



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

ADDITIONAL MATHEMATICS

0606/02

Paper 2

October/November 2008

2 hours

Additional Materials: Answer Booklet/Paper
Electronic calculator

Graph Paper (1 sheet)
Mathematical tables



READ THESE INSTRUCTIONS FIRST

- If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
- Write your Centre number, candidate number and name on all the work you hand in.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams or graphs.
- Do not use staples, paper clips, highlighters, glue or correction fluid.

- Answer **all** the questions.
- Write your answers on the separate Answer Booklet/Paper provided.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
- The use of an electronic calculator is expected, where appropriate.
- You are reminded of the need for clear presentation in your answers.

- At the end of the examination, fasten all your work securely together.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 80.

This document consists of **6** printed pages and **2** blank pages.



Mathematical Formulae**1. ALGEBRA***Quadratic Equation*

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} .$$

Binomial Theorem

$$(a + b)^n = a^n + \binom{n}{1} a^{n-1} b + \binom{n}{2} a^{n-2} b^2 + \dots + \binom{n}{r} a^{n-r} b^r + \dots + b^n,$$

where n is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$.

2. TRIGONOMETRY*Identities*

$$\sin^2 A + \cos^2 A = 1.$$

$$\sec^2 A = 1 + \tan^2 A.$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A.$$

Formulae for ΔABC

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} .$$

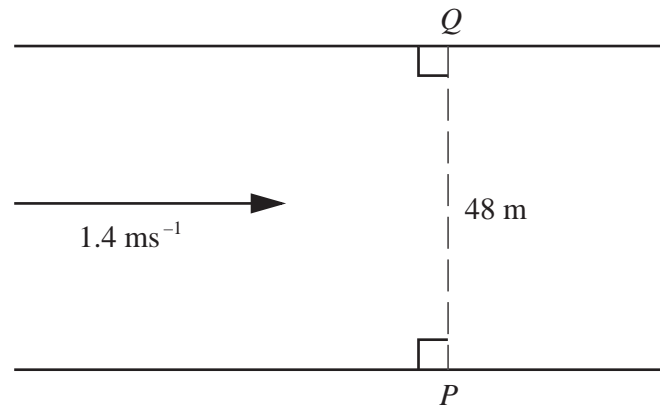
$$a^2 = b^2 + c^2 - 2bc \cos A.$$

$$\Delta = \frac{1}{2} bc \sin A.$$

- 1 Given that $\mathbf{A} = \begin{pmatrix} 13 & 6 \\ 7 & 4 \end{pmatrix}$, find the inverse matrix \mathbf{A}^{-1} and hence solve the simultaneous equations
- $$\begin{aligned} 13x + 6y &= 41, \\ 7x + 4y &= 24. \end{aligned}$$
- [4]
- 2 Variables x and y are connected by the equation $y = (2x - 9)^3$. Given that x is increasing at the rate of 4 units per second, find the rate of increase of y when $x = 7$. [4]
- 3 Find the set of values of m for which the line $y = mx + 2$ does not meet the curve $y = x^2 - 5x + 18$. [5]
- 4 (i) Differentiate $x \ln x$ with respect to x . [2]
- (ii) Hence find $\int \ln x \, dx$. [3]
- 5 Solve the equation
- (i) $\frac{4^x}{2^{5-x}} = \frac{2^{4x}}{8^{x-3}}$, [3]
- (ii) $\lg(2y + 10) + \lg y = 2$. [3]
- 6 (a) A sports team of 3 attackers, 2 centres and 4 defenders is to be chosen from a squad of 5 attackers, 3 centres and 6 defenders. Calculate the number of different ways in which this can be done. [3]
- (b) How many different 4-digit numbers greater than 3000 can be formed using the six digits 1, 2, 3, 4, 5 and 6 if no digit can be used more than once? [3]

4

7



The diagram shows a river with parallel banks. The river is 48 m wide and is flowing with a speed of 1.4 ms^{-1} . A boat travels in a straight line from a point P on one bank to a point Q which is on the other bank directly opposite P . Given that the boat takes 10 seconds to cross the river, find

