Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

ADDITIONAL MATHEMATICS **0606/12**

Paper 1 **May/June 2019**

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 **16** printed pages.

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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

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

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

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

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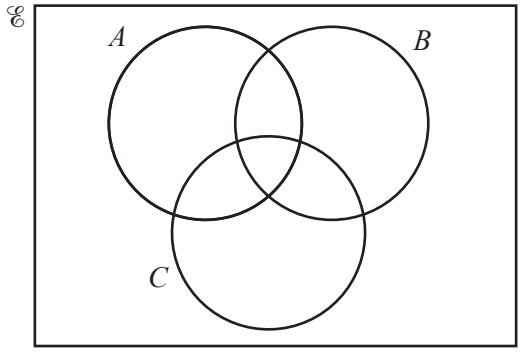
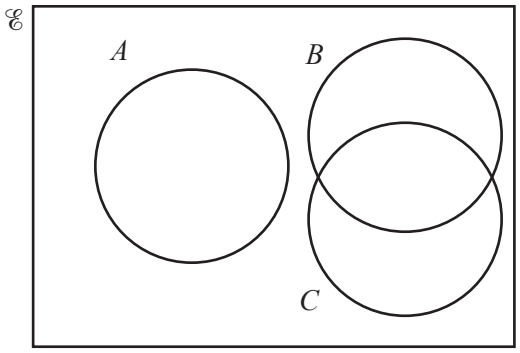
1 **(a)** On the Venn diagrams below, shade the region indicated.

View solution



$A' \cap B' \cap C'$



$A \cup (B \cap C)$

[2]

(b) $\mathscr{E} = \{x : 0° \leqslant x \leqslant 360°\}$

$P = \{x : \cos 2x = 0.5\}$

$Q = \{x : \sin x = 0.5\}$

View solution

Find $P \cap Q$. [3]

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2 Do not use a calculator in this question.

Find the coordinates of the points of intersection of the curve $y = (2x+3)^2(x-1)$ and the line $y = 3(2x+3)$. [5]

View solution

3 The number, B, of a certain type of bacteria at time t days can be described by $B = 200e^{2t} + 800e^{-2t}$.

(i) Find the value of B when $t = 0$. [1]

View solution

(ii) At the instant when $\frac{dB}{dt} = 1200$, show that $e^{4t} - 3e^{2t} - 4 = 0$. [3]

View solution

(iii) Using the substitution $u = e^{2t}$, or otherwise, solve $e^{4t} - 3e^{2t} - 4 = 0$. [2]

View solution

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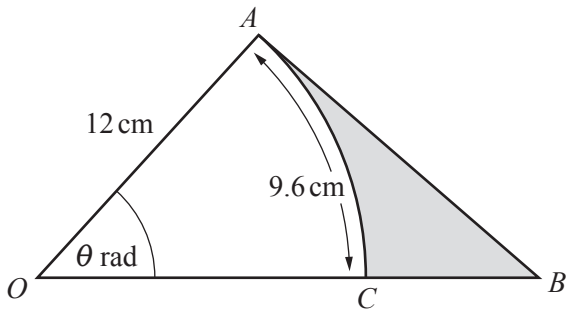
4 **(a)** Given that $\dfrac{\left(pr^2\right)^{\frac{3}{2}}\sqrt{qr}}{q^2\left(pr^2\right)^{-1}}$ can be written in the form $p^a q^b r^c$, find the value of each of the constants a, b and c. [3]

View solution

(b) Solve $3x^{\frac{1}{2}} - y^{-\frac{1}{2}} = 4,$
$4x^{\frac{1}{2}} + 3y^{-\frac{1}{2}} = 14.$ [3]

View solution

5



The diagram shows the right-angled triangle OAB. The point C lies on the line OB. Angle $OAB = \frac{\pi}{2}$ radians and angle $AOB = \theta$ radians. AC is an arc of the circle, centre O, radius 12 cm and AC has length 9.6 cm.

(i) Find the value of θ. [2]

View solution

(ii) Find the area of the shaded region. [4]

View solution

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6 **(a)** Eight books are to be arranged on a shelf. There are 4 mathematics books, 3 geography books and 1 French book.

(i) Find the number of different arrangements of the books if there are no restrictions. [1]

View solution

(ii) Find the number of different arrangements if the mathematics books have to be kept together. [3]

View solution

(iii) Find the number of different arrangements if the mathematics books have to be kept together and the geography books have to be kept together. [3]

View solution

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(b) A team of 6 players is to be chosen from 8 men and 4 women. Find the number of different ways this can be done if

(i) there are no restrictions, [1]

View solution

(ii) there is at least one woman in the team. [2]

View solution

7 A pilot wishes to fly his plane from a point A to a point B on a bearing of 055°. There is a wind blowing at $120\,\text{km}\,\text{h}^{-1}$ from the west. The plane can fly at $650\,\text{km}\,\text{h}^{-1}$ in still air.

