FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper A

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.



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1. $f(x) = 3x^3 - 2x^2 + kx + 9.$

Given that when $f(x)$ is divided by $(x + 2)$ there is a remainder of -35,

(a) find the value of the constant k, **(2)**

(b) find the remainder when $f(x)$ is divided by $(3x - 2)$. **(3)**

2.

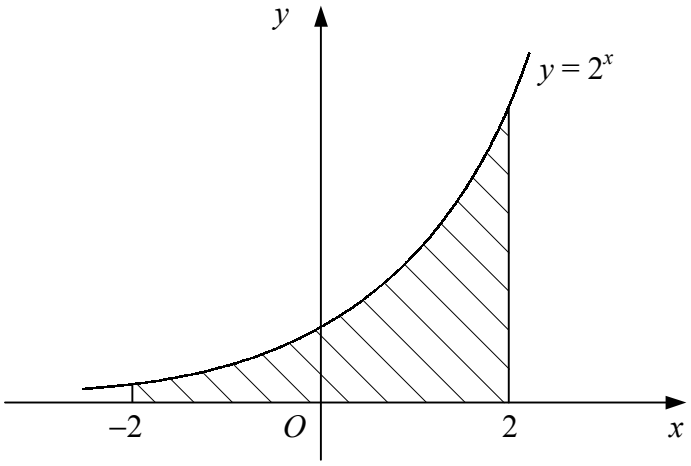


Figure 1

Figure 1 shows the curve with equation $y = 2^x$.

Use the trapezium rule with four intervals of equal width to estimate the area of the shaded region bounded by the curve, the x-axis and the lines $x = -2$ and $x = 2$. **(5)**

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3. Giving your answers in terms of π, solve the equation

$$3\tan^2\theta - 1 = 0,$$

for θ in the interval $-\pi \leq \theta \leq \pi$. **(6)**

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4. *(a)* Expand $(1 + 3x)^8$ in ascending powers of x up to and including the term in x^3. You should simplify each coefficient in your expansion. **(4)**

(b) Use your series, together with a suitable value of x which you should state, to estimate the value of $(1.003)^8$, giving your answer to 8 significant figures. **(3)**

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5. *(a)* Given that $t = \log_3 x$, find expressions in terms of t for

(i) $\log_3 x^2$,

(ii) $\log_9 x$. **(4)**

(b) Hence, or otherwise, find to 3 significant figures the value of x such that

$$\log_3 x^2 - \log_9 x = 4.$$ **(3)**

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6. The circle C has centre $(-3, 2)$ and passes through the point $(2, 1)$.

(a) Find an equation for C. **(4)**

(b) Show that the point with coordinates $(-4, 7)$ lies on C. **(1)**

(c) Find an equation for the tangent to C at the point $(-4, 7)$. Give your answer in the form $ax + by + c = 0$, where a, b and c are integers. **(5)**

7.

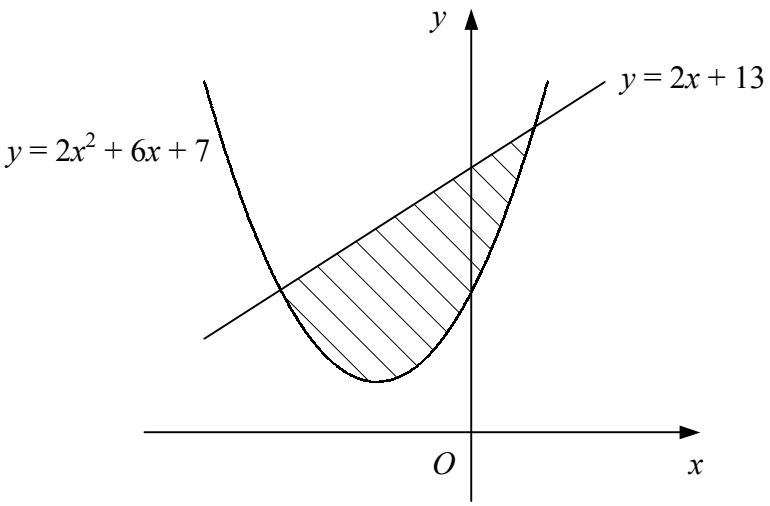


Figure 2

Figure 2 shows the curve $y = 2x^2 + 6x + 7$ and the straight line $y = 2x + 13$.

(a) Find the coordinates of the points where the curve and line intersect. **(4)**

(b) Find the area of the shaded region bounded by the curve and line. **(7)**

Turn over

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8. A geometric series has first term a and common ratio r where $r > 1$.
The sum of the first n terms of the series is denoted by S_n.

Given that $S_4 = 10 \times S_2$,

(a) find the value of r. **(6)**

Given also that $S_3 = 26$,

(b) find the value of a, **(3)**

(c) show that $S_6 = 728$. **(2)**

9.

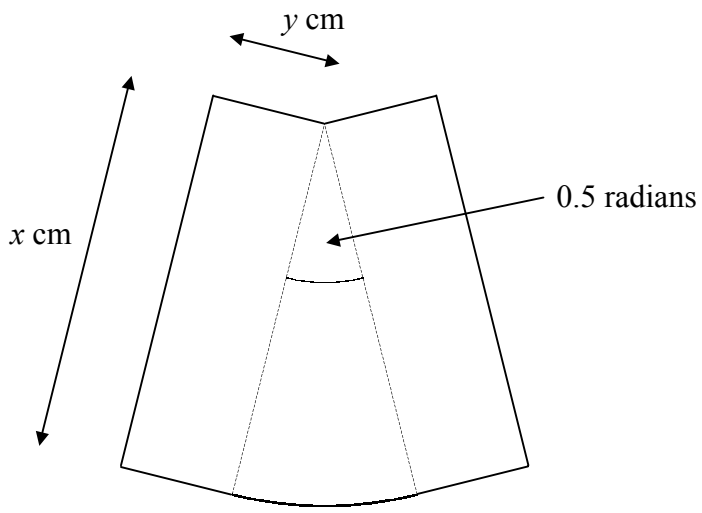


Figure 3

Figure 3 shows a design consisting of two rectangles measuring x cm by y cm joined to a circular sector of radius x cm and angle 0.5 radians.

Given that the area of the design is 50 cm^2,

(a) show that the perimeter, P cm, of the design is given by

$$P = 2x + \frac{100}{x}.$$ **(5)**

(b) Find the value of x for which P is a minimum. **(4)**

(c) Show that P is a minimum for this value of x. **(2)**

(d) Find the minimum value of P in the form $k\sqrt{2}$. **(2)**

END

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