6672/01

Edexcel GCE

Pure Mathematics

Unit P2 Mock Paper

Advanced Subsidiary / Advanced

Time: 1 hour 30 minutes

Materials required for the examination	Items included with these question papers
Answer Book (AB04) Graph Paper (GP02) Mathematical Formulae	Nil

Candidates may use any calculator EXCEPT **those with a facility for symbolic algebra, differentiation and/or integration. Thus candidates may** NOT **use calculators such as Texas TI 89, TI 92, Casio CFX 9970G, Hewlett Packard HP 48G.**

Instructions to Candidates

In the boxes on the Answer Book provided, write the name of the Examining Body (Edexcel), your Centre Number, Candidate Number, the Unit Title (Pure Mathematics P2), the Paper Reference (6672), your surname, other names and signature.

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae including Statistical Formulae and Tables' is provided.

Full marks may be obtained for answers to ALL questions.

This paper has 8 questions. There are no blank pages.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly numbered.

You must show sufficient working to make your methods clear to the Examiner. Answers without working will gain no credit.

Success through qualifications

1. (a) Expand $(2 + \frac{1}{4}x)^9$ in ascending powers of x as far as the term in x^3, simplifying each term. **(4 marks)**

(b) Use your series, together with a suitable value of x, to calculate an estimate of $(2.025)^9$. **(2 marks)**

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2. The curve C has equation $y = 4x^{\frac{3}{2}} - \ln(5x)$, where $x > 0$. The tangent at the point on C where $x = 1$ meets the x-axis at the point A.

Prove that the x-coordinate of A is $\frac{1}{5}\ln(5\mathrm{e})$. **(7 marks)**

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3. Find the volume generated when the region bounded by the curve with equation $y = 2 + \dfrac{1}{x}$, the x-axis and the lines $x = \frac{1}{2}$ and $x = 4$ is rotated through 360° about the x-axis.

Give your answer in the form $\pi(a + b \ln 2)$, where a and b are rational constants. **(7 marks)**

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4. On separate diagrams, sketch the curves with equations

(a) $y = \arcsin x, \quad -1 \leq x \leq 1$,

(b) $y = \sec x, \quad -\dfrac{\pi}{3} \leq x \leq \dfrac{\pi}{3}$,

stating the coordinates of the end points of your curves in each case. **(4 marks)**

Use the trapezium rule with five equally spaced ordinates to estimate the area of the region bounded by the curve with equation $y = \sec x$, the x-axis and the lines $x = \dfrac{\pi}{3}$ and $x = -\dfrac{\pi}{3}$, giving your answer to two decimal places. **(4 marks)**

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5. The even function f is defined over the domain $-4 \leq x \leq 4$ by

$$f(x) = x\,, \qquad 0 \leq x < 2,$$
$$f(x) = 4 - x\,, \qquad 2 \leq x \leq 4.$$

(*a*) Sketch the graph of f over its domain. **(4 marks)**

(*b*) Find all the values of x for which

$$f(x) = \frac{x+4}{4}\,.$$ **(5 marks)**

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6. (*a*) Prove that for all values of x,

$$\sin x + \sin(60° - x) \equiv \sin(60° + x).$$ **(4 marks)**

(*b*) Given that $\sin 84° - \sin 36° = \sin \alpha°$, deduce the exact value of the acute angle α.
(2 marks)

(*c*) Solve the equation

$$4\sin 2x + \sin(60° - 2x) = \sin(60° + 2x) - 1$$

for values of x in the interval $0 \leq x < 360°$, giving your answers to one decimal place.
(5 marks)

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7. Find, giving your answers to two decimal places, the values of w, x, y and z for which

(*a*) $e^{-w} = 4$, **(2 marks)**

(*b*) $\arctan x = 1$, **(2 marks)**

(*c*) $\ln(y + 1) - \ln y = 0.85$ **(4 marks)**

(*d*) $\cos z + \sin z = \frac{1}{3}$, $-\pi < z < \pi$. **(5 marks)**

Turn over

8.

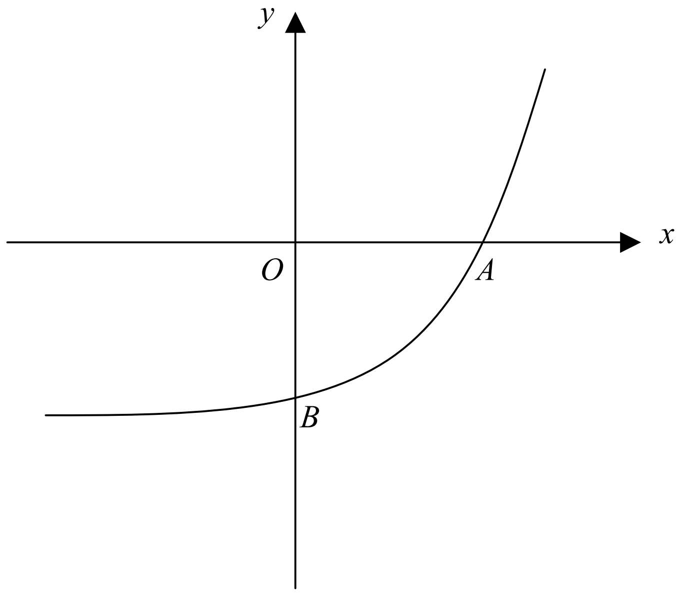

Fig. 1.

Figure 1 shows a sketch of the curve with equation $y = \mathrm{f}(x)$ where the function f is given by

$$\mathrm{f}: x \mapsto \mathrm{e}^{x-2} - 1, \quad x \in \mathbb{R}.$$

The curve meets the x-axis at the point A and the y-axis at the point B.

(a) Write down the coordinates of A and B. **(2 marks)**

(b) Find, in the form $\mathrm{f}^{-1}(x): x \mapsto$ . . ., the inverse function of f and state its domain. **(5 marks)**

(c) Prove that the equation $\mathrm{f}(x) = x$ has a root α in the interval [3, 4]. **(2 marks)**

(d) Use the iterative formula

$$x_{n+1} = \mathrm{f}^{-1}(x_n), \text{ with } x_1 = 3.5,$$

to find α to 3 decimal places. Prove that your answer is correct to 3 decimal places. **(5 marks)**

END