(i) the speed of the boat in still water, [4]

(ii) the angle to the bank at which the boat should be steered. [2]

8 The function f is defined, for $0 \leq x \leq 2\pi$, by

$$f(x) = 3 + 5 \sin 2x.$$

State

(i) the amplitude of f , [1]

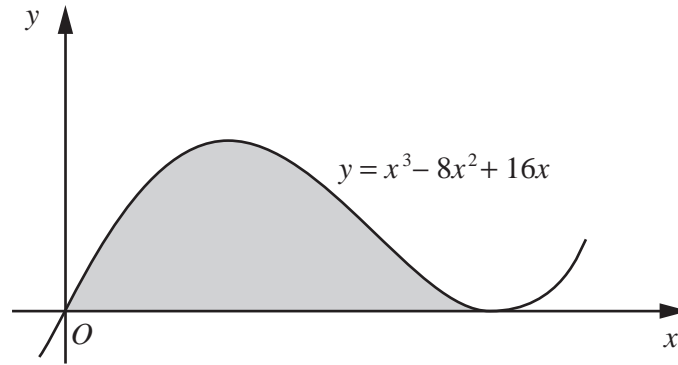
(ii) the period of f , [1]

(iii) the maximum and minimum values of f . [2]

Sketch the graph of $y = f(x)$. [3]

9 The line $y = 2x - 9$ intersects the curve $x^2 + y^2 + xy + 3x = 46$ at the points A and B . Find the equation of the perpendicular bisector of AB . [8]

10



The diagram shows part of the curve $y = x^3 - 8x^2 + 16x$.

- (i) Show that the curve has a minimum point at $(4, 0)$ and find the coordinates of the maximum point. [4]
- (ii) Find the area of the shaded region enclosed by the x -axis and the curve. [4]

11 The table shows experimental values of two variables x and y .

x	2	4	6	8
y	2.25	0.81	0.47	0.33

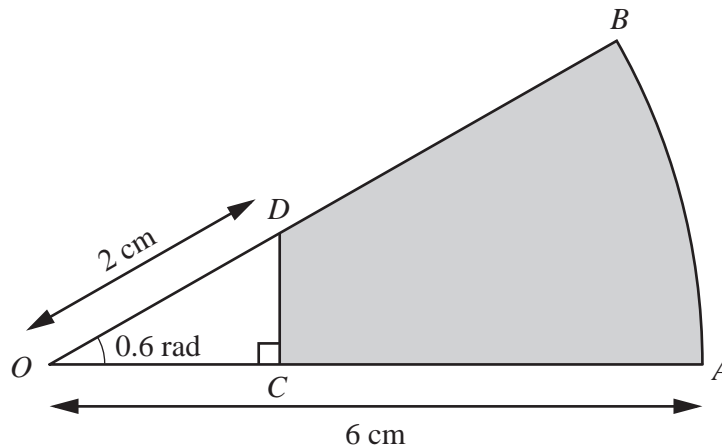
- (i) Using graph paper, plot xy against $\frac{1}{x}$ and draw a straight line graph. [3]
- (ii) Use your graph to express y in terms of x . [5]
- (iii) Estimate the value of x and of y for which $xy = 4$. [3]

[Question 12 is printed on the next page.]

6

12 Answer only **one** of the following two alternatives.

EITHER



The diagram shows a sector AOB of a circle with centre O and radius 6 cm. Angle $AOB = 0.6$ radians. The point D lies on OB such that the length of OD is 2 cm. The point C lies on OA such that OCD is a right angle.

- (i) Show that the length of OC is approximately 1.65 cm and find the length of CD . [4]
- (ii) Find the perimeter of the shaded region. [3]
- (iii) Find the area of the shaded region. [3]

OR

A particle moves in a straight line so that t seconds after passing a fixed point O its acceleration, $a \text{ ms}^{-2}$, is given by $a = 4t - 12$. Given that its speed at O is 16 ms^{-1} , find

- (i) the values of t at which the particle is stationary, [5]
- (ii) the distance the particle travels in the fifth second. [5]

