FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper F

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.

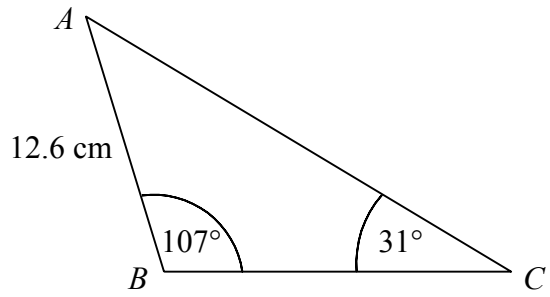


Figure 1

Figure 1 shows triangle ABC in which $AB = 12.6$ cm, $\angle ABC = 107°$ and $\angle ACB = 31°$.

Find, to 3 significant figures,

(a) the length BC, **(3)**

(b) the area of triangle ABC. **(2)**

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2. Show that

$$\int_2^3 \left(6\sqrt{x} - \frac{4}{\sqrt{x}}\right) \mathrm{d}x = k\sqrt{3},$$

where k is an integer to be found. **(6)**

3.

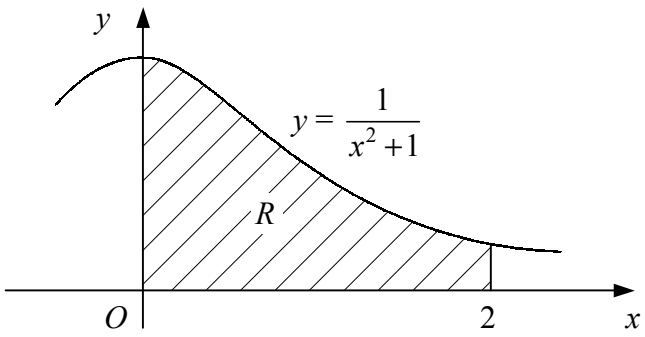


Figure 2

Figure 2 shows the curve with equation $y = \dfrac{1}{x^2 + 1}$.

The shaded region R is bounded by the curve, the coordinate axes and the line $x = 2$.

(a) Use the trapezium rule with four strips of equal width to estimate the area of R. **(5)**

The cross-section of a support for a bookshelf is modelled by R with 1 unit on each axis representing 8 cm. Given that the support is 2 cm thick,

(b) find an estimate for the volume of the support. **(2)**

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4. *(a)* Expand $(2 + y)^6$ in ascending powers of y as far as the term in y^3, simplifying each coefficient. **(4)**

(b) Hence expand $(2 + x - x^2)^6$ in ascending powers of x as far as the term in x^3, simplifying each coefficient. **(3)**

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5. *(a)* Given that

$$8 \tan x - 3 \cos x = 0,$$

show that

$$3 \sin^2 x + 8 \sin x - 3 = 0. \quad \textbf{(3)}$$

(b) Find, to 2 decimal places, the values of x in the interval $0 \leq x \leq 2\pi$ such that

$$8 \tan x - 3 \cos x = 0. \quad \textbf{(5)}$$

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6. *(a)* Given that $y = 3^x$, find expressions in terms of y for

(i) 3^{x+1},

(ii) 3^{2x-1}. **(4)**

(b) Hence, or otherwise, solve the equation

$$3^{x+1} - 3^{2x-1} = 6,$$

giving non-exact answers to 2 decimal places. **(5)**

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7. The circle C has centre (5, 2) and passes through the point (7, 3).

(a) Find the length of the diameter of C. **(2)**

(b) Find an equation for C. **(2)**

(c) Show that the line $y = 2x - 3$ is a tangent to C and find the coordinates of the point of contact. **(5)**

Turn over

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8.

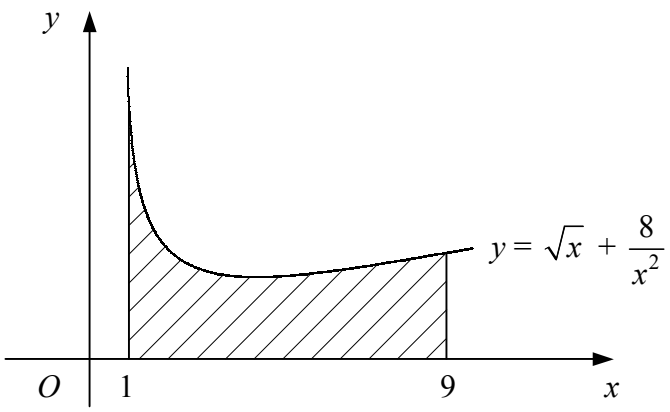


Figure 3

Figure 3 shows the curve with equation $y = \sqrt{x} + \frac{8}{x^2}$, $x > 0$.

(a) Find the coordinates of the minimum point of the curve. **(7)**

(b) Show that the area of the shaded region bounded by the curve, the x-axis and the lines $x = 1$ and $x = 9$ is $24\frac{4}{9}$. **(5)**

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9. The first three terms of a geometric series are $(x - 2)$, $(x + 6)$ and x^2 respectively.

(a) Show that x must be a solution of the equation

$$x^3 - 3x^2 - 12x - 36 = 0. \qquad \text{(I)}$$

(3)

(b) Verify that $x = 6$ is a solution of equation (I) and show that there are no other real solutions. **(6)**

Using $x = 6$,

(c) find the common ratio of the series, **(1)**

(d) find the sum of the first eight terms of the series. **(2)**

END

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