Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

ADDITIONAL MATHEMATICS **0606/12**

Paper 1 **October/November 2014**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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 **15** printed pages and **1** blank page.

© UCLES 2014

CAMBRIDGE International Examinations

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

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

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

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

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

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

© UCLES 2014

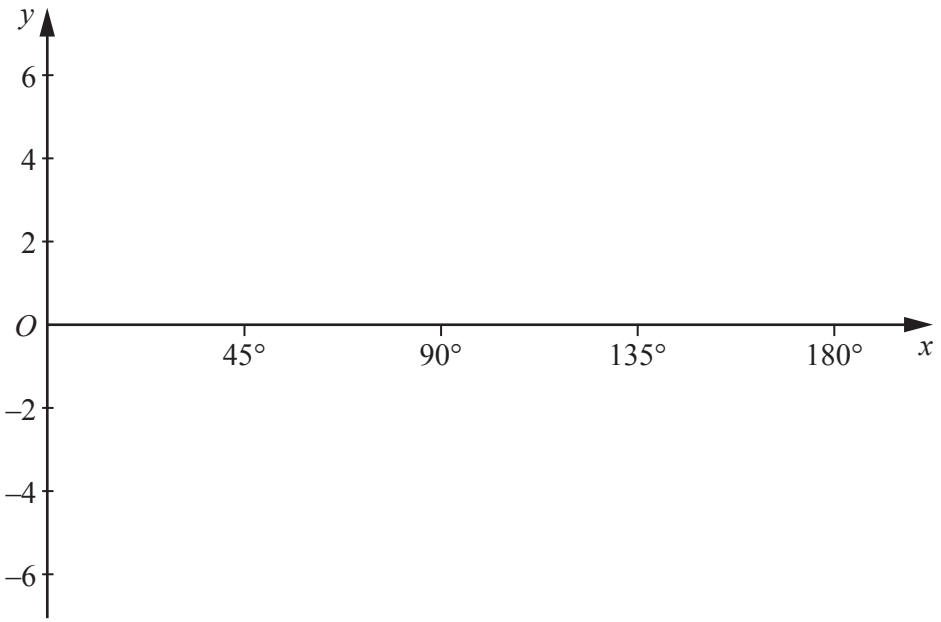
1 Find the coordinates of the stationary point on the curve $y = x^2 + \frac{16}{x}$. [4]

View solution

---

2 **(a)** On the axes below, sketch the curve $y = 3\cos 2x - 1$ for $0° \leqslant x \leqslant 180°$. [3]

View solution



(b) **(i)** State the amplitude of $1 - 4\sin 2x$. [1]

View solution

(ii) State the period of $5\tan 3x + 1$. [1]

View solution

© UCLES 2014

3 A curve is such that $\frac{dy}{dx} = \frac{2}{\sqrt{x+3}}$ for $x > -3$. The curve passes through the point $(6, 10)$.

(i) Find the equation of the curve. [4]

View solution

(ii) Find the x-coordinate of the point on the curve where $y = 6$. [1]

View solution

4 **(i)** Using the substitution $y = 5^x$, show that the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$ can be written in the form $ay^2 + by + 2 = 0$, where a and b are constants to be found. [2]

View solution

(ii) Hence solve the equation $5^{2x+1} - 5^{x+1} + 2 = 2(5^x)$. [4]

View solution

© UCLES 2014

5 **(i)** Find the equation of the tangent to the curve $y = x^3 - \ln x$ at the point on the curve where $x = 1$. [4]

View solution

(ii) Show that this tangent bisects the line joining the points $(-2, 16)$ and $(12, 2)$. [2]

View solution

© UCLES 2014

6 **(i)** Given that the coefficient of x^2 in the expansion of $(2+px)^6$ is 60, find the value of the positive constant p. [3]

View solution

(ii) Using your value of p, find the coefficient of x^2 in the expansion of $(3-x)(2+px)^6$. [3]

View solution

© UCLES 2014

7 Matrices **A** and **B** are such that $\mathbf{A} = \begin{pmatrix} 3a & 2b \\ -a & b \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} -a & b \\ 2a & 2b \end{pmatrix}$, where a and b are non-zero constants.

