Cambridge IGCSE

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

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

*8047669716*

**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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CAMBRIDGE International Examinations

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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* $\Delta ABC$

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

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

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

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

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

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

**4** Solve the simultaneous equations

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

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

[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]

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

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

**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]

**(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]

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

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]

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

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

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

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

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

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

[4]

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

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

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

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

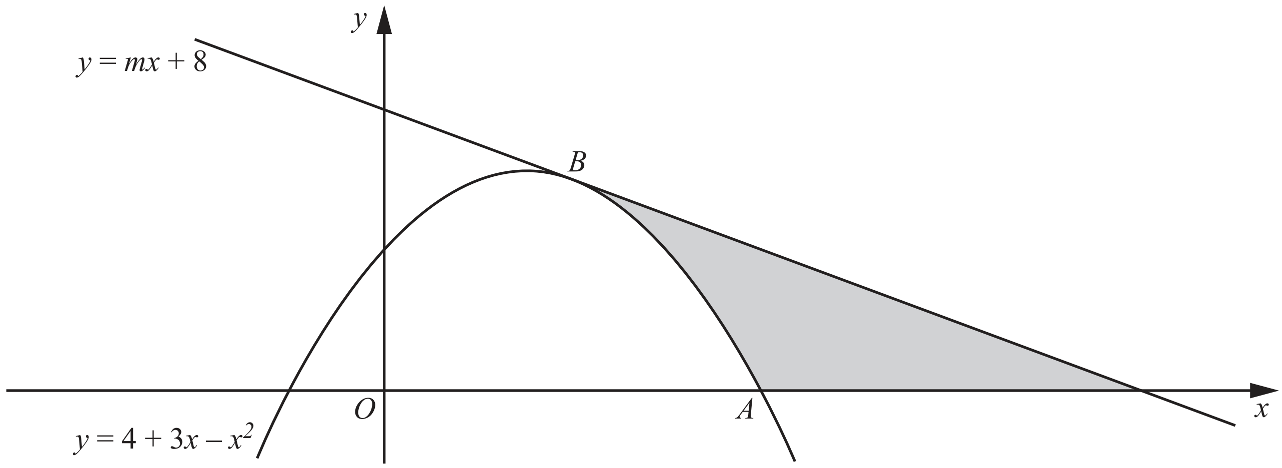
It is given that $y = \tan x + 6\sin x$.

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

**(iii)** If $\dfrac{\mathrm{d}y}{\mathrm{d}x} = 7$ show that $6\cos^3 x - 7\cos^2 x + 1 = 0$. [2]

**(iv)** Hence solve the equation $\dfrac{\mathrm{d}y}{\mathrm{d}x} = 7$ for $0 \leqslant x \leqslant \pi$ radians. [2]

**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]

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

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

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

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