UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1237304545

ADDITIONAL MATHEMATICS **0606/13**

Paper 1 **May/June 2012**

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.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total	

This document consists of **16** printed pages.

© UCLES 2012

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

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

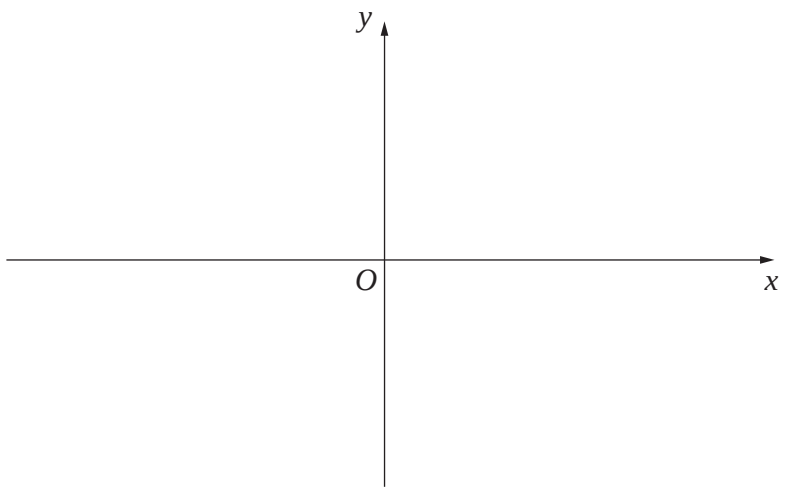
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

© UCLES 2012

1 **(i)** Sketch the graph of $y = |2x - 5|$, showing the coordinates of the points where the graph meets the coordinate axes. [2]

For Examiner's Use



(ii) Solve $|2x - 5| = 3$. [2]

2 The expression $2x^3 + ax^2 + bx - 30$ is divisible by $x + 2$ and leaves a remainder of -35 when divided by $2x - 1$. Find the values of the constants a and b. [5]

For Examiner's Use

3 Find the set of values of k for which the line $y = 2x + k$ cuts the curve $y = x^2 + kx + 5$ at two distinct points. [6]

For Examiner's Use

For Examiner's Use

4 **(a)** Arrangements containing 5 different letters from the word AMPLITUDE are to be made. Find

(i) the number of 5-letter arrangements if there are no restrictions, [1]

(ii) the number of 5-letter arrangements which start with the letter A and end with the letter E. [1]

(b) Tickets for a concert are given out randomly to a class containing 20 students. No student is given more than one ticket. There are 15 tickets.

(i) Find the number of ways in which this can be done. [1]

© UCLES 2012

There are 12 boys and 8 girls in the class. Find the number of different ways in which

For Examiner's Use

(ii) 10 boys and 5 girls get tickets, [3]

(iii) all the boys get tickets. [1]

5 **(i)** Find the equation of the tangent to the curve $y = x^3 + 2x^2 - 3x + 4$ at the point where the curve crosses the y-axis. [4]

For Examiner's Use

(ii) Find the coordinates of the point where this tangent meets the curve again. [3]

© UCLES 2012

6 **(i)** Given that $15\cos^2\theta + 2\sin^2\theta = 7$, show that $\tan^2\theta = \frac{8}{5}$. [4]

