

--

--	--	--	--	--

--	--	--	--

0606/23

October/November 2011

2 hours

Additional Materials: Electronic calculator

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.

Answer **all** 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	
12	
Total	

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

Mathematical FormulaeFor
Examiner's
Use**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 Solve the inequality $x(2x - 1) > 15$.

[3]

For
Examiner's
Use

-
- 2 (i) Given that $y = (12 - 4x)^5$, find $\frac{dy}{dx}$.

[2]

- (ii) Hence find the approximate change in y as x increases from 0.5 to $0.5 + p$, where p is small.

[2]

- 3 (i) Find the coefficient of x^3 in the expansion of $(1 - 2x)^7$.

[2]

For
Examiner's
Use

- (ii) Find the coefficient of x^3 in the expansion of $(1 + 3x^2)(1 - 2x)^7$.

[3]

- 4 Without using a calculator, find the positive root of the equation

$$(5 - 2\sqrt{2})x^2 - (4 + 2\sqrt{2})x - 2 = 0,$$

giving your answer in the form $a + b\sqrt{2}$, where a and b are integers.

[6]

*For
Examiner's
Use*

- 5 A school council of 6 people is to be chosen from a group of 8 students and 6 teachers. Calculate the number of different ways that the council can be selected if

For
Examiner's
Use

(i) there are no restrictions, [2]

(ii) there must be at least 1 teacher on the council and more students than teachers. [3]

After the council is chosen, a chairperson and a secretary have to be selected from the 6 council members.

(iii) Calculate the number of different ways in which a chairperson and a secretary can be selected. [1]

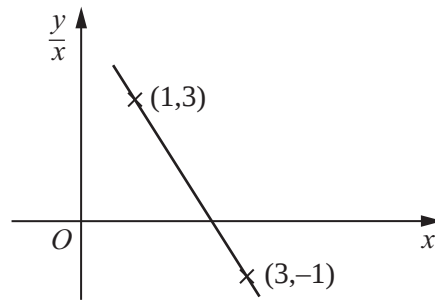
- 6 (i) In the space below sketch the graph of $y = |(2x + 3)(2x - 7)|$.

[4]

For
Examiner's
Use

- (ii) How many values of x satisfy the equation $|(2x + 3)(2x - 7)| = 2x$?

[2]



The variables x and y are related in such a way that when $\frac{y}{x}$ is plotted against x a straight line is obtained, as shown in the graph. The line passes through the points $(1, 3)$ and $(3, -1)$.

(i) Express y in terms of x . [4]

(ii) Find the value of x and of y such that $\frac{y}{x} = -9$. [2]

8 A sector of a circle, of radius r cm, has a perimeter of 200 cm.

(i) Express the area, A cm², of the sector in terms of r .

[3]

For
Examiner's
Use

(ii) Given that r can vary, find the stationary value of A .

[3]

- 9 An aircraft, whose speed in still air is 350 kmh^{-1} , flies in a straight line from A to B , a distance of 480 km . There is a wind of 50 kmh^{-1} blowing from the north. The pilot sets a course of 130° .

*For
Examiner's
Use*

- (i) Calculate the time taken to fly from A to B . [5]

- (ii) Calculate the bearing of B from A . [3]

- 10 The line $y = 2x + 10$ intersects the curve $2x^2 + 3xy - 5y + y^2 = 218$ at the points A and B . Find the equation of the perpendicular bisector of AB .

[9]

*For
Examiner's
Use*

11 (i) Solve $4 \cot \frac{1}{2}x = 1$, for $0^\circ < x < 360^\circ$.

[3]

For
Examiner's
Use

(ii) Solve $3(1 - \tan y \cos y) = 5 \cos^2 y - 2$, for $0^\circ < y < 360^\circ$.

[5]

(iii) Solve $3 \sec^2 z = 4$, for $0 < z < 2\pi$ radians.

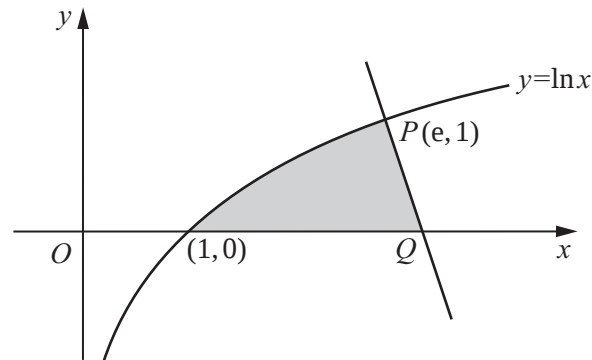
[3]

*For
Examiner's
Use*

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

EITHER

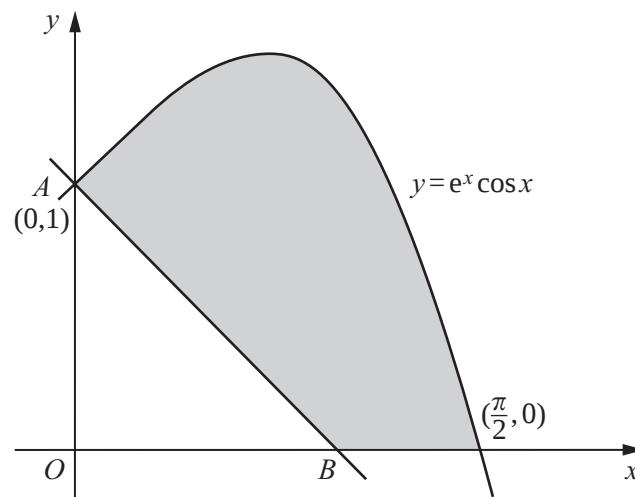
For
Examiner's
Use



The diagram shows part of the curve $y = \ln x$ cutting the x -axis at the point $(1, 0)$. The normal to the curve at the point $P(e, 1)$ cuts the x -axis at the point Q .

- (i) Show that Q is the point $\left(e + \frac{1}{e}, 0\right)$. [4]
- (ii) Show that $\frac{d}{dx}(x \ln x) = 1 + \ln x$. [1]
- (iii) Hence find $\int \ln x dx$ and the area of the shaded region. [5]

OR



The diagram shows part of the curve $y = e^x \cos x$, cutting the x -axis at the point $\left(\frac{\pi}{2}, 0\right)$. The normal to the curve at the point $A(0, 1)$ cuts the x -axis at the point B .

- (i) Find the coordinates of B . [4]
- (ii) Show that $\frac{d}{dx}[e^x(\cos x + \sin x)] = 2e^x \cos x$. [2]
- (iii) Hence find $\int e^x \cos x dx$ and the area of the shaded region. [4]

Indicate which question you are answering.

EITHER	
OR	

[illegible]

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.