Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | |
| CENTRE NUMBER | |
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**ADDITIONAL MATHEMATICS** **0606/22**

Paper 2 **October/November 2017**

**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.

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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 $\Delta ABC$*

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

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

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

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**1** If $z = 2 + \sqrt{3}$ find the integers $a$ and $b$ such that $az^2 + bz = 1 + \sqrt{3}$. [5]

View solution

**2** Solve the equation $\dfrac{2x^{1.5} + 6x^{-0.5}}{x^{0.5} + 5x^{-0.5}} = x$. [5]

View solution

**3** Solve the inequality $|3x - 1| > 3 + x$. [3]

View solution

**4** Solve the simultaneous equations

View solution

$$\log_2 (x + 4) = 2 \log_2 y,$$

$$\log_2 (7y - x) = 4.$$

[5]

**5** Naomi is going on holiday and intends to read 4 books during her time away. She selects these books from 5 mystery, 3 crime and 2 romance books. Find the number of ways in which she can make her selection in each of the following cases.

**(i)** There are no restrictions. [1]

View solution

**(ii)** She selects at least 2 mystery books. [3]

View solution

**(iii)** She selects at least 1 book of each type. [3]

View solution

**6** The volume of a closed cylinder of base radius $x$ cm and height $h$ cm is $500\,\text{cm}^3$.

**(i)** Express $h$ in terms of $x$. [1]

View solution

**(ii)** Show that the total surface area of the cylinder is given by $A = 2\pi x^2 + \frac{1000}{x}\,\text{cm}^2$. [2]

View solution

**(iii)** Given that $x$ can vary, find the stationary value of $A$ and show that this value is a minimum. [5]

View solution

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**7** The gradient of the normal to a curve at the point with coordinates $(x, y)$ is given by $\frac{\sqrt{x}}{1-3x}$.

**(i)** Find the equation of the curve, given that the curve passes through the point $(1, -10)$. [5]

View solution

**(ii)** Find, in the form $y = mx + c$, the equation of the tangent to the curve at the point where $x = 4$. [4]

View solution

**8** The matrix $\mathbf{A}$ is $\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$.

**(i)** Find $(2\mathbf{A})^{-1}$. [3]

View solution

**(ii)** Hence solve the simultaneous equations

View solution

$$2y + 4x + 5 = 0,$$

$$6y + 8x + 9 = 0.$$

[4]

**9** **(i)** Find $\frac{\mathrm{d}}{\mathrm{d}x}(x \ln x)$. [2]

View solution

**(ii)** Hence find $\int \ln x \, \mathrm{d}x$. [2]

View solution

**(iii)** Hence, given that $k > 0$, show that $\int_k^{2k} \ln x \, \mathrm{d}x = k(\ln 4k - 1)$. [4]

View solution

**10 (i) Without using a calculator**, solve the equation $6c^3 - 7c^2 + 1 = 0$. [5]

View solution

It is given that $y = \tan x + 6\sin x$.

**(ii)** Find $\frac{\mathrm{d}y}{\mathrm{d}x}$. [2]

View solution

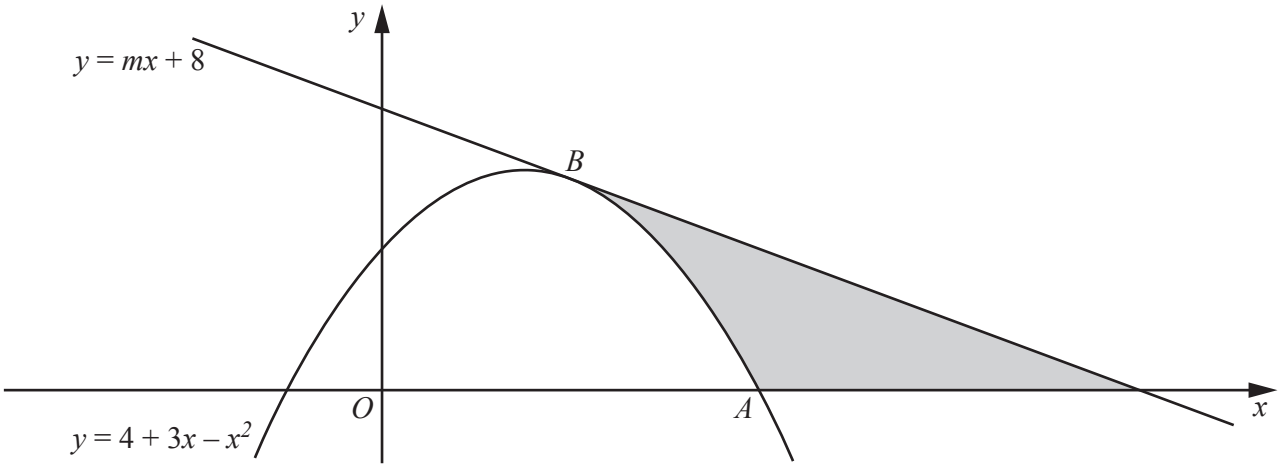
**(iii)** If $\frac{dy}{dx} = 7$ show that $6\cos^3 x - 7\cos^2 x + 1 = 0$. [2]

View solution

**(iv)** Hence solve the equation $\frac{dy}{dx} = 7$ for $0 \leqslant x \leqslant \pi$ radians. [2]

View solution

**11**




The diagram shows the curve $y = 4 + 3x - x^2$ intersecting the positive $x$-axis at the point $A$. The line $y = mx + 8$ is a tangent to the curve at the point $B$. Find

**(i)** the coordinates of $A$, [2]

View solution

**(ii)** the value of $m$, [3]

View solution

**(iii)** the coordinates of $B$, [2]

View solution

**(iv)** the area of the shaded region, showing all your working. [5]

View solution

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