FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

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.

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

1. Evaluate

$$\int_{-2}^{0} (3x - 1)^2 \, dx. \qquad \textbf{(5)}$$

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2. $f(x) = x^3 + kx - 20.$

Given that $f(x)$ is exactly divisible by $(x + 1)$,

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

(b) solve the equation $f(x) = 0$. **(4)**

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3. *(a)* Given that

$$5 \cos \theta - 2 \sin \theta = 0,$$

show that $\tan \theta = 2.5$ **(2)**

(b) Solve, for $0 \leq x \leq 180$, the equation

$$5 \cos 2x^\circ - 2 \sin 2x^\circ = 0,$$

giving your answers to 1 decimal place. **(4)**

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4. Solve each equation, giving your answers to an appropriate degree of accuracy.

(a) $3^{x-2} = 5$ **(3)**

(b) $\log_2 (6 - y) = 3 - \log_2 y$ **(4)**

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5. A geometric series has third term 36 and fourth term 27.

Find

(a) the common ratio of the series, **(2)**

(b) the fifth term of the series, **(2)**

(c) the sum to infinity of the series. **(4)**

6.

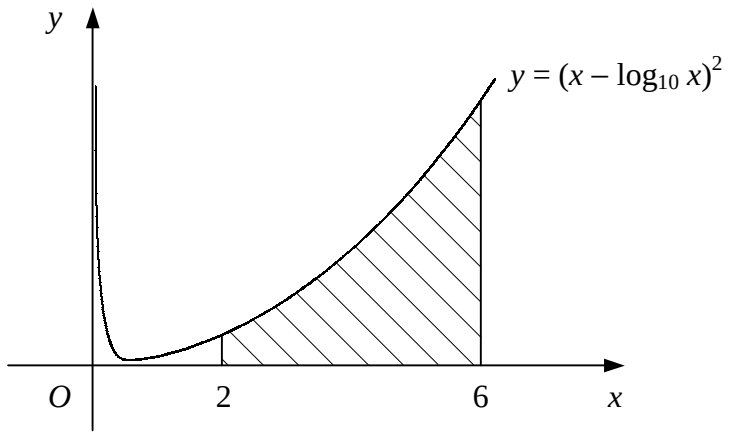

Figure 1

Figure 1 shows the curve with equation $y = (x - \log_{10} x)^2$, $x > 0$.

(a) Copy and complete the table below for points on the curve, giving the y values to 2 decimal places.

x	2	3	4	5	6
y	2.89	6.36			

(2)

The shaded area is bounded by the curve, the x-axis and the lines $x = 2$ and $x = 6$.

(b) Use the trapezium rule with all the values in your table to estimate the area of the shaded region. **(4)**

(c) State, with a reason, whether your answer to part *(b)* is an under-estimate or an over-estimate of the true area. **(2)**

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

(a) Find the coordinates of the stationary points of the curve $y = f(x)$. **(5)**

(b) Determine whether each stationary point is a maximum or minimum point. **(3)**

(c) Sketch the curve $y = f(x)$. **(2)**

(d) State the set of values of k for which the equation $f(x) = k$ has three solutions. **(1)**

Turn over

8.

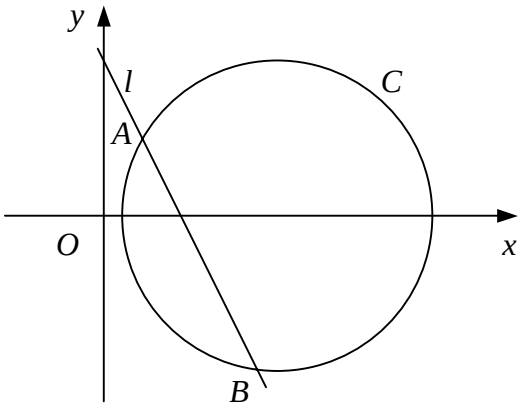

Figure 2

Figure 2 shows the circle C and the straight line l. The centre of C lies on the x-axis and l intersects C at the points A (2, 4) and B (8, −8).

(a) Find the gradient of l. **(2)**

(b) Find the coordinates of the mid-point of AB. **(2)**

(c) Find the coordinates of the centre of C. **(5)**

(d) Show that C has the equation $x^2 + y^2 - 18x + 16 = 0$. **(3)**

9.

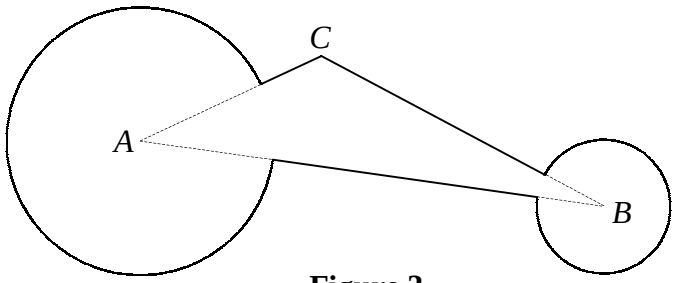

Figure 3

Figure 3 shows a design painted on the wall at a karting track. The sign consists of triangle ABC and two circular sectors of radius 2 metres and 1 metre with centres A and B respectively.

Given that $AB = 7$ m, $AC = 3$ m and $\angle ACB = 2.2$ radians,

(a) use the sine rule to find the size of $\angle ABC$ in radians to 3 significant figures, **(3)**

(b) show that $\angle BAC = 0.588$ radians to 3 significant figures, **(2)**

(c) find the area of triangle ABC, **(2)**

(d) find the area of the wall covered by the design. **(5)**

END