Centre No.						Paper Reference	Surname	Initial(s)
Candidate No.						6 6 7 1 / 0 1	Signature	

Paper Reference(s)

6671

Edexcel GCE

Pure Mathematics P1

Advanced/Advanced Subsidiary

Wednesday 9 June 2004 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination	Items included with question papers
Mathematical Formulae (Lilac)	Nil

Candidates may only use one of the basic scientific calculators approved by the Qualifications and Curriculum Authority.

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
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Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
You must write your answer for each question in the space following the question.
If you need more space to complete your answer to any question, use additional answer sheets.
When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
This paper has eight questions.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the examiner. Answers without working may gain no credit.

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Turn over

Edexcel
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1. The points A and B have coordinates (1, 2) and (5, 8) respectively.

(a) Find the coordinates of the mid-point of AB.

(2)

(b) Find, in the form $y = mx + c$, an equation for the straight line through A and B.

(4)

2. Giving your answers in the form $a + b\sqrt{2}$, where a and b are rational numbers, find

(a) $(3 - \sqrt{8})^2$,

(3)

(b) $\dfrac{1}{4 - \sqrt{8}}$.

(3)

3. The width of a rectangular sports pitch is x metres, $x > 0$. The length of the pitch is 20 m more than its width. Given that the perimeter of the pitch must be less than 300 m,

(a) form a linear inequality in x.

(2)

Given that the area of the pitch must be greater than 4800 m^2,

(b) form a quadratic inequality in x.

(2)

(c) By solving your inequalities, find the set of possible values of x.

(4)

4. The curve C has equation $y = x^2 - 4$ and the straight line l has equation $y + 3x = 0$.

(a) In the space below, sketch C and l on the same axes.

(3)

(b) Write down the coordinates of the points at which C meets the coordinate axes.

(2)

(c) Using algebra, find the coordinates of the points at which l intersects C.

(4)

5. (a) Given that $3 \sin x = 8 \cos x$, find the value of $\tan x$.

(1)

(b) Find, to 1 decimal place, all the solutions of

$$3 \sin x - 8 \cos x = 0$$

in the interval $0 \leqslant x < 360°$.

(3)

(c) Find, to 1 decimal place, all the solutions of

$$3 \sin^2 y - 8 \cos y = 0$$

in the interval $0 \leqslant y < 360°$.

(6)

6.

$$f(x) = \frac{(x^2 - 3)^2}{x^3}, \; x \neq 0.$$

(a) Show that $f(x) \equiv x - 6x^{-1} + 9x^{-3}$.

(2)

(b) Hence, or otherwise, differentiate $f(x)$ with respect to x.

(3)

(c) Verify that the graph of $y = f(x)$ has stationary points at $x = \pm\sqrt{3}$.

(2)

(d) Determine whether the stationary value at $x = \sqrt{3}$ is a maximum or a minimum.

(3)

7. A geometric series is $a + ar + ar^2 + \ldots$

(a) Prove that the sum of the first n terms of this series is

$$S_n = \frac{a(1-r^n)}{1-r}.$$

(4)

The first and second terms of a geometric series G are 10 and 9 respectively.

(b) Find, to 3 significant figures, the sum of the first twenty terms of G.

(3)

(c) Find the sum to infinity of G.

(2)

Another geometric series has its first term equal to its common ratio. The sum to infinity of this series is 10.

(d) Find the exact value of the common ratio of this series.

(3)

8.

Figure 1

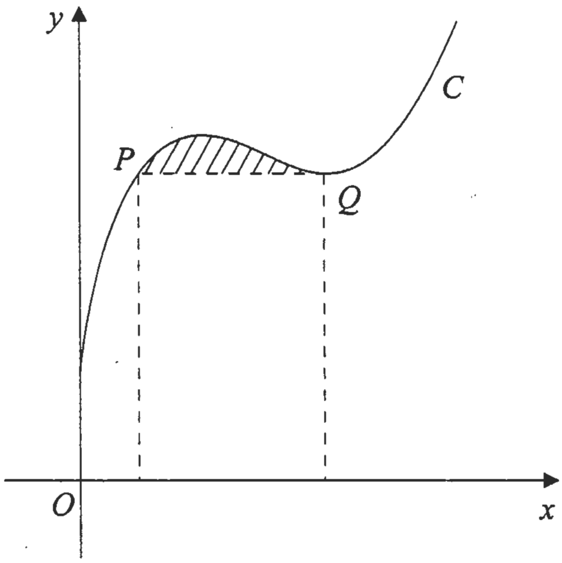

Figure 1 shows a sketch of part of the curve C with equation

$$y = x^3 - 7x^2 + 15x + 3, \quad x \geqslant 0.$$

The point P, on C, has x-coordinate 1 and the point Q is the minimum turning point of C.

(a) Find $\frac{dy}{dx}$.

(2)

(b) Find the coordinates of Q.

(4)

(c) Show that PQ is parallel to the x-axis.

(2)

(d) Calculate the area, shown shaded in Fig. 1, bounded by C and the line PQ.

(6)