = 2 \cos^2(\theta/2)$. [6]