



--

--	--	--	--	--

--	--	--	--

0606/12

May/June 2013

2 hours

Additional Materials: Electronic calculator

DO **NOT** WRITE IN ANY BARCODES.

You are reminded of the need for clear presentation in your answers.

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*

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

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

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

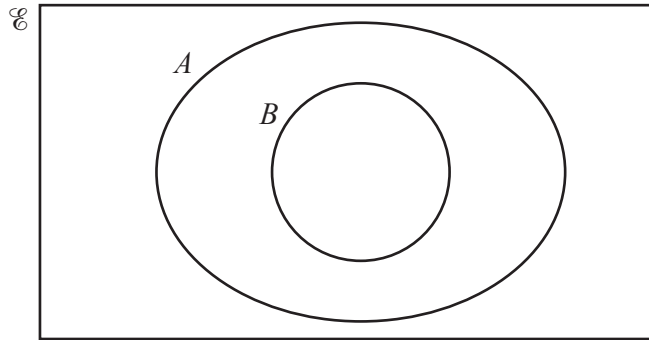
Formulae for $\triangle ABC$

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

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

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

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

$$\begin{aligned} 6x + y &= 5, \\ -9x + 3y &= \frac{3}{2}. \end{aligned}$$

[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 $v \text{ m s}^{-1}$ 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

BLANK PAGE

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.