For Examiner's Use

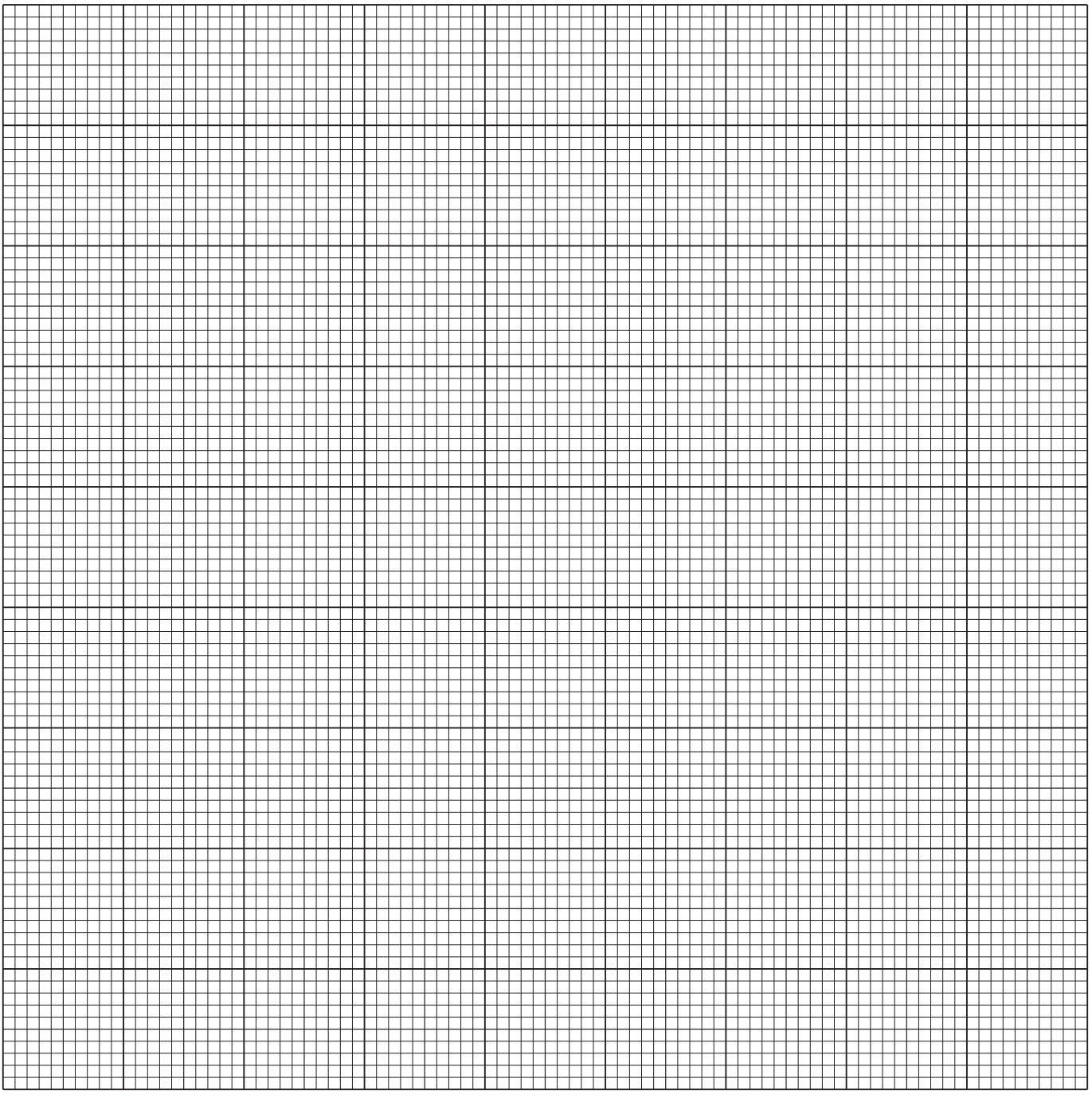
(ii) Solve $15\cos^2\theta + 2\sin^2\theta = 7$ for $0 \leqslant \theta \leqslant \pi$ radians. [3]

7 The table shows values of variables x and y.

For Examiner's Use

x	1	3	6	10	14
y	2.5	4.5	0	–20	–56

(i) By plotting a suitable straight line graph, show that y and x are related by the equation $y = Ax + Bx^2$, where A and B are constants. [4]



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

For Examiner's Use

---

8 **(a)** Find the value of x for which $2\lg x - \lg(5x + 60) = 1$. [5]

(b) Solve $\log_5 y = 4\log_y 5$. [4]

---

9 Find the values of the positive constants p and q such that, in the binomial expansion of $(p + qx)^{10}$, the coefficient of x^5 is 252 and the coefficient of x^3 is 6 times the coefficient of x^2. [8]

For Examiner's Use

10 Variables x and y are such that $y = e^{2x} + e^{-2x}$.

For Examiner's Use

(i) Find $\frac{dy}{dx}$. [2]

(ii) By using the substitution $u = e^{2x}$, find the value of y when $\frac{dy}{dx} = 3$. [4]

