FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper I

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.

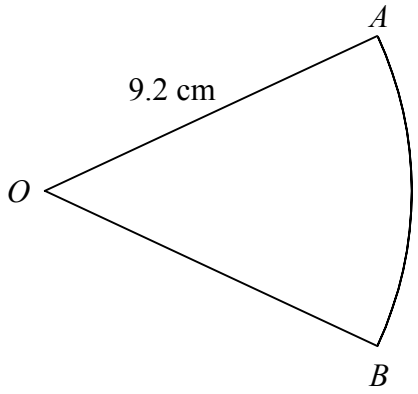


Figure 1

Figure 1 shows the sector OAB of a circle of radius 9.2 cm and centre O.

Given that the area of the sector is 37.4 cm^2, find to 3 significant figures

(a) the size of $\angle AOB$ in radians, **(2)**

(b) the perimeter of the sector. **(2)**

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2. The first three terms of a geometric series are $(p - 1)$, 2 and $(2p + 5)$ respectively, where p is a constant.

Find the two possible values of p. **(5)**

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3. Find the area of the finite region enclosed by the curve $y = 5x - x^2$ and the x-axis. **(6)**

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4. Solve the equation

$$\sin^2 \theta = 4 \cos \theta,$$

for values of θ in the interval $0 \leq \theta \leq 360°$. **(7)**

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5. Given that

$$f(x) = x^3 + 7x^2 + px - 6,$$

and that $x = -3$ is a solution to the equation $f(x) = 0$,

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

(b) show that when $f(x)$ is divided by $(x - 2)$ there is a remainder of 50, **(2)**

(c) find the other solutions to the equation $f(x) = 0$, giving your answers to 2 decimal places. **(5)**

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6. The circle C has the equation

$$x^2 + y^2 - 12x + 8y + 16 = 0.$$

(a) Find the coordinates of the centre of C. **(2)**

(b) Find the radius of C. **(2)**

(c) Sketch C. **(2)**

Given that C crosses the x-axis at the points A and B,

(d) find the length AB, giving your answer in the form $k\sqrt{5}$. **(4)**

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7. Given that for small values of x

$$(1 + ax)^n \approx 1 - 24x + 270x^2,$$

where n is an integer and $n > 1$,

(a) show that $n = 16$ and find the value of a, **(7)**

(b) use your value of a and a suitable value of x to estimate the value of $(0.9985)^{16}$, giving your answer to 5 decimal places. **(3)**

Turn over

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8. *(a)* Given that

$$\log_2 (y - 1) = 1 + \log_2 x,$$

show that

$$y = 2x + 1.$$ **(3)**

(b) Solve the simultaneous equations

$$\log_2 (y - 1) = 1 + \log_2 x$$

$$2 \log_3 y = 2 + \log_3 x$$ **(7)**

9.

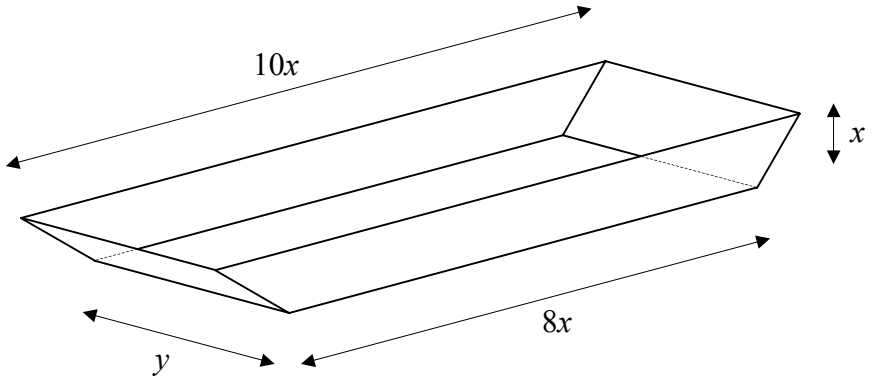


Figure 2

Figure 2 shows a tray made from sheet metal.

The horizontal base is a rectangle measuring $8x$ cm by y cm and the two vertical sides are trapezia of height x cm with parallel edges of length $8x$ cm and $10x$ cm. The remaining two sides are rectangles inclined at 45° to the horizontal.

Given that the capacity of the tray is 900 cm^3,

(a) find an expression for y in terms of x, **(3)**

(b) show that the area of metal used to make the tray, A cm^2, is given by

$$A = 18x^2 + \frac{200(4+\sqrt{2})}{x},$$ **(4)**

(c) find to 3 significant figures, the value of x for which A is stationary, **(4)**

(d) find the minimum value of A and show that it is a minimum. **(3)**

END

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