

Core Mathematics C2 Advanced Subsidiary

For Edexcel

Paper K

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.

Published by Elmwood Press
80 Attimore Road
Welwyn Garden City
Herts. AL8 6LP
Tel. 01707 333232

These sheets may be copied for use solely by the purchaser's institute.

© Elmwood Press

1. Two points $A(3, 5)$ and $B(-3, 13)$ lie on a circle such that AB is the diameter of the circle.
- (a) Find the coordinates of the mid-point of AB . (2)
- (b) Find an equation of the circle. (4)
-

2. (a) Write down the first four terms, in ascending powers of x , in the expansion of $(1 + 3x)^5$. (3)
- (b) If x is small so that terms in x^3 or higher powers of x are ignored, show that $(1 + x)(1 + 3x)^5 = 1 + 16x + 105x^2$. (3)
-

3. Given that $y = \frac{x - 3}{x^2}$, $x \neq 0$,
- (a) Show that $\frac{dy}{dx} = \frac{6}{x^3} - \frac{1}{x^2}$, (2)
- (b) Show that y has a stationary value when $x = 6$, (2)
- (c) Find the value of $\frac{d^2y}{dx^2}$ when $x = 6$, and deduce the nature of this stationary value. (2)
-

4. (a) Find all the solutions of the equation $x^2 - 3x - 10 = 0$. (2)
- (b) Prove that the value of x that satisfies $\log_2 x + \log_2(x - 3) = \log_2 10$ [A] is a solution of the equation $x^2 - 3x - 10 = 0$. (3)
- (c) State, with a reason, the value of x that satisfies equation [A]. (2)
-

5. Find the values of θ , to 1 decimal place, in the interval $-180 \leq \theta < 180^\circ$ for which

$$4 \sin^2 \theta - 4 \sin \theta + \cos^2 \theta = 0 \tag{8}$$

6. A geometric series has first term a , common ratio r and the sum of the first n terms of the series is denoted by S_n .

You are given that $S_4 = 5S_2$ and $r > 0$.

(a) Find the value of r (7)

Given further that $S_4 = 75$,

(b) Find the value of a , (3)

7.

Figure 1

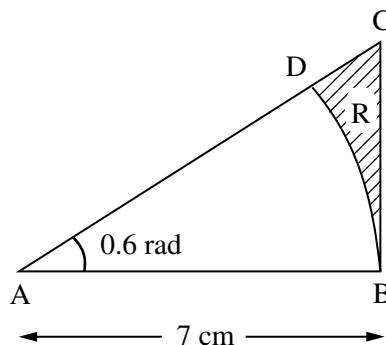


Figure 1 shows the triangle ABC , with $AB = 7$ cm, $\angle BAC = 0.6$ radians and $\angle ABC = \frac{\pi}{2}$ radians. The arc BD is an arc of a circle with centre A and radius 7 cm. The region R , shown shaded in figure 1, is bounded by the straight lines BC and CD and the arc BD .

Find

(a) the length of the arc BD , (2)

(b) the length of BC , giving your answer to 3 significant figures, (3)

(c) the area of R , giving your answer to 3 significant figures. (5)

8.

$$f(x) = 2x^3 + 5x^2 - x - 6$$

(a) Write $f(x)$ as the product of 3 linear factors. (5)

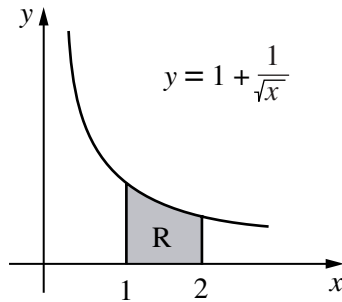
(b) Solve the equation $f(x) = 0$. (1)

(c) Find the values of θ in the interval $0 \leq \theta \leq 2\pi$ for which

$$2 \cos^3 \theta + 5 \cos^2 \theta - \cos \theta - 6 = 0$$

giving your answers in terms of π where appropriate. (4)

9.



The shaded region R is bounded by the curve $y = 1 + \frac{1}{\sqrt{x}}$, the x -axis and the lines $x = 1$ and $x = 2$.

(a) Use the trapezium rule with four intervals to estimate, to 2 decimal places, the area of R . (7)

(b) Work out $\int_1^2 \left(1 + \frac{1}{\sqrt{x}}\right) dx$ to show that the exact area of R is $2\sqrt{2} - 1$. (5)

END

TOTAL 75 MARKS