

Core Mathematics C2 Advanced Subsidiary

For Edexcel

Paper G

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.

The booklet ‘Mathematical Formulae and Statistical Tables’, available from Edexcel, may be used.

Advice to Candidates

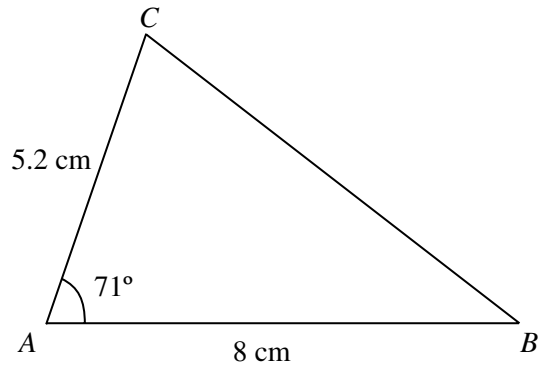
You must show sufficient working to make your methods clear to an examiner.
Answers without working may gain no credit.

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1.



The diagram shows triangle ABC in which $AB = 8$ cm, $AC = 5.2$ cm and $\angle BAC = 71^\circ$.

Find, to 2 decimal places

(a) the length BC , (3)

(b) the angle $\hat{A}BC$ (2)

(c) the area of triangle ABC (2)

2. (a) Write the expression $(\log_3 100 - 2 \log_3 5)$ in the form $\log_3 k$. (2)

(b) Solve the equation

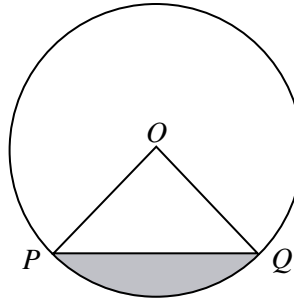
$$\log_3(2x + 1) - \log_3(x - 1) = 2. \quad (5)$$

3. Show that

$$\int_1^5 \left(3\sqrt{x} - \frac{1}{\sqrt{x}} \right) dx = 8\sqrt{5} \quad (6)$$

4.

Figure 1



In Figure 1 O is the centre of a circle of radius 8 cm and angle $POQ = 1.6$ radians.

Find the following, correct to 1 decimal place.

- (a) the area of sector POQ (2)
- (b) the area of triangle POQ (2)
- (c) the shaded area. (1)
-

5. In the binomial expansion of $(1 + kx)^6$, where k is a positive constant, the coefficient of x^2 is 135.

- (a) Find the value of k . (3)
- (b) Find the coefficient of x^3 in the expansion. (2)
- (c) Show that the first three terms in the expansion of

$$(5 - x)(1 + kx)^6$$

are $5 + 89x + 657x^2$.

(3)

6. The angle θ radians satisfies the equation

$$2 \cos \theta = 3 \tan \theta.$$

- (a) Show that $2 \cos^2 \theta = 3 \sin \theta$. (1)
- (b) By using an appropriate identity, find the values of θ for which $2 \cos^2 \theta = 3 \sin \theta$ and $0 \leq \theta \leq 2\pi$, giving your answers in terms of π . (7)
-

7. The polynomial $f(x)$ is given by

$$f(x) = x^3 + ax^2 + bx - 12,$$

where a and b are constants.

When $f(x)$ is divided by $(x - 1)$ the remainder is -18 .

When $f(x)$ is divided by $(x + 3)$ the remainder is -6

(a) Find the value of a and the value of b . (5)

(b) Show that $(x - 3)$ is a factor of $f(x)$. (2)

(c) Determine the number of different solutions there are to the equation $f(x) = 0$ (4)

8.

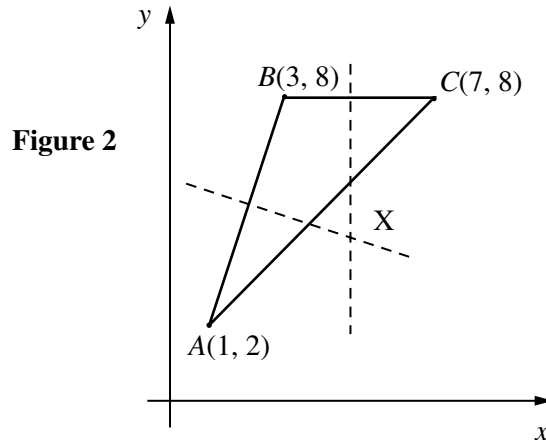


Figure 2 shows a triangle ABC . The perpendicular bisectors of AB and BC meet at X .

(a) Write down the equation of the perpendicular bisector of BC . (1)

(b) Find the equation of the perpendicular bisector of AB . (2)

(c) Hence show that the coordinates of X are $(5, 4)$. (3)

(d) Explain why the point X is the centre of the circle which passes through A , B and C . (1)

(e) Find the equation of the circle which passes through A , B and C . (3)

(f) Find the coordinates of the two points where this circle crosses the x -axis. (2)

9. The curve C has the equation

$$y = 6 - \frac{1}{x^2} - 2x\sqrt{x}, \quad x > 0.$$

- (a) Write $x\sqrt{x}$ in the form x^n , where n is a fraction. (1)
- (b) Find $\frac{dy}{dx}$. (3)
- (c) Find an equation of the normal to the curve C at the point on the curve where $x = 1$. (4)
- (d) Find $\frac{d^2y}{dx^2}$ (2)
- (e) Deduce that the curve C has no minimum points. (2)
-

END

TOTAL 75 MARKS