(i) Find $\mathbf{A}^{-1}$. [2]

View solution

(ii) Using your answer to part **(i)**, find the matrix **X** such that $\mathbf{XA} = \mathbf{B}$. [4]

View solution

© UCLES 2014

8 The point P lies on the line joining $A(-2, 3)$ and $B(10, 19)$ such that $AP:PB = 1:3$.

(i) Show that the x-coordinate of P is 1 and find the y-coordinate of P. [2]

View solution

(ii) Find the equation of the line through P which is perpendicular to AB. [3]

View solution

The line through P which is perpendicular to AB meets the y-axis at the point Q.

(iii) Find the area of the triangle AQB. [3]

View solution

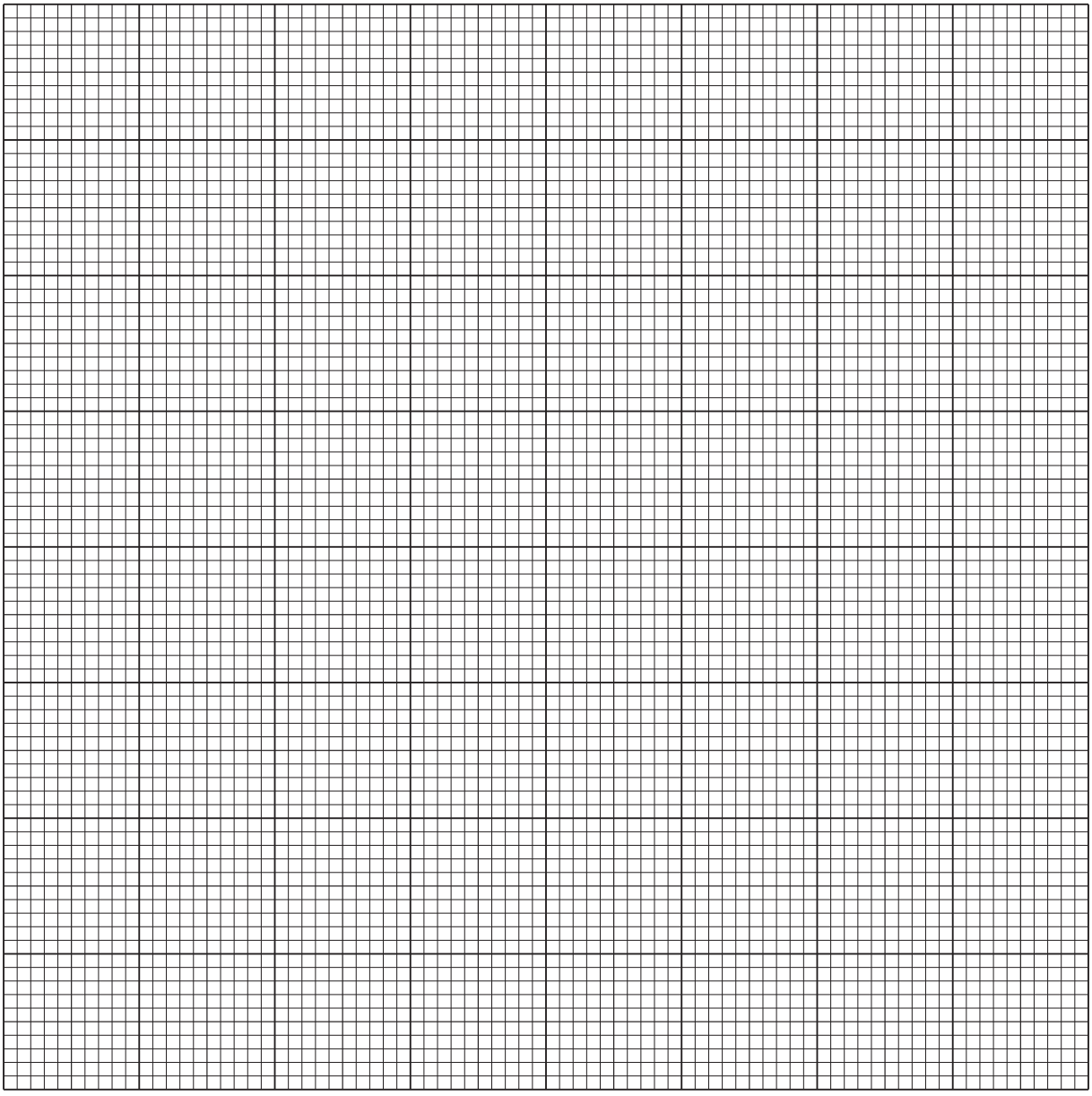
© UCLES 2014

9 The table shows experimental values of variables x and y.

x	2	2.5	3	3.5	4
y	18.8	29.6	46.9	74.1	117.2

(i) By plotting a suitable straight line graph on the grid below, show that x and y are related by the equation $y = ab^x$, where a and b are constants. [4]

View solution



(ii) Use your graph to find the value of a and of b. [4]

View solution

10 (a) (i) Find how many different 4-digit numbers can be formed using the digits 1, 2, 3, 4, 5 and 6 if no digit is repeated. [1]

View solution

(ii) How many of the 4-digit numbers found in part **(i)** are greater than 6000? [1]

View solution

(iii) How many of the 4-digit numbers found in part **(i)** are greater than 6000 and are odd? [1]

View solution

(b) A quiz team of 10 players is to be chosen from a class of 8 boys and 12 girls.

View solution

