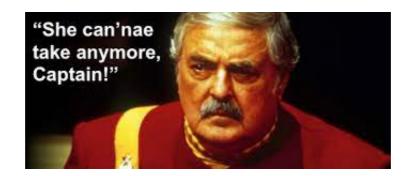
Further Pure A-Level Mathematics Compulsory Course Components Core 1 and Core 2

PusH ThE PacE



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

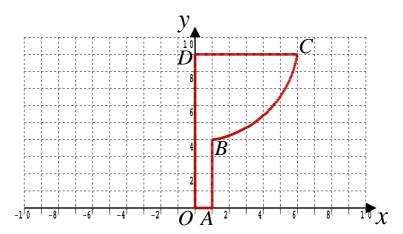
Further A-Level Examination Question from October 2021, Paper 1, Q6 (OCR) O is the origin of a coordinate system whose units are cm.

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.

Further A-Level Examination Question from June 2020, Paper 2, Q4 (AQA) The matrices **A** and **B** are defined as follows,

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

Show that there is a value of x for which $\mathbf{AB} = k\mathbf{I}$, where \mathbf{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

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.

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 $x = 0$

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.

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]