(i) Find the direction in which the pilot must fly his plane in order to reach B. [4]

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(ii) Given that the distance between A and B is 1250 km, find the time it will take the pilot to fly from A to B. [4]

View solution

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8 When e^y is plotted against $\frac{1}{x}$, a straight line graph passing through the points $(2, 20)$ and $(4, 8)$ is obtained.

(i) Find y in terms of x. [5]

View solution

(ii) Hence find the positive values of x for which y is defined. [1]

View solution

(iii) Find the exact value of y when $x = 3$. [1]

View solution

(iv) Find the exact value of x when $y = 2$. [2]

View solution

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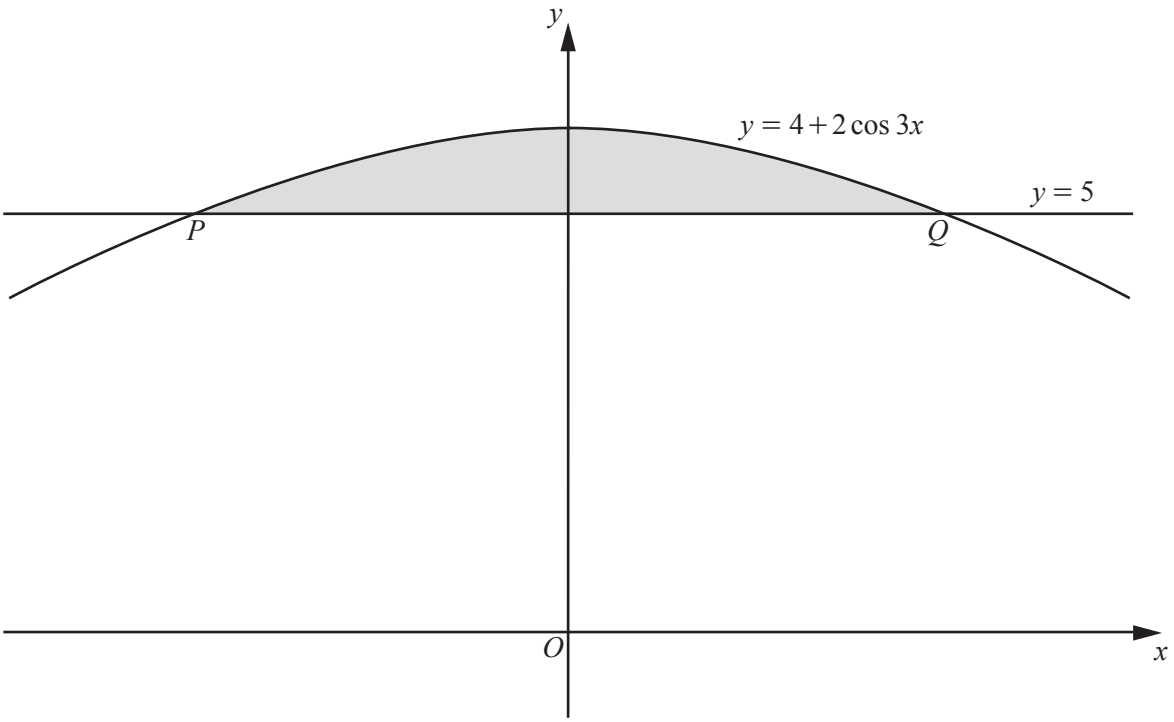


The diagram shows the curve $y = 4 + 2\cos 3x$ intersecting the line $y = 5$ at the points P and Q.

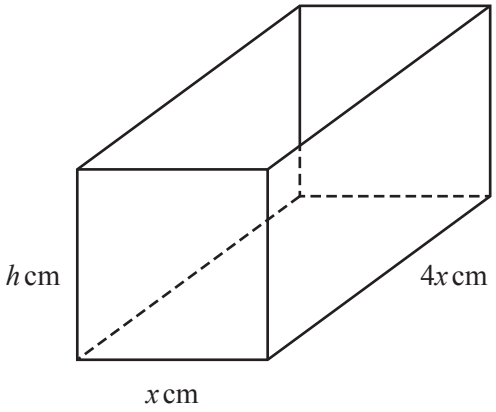
(i) Find, in terms of π, the x-coordinate of P and of Q. [3]

View solution

(ii) Find the exact area of the shaded region. You must show all your working. [6]

View solution

10



The diagram shows an open container in the shape of a cuboid of width x cm, length $4x$ cm and height h cm. The volume of the container is $800\,\text{cm}^3$.

(i) Show that the external surface area, $S\,\text{cm}^2$, of the open container is such that $S = 4x^2 + \frac{2000}{x}$. [4]

View solution

(ii) Given that x can vary, find the stationary value of S and determine its nature. [5]



Question 11 is printed on the next page.

11 The normal to the curve $y = (x-2)(3x+1)^{\frac{2}{3}}$ at the point where $x = \frac{7}{3}$, meets the y-axis at the point P. Find the exact coordinates of the point P. [7]

View solution

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