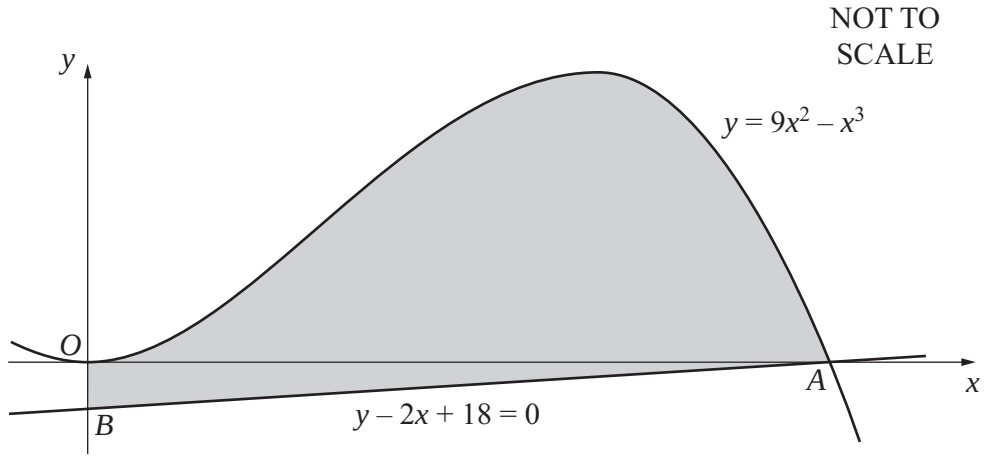
(iii) Given that x is decreasing at the rate of 0.5 units s^{-1}, find the corresponding rate of change of y when $x = 1$. [3]

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

For Examiner's Use

11 EITHER

The diagram shows part of the curve $y = 9x^2 - x^3$, which meets the x-axis at the origin O and at the point A. The line $y - 2x + 18 = 0$ passes through A and meets the y-axis at the point B.

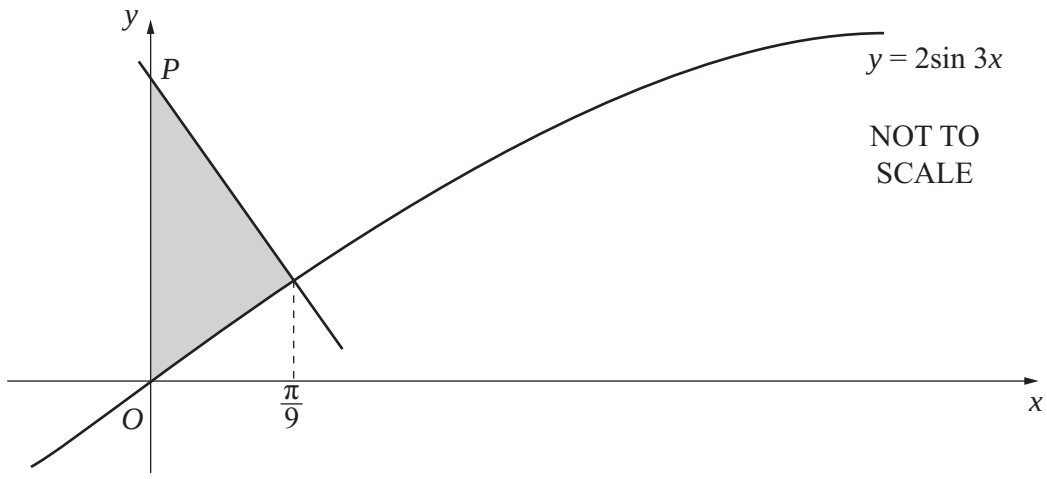


(i) Show that, for $x \geqslant 0$, $9x^2 - x^3 \leqslant 108$. [4]

(ii) Find the area of the shaded region bounded by the curve, the line AB and the y-axis. [6]

OR

The diagram shows part of the curve $y = 2\sin 3x$. The normal to the curve $y = 2\sin 3x$ at the point where $x = \frac{\pi}{9}$ meets the y-axis at the point P.



(i) Find the coordinates of P. [5]

(ii) Find the area of the shaded region bounded by the curve, the normal and the y-axis. [5]

Start your answer to Question 11 here.

Indicate which question you are answering.

EITHER	
OR	

For Examiner's Use

Continue your answer here if necessary.

For Examiner's Use

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.