(i) Find the number of different teams that can be chosen if the team has to have equal numbers of girls and boys. [3]

(ii) Find the number of different teams that can be chosen if the team has to include the youngest and oldest boy and the youngest and oldest girl. [2]

View solution

© UCLES 2014

11 **(a)** Solve $2\cos 3x = \cot 3x$ for $0° \leqslant x \leqslant 90°$. [5]

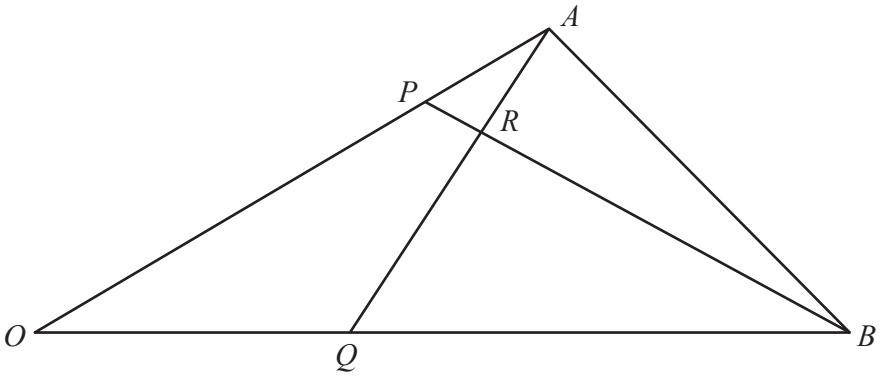
View solution

(b) Solve $\sec\left(y + \frac{\pi}{2}\right) = -2$ for $0 \leqslant y \leqslant \pi$ radians. [4]

View solution

© UCLES 2014

12



The position vectors of points A and B relative to an origin O are **a** and **b** respectively. The point P is such that $\overrightarrow{OP} = \mu\overrightarrow{OA}$. The point Q is such that $\overrightarrow{OQ} = \lambda\overrightarrow{OB}$. The lines AQ and BP intersect at the point R.

(i) Express $\overrightarrow{AQ}$ in terms of λ, **a** and **b**. [1]

View solution

(ii) Express $\overrightarrow{BP}$ in terms of μ, **a** and **b**. [1]

View solution

It is given that $3\overrightarrow{AR} = \overrightarrow{AQ}$ and $8\overrightarrow{BR} = 7\overrightarrow{BP}$.

(iii) Express $\overrightarrow{OR}$ in terms of λ, **a** and **b**. [2]

View solution

© UCLES 2014

(iv) Express $\overrightarrow{OR}$ in terms of μ, **a** and **b**. [2]

View solution

(v) Hence find the value of μ and of λ. [3]

View solution

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.

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.

© UCLES 2014