Paper Reference(s)
6671

# Edexcel GCE

## Pure Mathematics P1

## Advanced/Advanced Subsidiary

## Tuesday 3 June 2003 – Afternoon
## Time: 1 hour 30 minutes

**Materials required for examination**
Answer Book (AB16)
Mathematical Formulae (Lilac)
Graph paper (ASG2)

**Items included with question papers**
Nil

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

### Instructions to Candidates

In the boxes on the answer book, write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Pure Mathematics P1), the paper reference (6671), your surname, initials 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 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.

**1.** $$\frac{dy}{dx} = 5 + \frac{1}{x^2}.$$

(a) Use integration to find $y$ in terms of $x$.

**(3)**

(b) Given that $y = 7$ when $x = 1$, find the value of $y$ at $x = 2$.

**(4)**

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**2.** Find the set of values for $x$ for which

(a) $6x - 7 < 2x + 3$,

**(2)**

(b) $2x^2 - 11x + 5 < 0$,

**(4)**

(c) both $6x - 7 < 2x + 3$ and $2x^2 - 11x + 5 < 0$.

**(1)**

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**3.** In the first month after opening, a mobile phone shop sold 280 phones. A model for future trading assumes that sales will increase by $x$ phones per month for the next 35 months, so that $(280 + x)$ phones will be sold in the second month, $(280 + 2x)$ in the third month, and so on.

Using this model with $x = 5$, calculate

(a) (i) the number of phones sold in the 36th month,

**(2)**

(ii) the total number of phones sold over the 36 months.

**(2)**

The shop sets a sales target of 17 000 phones to be sold over the 36 months.

Using the same model,

(b) find the least value of $x$ required to achieve this target.

**(4)**

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**4.** **Figure 1**

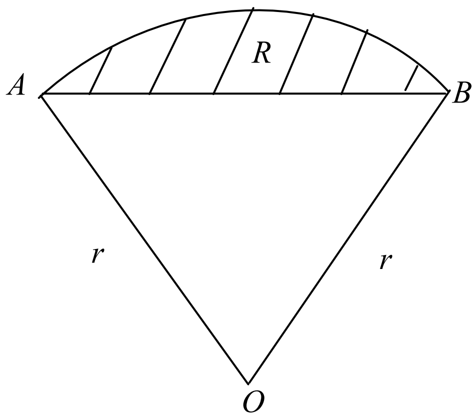


Figure 1 shows the sector $OAB$ of a circle of radius $r$ cm. The area of the sector is 15 cm$^2$ and $\angle AOB = 1.5$ radians.

(a) Prove that $r = 2\sqrt{5}$.

**(3)**

(b) Find, in cm, the perimeter of the sector $OAB$.

**(2)**

The segment $R$, shaded in Fig 1, is enclosed by the arc $AB$ and the straight line $AB$.

(c) Calculate, to 3 decimal places, the area of $R$.

**(3)**

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**5.** Find, in degrees, the value of $\theta$ in the interval $0 \leq \theta < 360°$ for which

$$2\cos^2\theta - \cos\theta - 1 = \sin^2\theta.$$

Give your answers to 1 decimal place where appropriate.

**(8)**

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**6.** The points $A$ and $B$ have coordinates (4, 6) and (12, 2) respectively.

The straight line $l_1$ passes through $A$ and $B$.

(a) Find an equation for $l_1$ in the form $ax + by = c$, where $a$, $b$ and $c$ are integers.

**(4)**

The straight line $l_2$ passes through the origin and has gradient –4.

(b) Write down an equation for $l_2$.

**(1)**

The lines $l_1$ and $l_2$ intercept at the point $C$.

(c) Find the exact coordinates of the mid-point of $AC$.

**(5)**

**7.** **Figure 2**

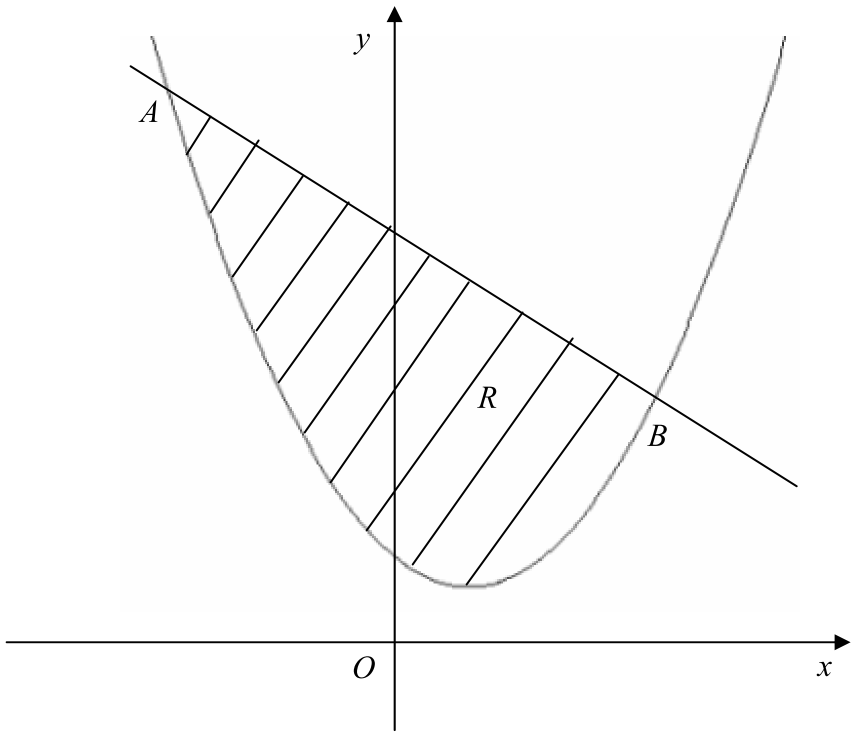


Figure 2 shows the line with equation $y = 9 - x$ and the curve with equation $y = x^2 - 2x + 3$. The line and the curve intersect at the points $A$ and $B$, and $O$ is the origin.

(a) Calculate the coordinates of $A$ and the coordinates of $B$.

**(5)**

The shaded region $R$ is bounded by the line and the curve.

(b) Calculate the area of $R$.

**(7)**

**8.** For the curve $C$ with equation $y = x^4 - 8x^2 + 3$,

(a) find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$,

**(2)**

(b) find the coordinates of each of the stationary points,

**(5)**

(c) determine the nature of each stationary point.

**(3)**

The point $A$, on the curve $C$, has $x$-coordinate 1.

(d) Find an equation for the normal to $C$ at $A$, giving your answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.

**(5)**

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**END**