| Centre No. | | | | | Pape | r Refer | ence | | | Surname | Initial(s) |
|------------------|--|--|---|---|------|---------|------|---|---|-----------|------------|
| Candidate No. | | | 6 | 6 | 6 | 4 | / | 0 | 1 | Signature | |

6664/01

Edexcel GCE

Core Mathematics C2 Advanced Subsidiary

Monday 21 May 2007 – Morning

Time: 1 hour 30 minutes

Materials required for examination Mathematical Formulae (Green)

Items included with question papers

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulas stored in them.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper. When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 10 questions in this question paper. The total mark for this paper is 75.

There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled. You should show sufficient working to make your methods clear to the Examiner. Answers without working may not gain full credit.

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Examiner's use only

Team Leader's use only

Question

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| Evaluate $\int_{1}^{8} \frac{1}{\sqrt{x}} dx$, giving your answer in the form a | |
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Q1

(Total 4 marks)

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 $f(x) = 3x^3 - 5x^2 - 16x + 12.$

(a) Find the remainder when f(x) is divided by (x - 2).

(2)

Given that (x + 2) is a factor of f(x),

(b) factorise f(x) completely.

(4)

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Q2

(Total 6 marks)

| 3. | (a) Find the first four terms, in ascending powers of x , in the binomial expans $(1+kx)^6$, where k is a non-zero constant. | |
|----|---|-----|
| | | (3) |
| | Given that, in this expansion, the coefficients of x and x^2 are equal, find | |
| | (b) the value of k , | |
| | | (2) |
| | (c) the coefficient of x^3 . | (1) |
| | | (1) |
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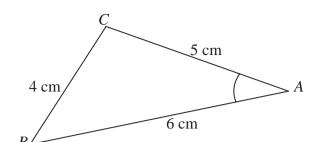


Figure 1

Figure 1 shows the triangle ABC, with AB = 6 cm, BC = 4 cm and CA = 5 cm.

(a) Show that $\cos A = \frac{3}{4}$.

(3)

(b) Hence, or otherwise, find the exact value of $\sin A$.

(2)

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5. The curve C has equation

$$y = x\sqrt{(x^3 + 1)}, \qquad 0 \leqslant x \leqslant 2.$$

(a) Complete the table below, giving the values of y to 3 decimal places at x = 1 and x = 1.5.

| Х | 0 | 0.5 | 1 | 1.5 | 2 |
|---|---|-------|---|-----|---|
| у | 0 | 0.530 | | | 6 |

(2)

(b) Use the trapezium rule, with all the y values from your table, to find an approximation for the value of $\int_0^2 x \sqrt{(x^3+1)} dx$, giving your answer to 3 significant figures. (4)

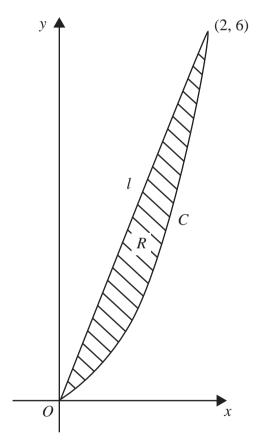


Figure 2

Figure 2 shows the curve C with equation $y = x\sqrt{(x^3 + 1)}$, $0 \le x \le 2$, and the straight line segment l, which joins the origin and the point (2, 6). The finite region R is bounded by C and l.

(c) Use your answer to part (b) to find an approximation for the area of R, giving your answer to 3 significant figures.

(3)



| 6. (a) Find, to 3 significant figures, the value of x for which $8^x = 0.8$. | (2 |
|--|----|
| (b) Solve the equation | |
| $2\log_3 x - \log_3 7x = 1.$ | |
| | (4 |
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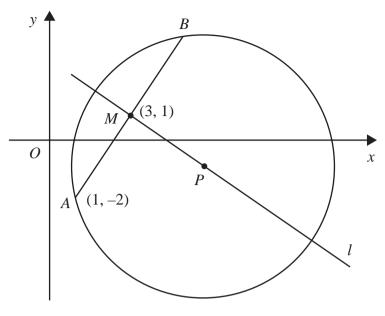


Figure 3

The points A and B lie on a circle with centre P, as shown in Figure 3. The point A has coordinates (1, -2) and the mid-point M of AB has coordinates (3, 1). The line I passes through the points M and P.

(a) Find an equation for l.

(4)

Given that the *x*-coordinate of *P* is 6,

(b) use your answer to part (a) to show that the y-coordinate of P is -1,

(1)

(c) find an equation for the circle.

(4)



8. A trading company made a profit of £50 000 in 2006 (Year 1).

A model for future trading predicts that profits will increase year by year in a geometric sequence with common ratio r, r > 1.

The model therefore predicts that in 2007 (Year 2) a profit of £50 000r will be made.

(a) Write down an expression for the predicted profit in Year n.

(1)

The model predicts that in Year n, the profit made will exceed £200 000.

(b) Show that $n > \frac{\log 4}{\log r} + 1$.

(3)

Using the model with r = 1.09,

(c) find the year in which the profit made will first exceed £200 000,

(2)

(d) find the total of the profits that will be made by the company over the 10 years from 2006 to 2015 inclusive, giving your answer to the nearest £10 000.

(3)



9. (a) Sketch, for $0 \le x \le 2\pi$, the graph of $y = \sin\left(x + \frac{\pi}{6}\right)$.

(2)

(b) Write down the exact coordinates of the points where the graph meets the coordinate axes.

(3)

(c) Solve, for $0 \le x \le 2\pi$, the equation

$$\sin\left(x + \frac{\pi}{6}\right) = 0.65 ,$$

giving your answers in radians to 2 decimal places.

(5)

| Question 9 continued | Le |
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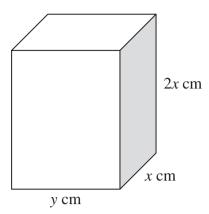


Figure 4

Figure 4 shows a solid brick in the shape of a cuboid measuring 2x cm by x cm by y cm.

The total surface area of the brick is 600 cm².

(a) Show that the volume, $V \text{ cm}^3$, of the brick is given by

$$V = 200x - \frac{4x^3}{3}.$$

(4)

Given that x can vary,

- (b) use calculus to find the maximum value of V, giving your answer to the nearest cm³. (5)
- (c) Justify that the value of V you have found is a maximum.

(2)

| Question 10 continued | blank |
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