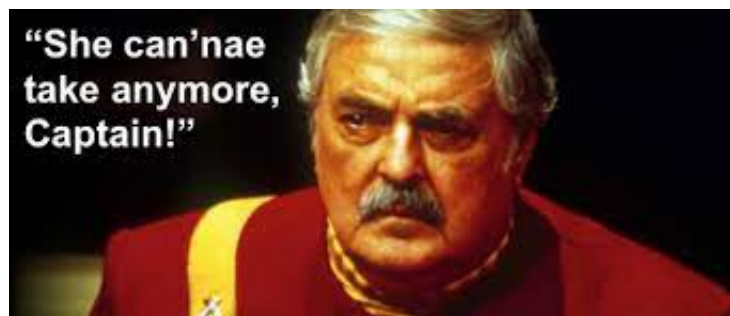


Further Pure A-Level Mathematics
Compulsory Course Components
Core 1 and Core 2

P U S H T H E P A C E



Further A-Level
Mathematics Revision



Push The Pace #1

You have thirty-five minutes to answer seven examination questions

Marks Available : 40 (+ 6 bonus)

Further A-Level Pure Mathematics
Push The Pace Revision Papers

Question 1

Further A-Level Examination Question from October 2021, Paper 1, Q6 (OCR)

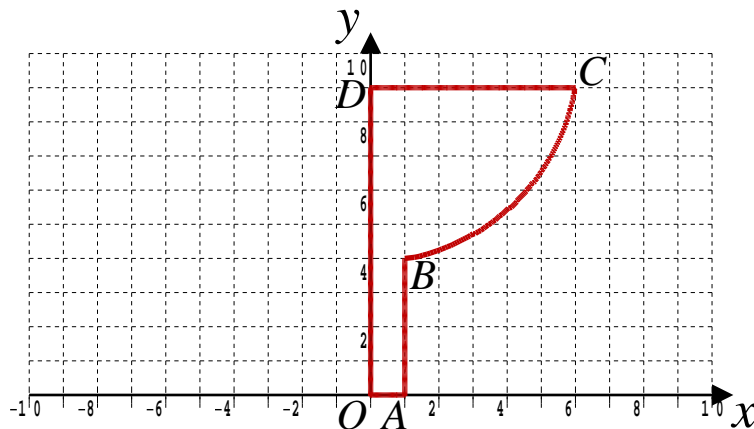
O is the origin of a coordinate system whose units are cm.

The points A , B , C and D have coordinates $(1, 0)$, $(1, 4)$, $(6, 9)$ and $(0, 9)$ respectively.

The arc BC is part of the curve with equation $x^2 + (y - 10)^2 = 37$

The closed shape $OABCD$ is formed, in turn, from the line segments OA and AB , the arc BC and the line segments CD and DO (see diagram).

A funnel can be modelled by rotating $OABCD$ by 2π radians about the y -axis.



Find the volume of the funnel according to the model.

[3 marks]

Question 2

Further A-Level Examination Question from June 2020, Paper 2, Q4 (AQA)

The matrices **A** and **B** are defined as follows,

$$\mathbf{A} = \begin{pmatrix} x + 1 & 2 \\ x + 2 & -3 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} x - 4 & x - 2 \\ 0 & -2 \end{pmatrix}$$

Show that there is a value of x for which $\mathbf{AB} = k\mathbf{I}$, where **I** is the 2×2 identity matrix and k is an integer to be found.

[3 marks]

Question 3

Further A-Level Examination Question from June 2019, Paper 2, Q4 (AQA)

The positive integer k is such that, $\sum_{r=1}^k (3r - k) = 90$

Find the value of k

[3 marks]

Question 4

Further A-Level Examination Question from June 2022, Paper 4, Q7 (WJEC)

- (a) Express $4x^2 + 10x - 24$ in the form $a(x + b)^2 + c$, where a , b and c are constants whose values are to be found.

[3 marks]

- (b) Hence evaluate the integral $\int_3^5 \frac{6}{\sqrt{4x^2 + 10x - 24}} dx$
Give your answer correct to 3 decimal places.

[5 marks]

Question 5

Further A-Level Examination Question from June 2022, Paper 4, Q12 (WJEC)

Find the solution of the differential equation,

$$3 \frac{d^2y}{dx^2} + 5 \frac{dy}{dx} - 2y = 8 + 6x - 2x^2$$

where $y = 6$ and $\frac{dy}{dx} = 5$ when $x = 0$

[12 marks]

Question 6

Further A-Level Examination Question from May 2020, Paper 1, Q8 (AQA)

The three roots of the equation,

$$4x^3 - 12x^2 - 13x + k = 0$$

where k is a constant, form an arithmetic sequence.

Find the roots of the equation.

[6 marks]

Question 7

Further A-Level Examination Question from June 2022, Paper 4, Q5 (WJEC)

- (a) Determine the number of solutions of the equations,

$$x + 2y = 3$$

$$2x - 5y + 3z = 8$$

$$6y - 2z = 0$$

[5 marks]

- (b) Each of the three equations in part (a) has the geometric interpretation of being a three dimensional plane. Backed up by a rigorous analysis determine the configuration of the three planes.

[6 BONUS marks]

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Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk