



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

CANDIDATE
NUMBER

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|



ADDITIONAL MATHEMATICS

0606/12

Paper 1

May/June 2013

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator

READ THESE INSTRUCTIONS FIRST

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 pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** the questions.

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 **17** printed pages and **3** 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*

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

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

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

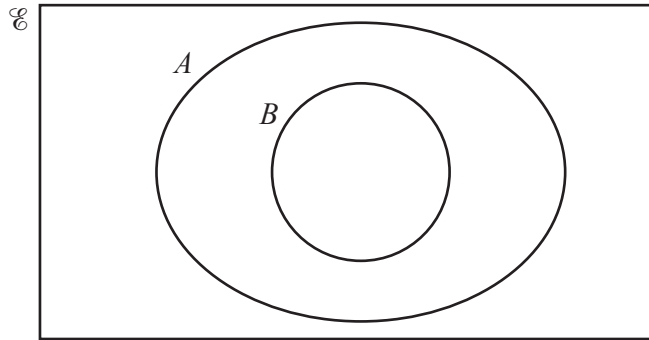
Formulae for ΔABC

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

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

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

1



For
Examiner's
Use

The Venn diagram shows the universal set \mathcal{E} , the set A and the set B . Given that $n(B) = 5$, $n(A') = 10$ and $n(\mathcal{E}) = 26$, find

(i) $n(A \cap B)$, [1]

(ii) $n(A)$, [1]

(iii) $n(B' \cap A)$. [1]

- 2 A 4-digit number is to be formed from the digits 1, 2, 5, 7, 8 and 9. Each digit may only be used once. Find the number of different 4-digit numbers that can be formed if

*For
Examiner's
Use*

(i) there are no restrictions, [1]

(ii) the 4-digit numbers are divisible by 5, [2]

(iii) the 4-digit numbers are divisible by 5 and are greater than 7000. [2]

3 Show that $(1 - \cos \theta - \sin \theta)^2 - 2(1 - \sin \theta)(1 - \cos \theta) = 0$.

[3]

*For
Examiner's
Use*

- 4 Find the set of values of k for which the curve $y = 2x^2 + kx + 2k - 6$ lies above the x -axis for all values of x . [4]

*For
Examiner's
Use*

- 5 The line $3x + 4y = 15$ cuts the curve $2xy = 9$ at the points A and B . Find the length of the line AB . [6]

*For
Examiner's
Use*

- 6 The normal to the curve $y + 2 = 3 \tan x$, at the point on the curve where $x = \frac{3\pi}{4}$, cuts the y -axis at the point P . Find the coordinates of P .

[6]

*For
Examiner's
Use*

- 7 It is given that $f(x) = 6x^3 - 5x^2 + ax + b$ has a factor of $x + 2$ and leaves a remainder of 27 when divided by $x - 1$.

*For
Examiner's
Use*

(i) Show that $b = 40$ and find the value of a . [4]

(ii) Show that $f(x) = (x + 2)(px^2 + qx + r)$, where p , q and r are integers to be found. [2]

(iii) Hence solve $f(x) = 0$. [2]

8 (a) Given that the matrix $\mathbf{A} = \begin{pmatrix} 4 & 2 \\ 3 & -5 \end{pmatrix}$, find

(i) \mathbf{A}^2 ,

[2]

*For
Examiner's
Use*

(ii) $3\mathbf{A} + 4\mathbf{I}$, where \mathbf{I} is the identity matrix.

[2]

(b) (i) Find the inverse matrix of $\begin{pmatrix} 6 & 1 \\ -9 & 3 \end{pmatrix}$.

[2]

*For
Examiner's
Use*

(ii) Hence solve the equations

$$6x + y = 5,$$

$$-9x + 3y = \frac{3}{2}.$$

[3]

- 9 (i) Given that n is a positive integer, find the first 3 terms in the expansion of $\left(1 + \frac{1}{2}x\right)^n$ in ascending powers of x . [2]

For
Examiner's
Use

- (ii) Given that the coefficient of x^2 in the expansion of $(1 - x)\left(1 + \frac{1}{2}x\right)^n$ is $\frac{25}{4}$, find the value of n . [5]

10 (a) (i) Find $\int \sqrt{2x - 5} \, dx$.

[2]

*For
Examiner's
Use*

(ii) Hence evaluate $\int_3^{15} \sqrt{2x - 5} \, dx$.

[2]

(b) (i) Find $\frac{d}{dx}(x^3 \ln x)$.

[2]

*For
Examiner's
Use*

(ii) Hence find $\int x^2 \ln x dx$.

[3]

11 (a) Solve $\cos 2x + 2\sec 2x + 3 = 0$ for $0^\circ \leq x \leq 360^\circ$.

[5]

*For
Examiner's
Use*

(b) Solve $2 \sin^2\left(y - \frac{\pi}{6}\right) = 1$ for $0 \leq y \leq \pi$.

[4]

12 A particle P moves in a straight line such that, t s after leaving a point O , its velocity v m s⁻¹ is given by $v = 36t - 3t^2$ for $t \geq 0$.

For
Examiner's
Use

(i) Find the value of t when the velocity of P stops increasing. [2]

(ii) Find the value of t when P comes to instantaneous rest. [2]

(iii) Find the distance of P from O when P is at instantaneous rest. [3]

(iv) Find the speed of P when P is again at O .

[4]

*For
Examiner's
Use*

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.