FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper D

Time: 1 hour 30 minutes

Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and / or integration.

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has nine questions.

Advice to Candidates

You must show sufficient working to make your methods clear to an examiner. Answers without working may gain no credit.



Written by Shaun Armstrong

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1. Expand $(3 - 2x)^4$ in ascending powers of x and simplify each coefficient. **(4)**

2.

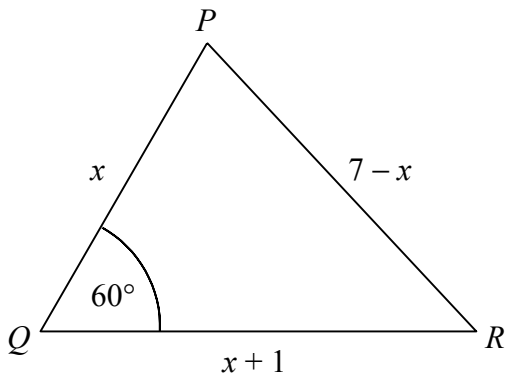


Figure 1

Figure 1 shows triangle PQR in which $PQ = x$, $PR = 7 - x$, $QR = x + 1$ and $\angle PQR = 60°$.

Using the cosine rule, find the value of x. **(4)**

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3. Find the coordinates of the stationary point of the curve with equation

$$y = x + \frac{4}{x^2}.$$ **(6)**

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4. Find all values of x in the interval $0 \leq x < 360°$ for which

$$2\sin^2 x - 2\cos x - \cos^2 x = 1.$$ **(8)**

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5. *(a)* Sketch the curve $y = 5^{x-1}$, showing the coordinates of any points of intersection with the coordinate axes. **(2)**

(b) Find, to 3 significant figures, the x-coordinates of the points where the curve $y = 5^{x-1}$ intersects

(i) the straight line $y = 10$,

(ii) the curve $y = 2^x$. **(6)**

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6. $f(x) = 2x^3 + 3x^2 - 6x + 1.$

(a) Find the remainder when $f(x)$ is divided by $(2x - 1)$. **(2)**

(b) *(i)* Find the remainder when $f(x)$ is divided by $(x + 2)$.

(ii) Hence, or otherwise, solve the equation

$$2x^3 + 3x^2 - 6x - 8 = 0,$$

giving your answers to 2 decimal places where appropriate. **(7)**

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7. *(a)* Prove that the sum of the first n terms of a geometric series with first term a and common ratio r is given by

$$\frac{a(1-r^n)}{1-r}.$$ **(4)**

(b) Evaluate $\sum_{r=1}^{12} (5 \times 2^r)$. **(5)**

8.

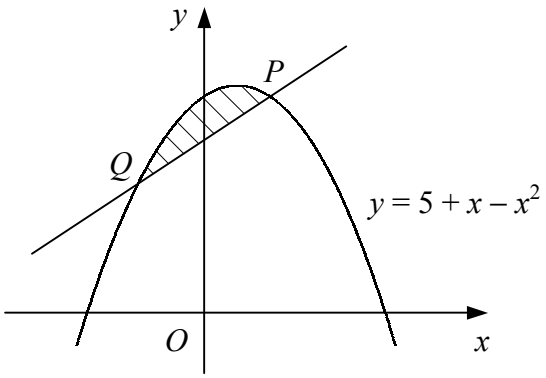


Figure 2

Figure 2 shows the curve with equation $y = 5 + x - x^2$ and the normal to the curve at the point P (1, 5).

(a) Find an equation for the normal to the curve at P in the form $y = mx + c$. **(5)**

(b) Find the coordinates of the point Q, where the normal to the curve at P intersects the curve again. **(2)**

(c) Show that the area of the shaded region bounded by the curve and the straight line PQ is $\frac{4}{3}$. **(6)**

Turn over

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9.

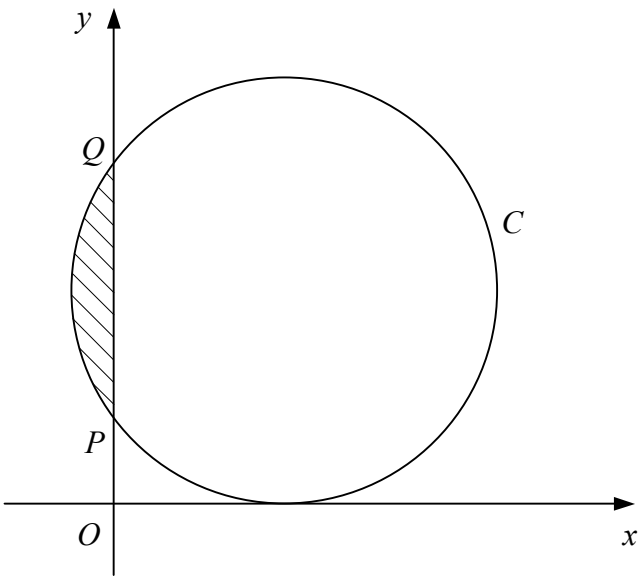


Figure 3

Figure 3 shows the circle C with equation

$$x^2 + y^2 - 8x - 10y + 16 = 0.$$

(a) Find the coordinates of the centre and the radius of C. **(3)**

C crosses the y-axis at the points P and Q.

(b) Find the coordinates of P and Q. **(3)**

The chord PQ subtends an angle of θ at the centre of C.

(c) Using the cosine rule, show that $\cos\theta = \frac{7}{25}$. **(4)**

(d) Find the area of the shaded minor segment bounded by C and the chord PQ. **(4)**

END

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