Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

7292744436

ADDITIONAL MATHEMATICS **0606/23**

Paper 2 **May/June 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.

DC (ST/FC) 129465/2

CAMBRIDGE
International Examinations

[Turn over

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

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

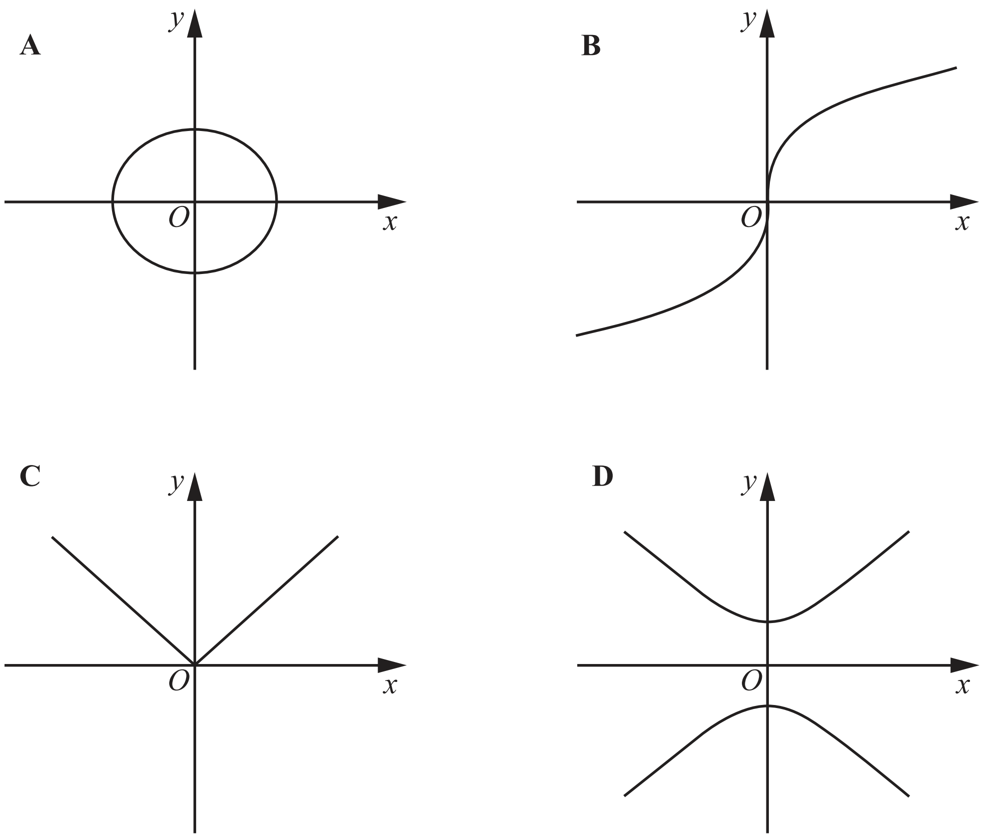
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

1 **(a)** Solve the equation $7^{2x+5} = 2.5$, giving your answer correct to 2 decimal places. [3]

(b) Express $\dfrac{(5\sqrt{q})^3}{(625p^{12}q)^{\frac{1}{4}}}$ in the form $5^a p^b q^c$, where a, b and c are constants. [3]

2

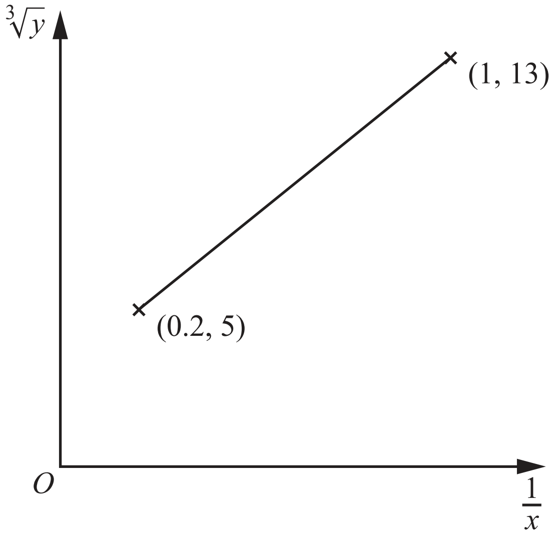


The four graphs above are labelled **A**, **B**, **C** and **D**.

(i) Write down the letter of each graph that represents a function, giving a reason for your choice. [2]

(ii) Write down the letter of each graph that represents a function which has an inverse, giving a reason for your choice. [2]

3



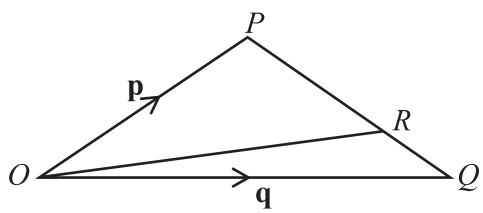
Variables x and y are such that when $\sqrt[3]{y}$ is plotted against $\frac{1}{x}$, a straight line graph passing through the points (0.2, 5) and (1, 13) is obtained. Express y in terms of x. [4]

4 **(a)** Vectors **a**, **b** and **c** are such that $\mathbf{a} = \begin{pmatrix} 5 \\ -6 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 11 \\ -15 \end{pmatrix}$ and $3\mathbf{a} + \mathbf{c} = \mathbf{b}$.

(i) Find **c**. [1]

(ii) Find the unit vector in the direction of **b**. [2]

(b)



In the diagram, $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$. The point R lies on PQ such that $PR = 3RQ$. Find $\overrightarrow{OR}$ in terms of **p** and **q**, simplifying your answer. [3]

5 **(a)** How many 5-digit numbers are there that have 5 different digits and are divisible by 5? [3]

(b) A committee of 8 people is to be selected from 9 men and 5 women. Find the number of different committees that can be selected if the committee must have at least 4 women. [3]

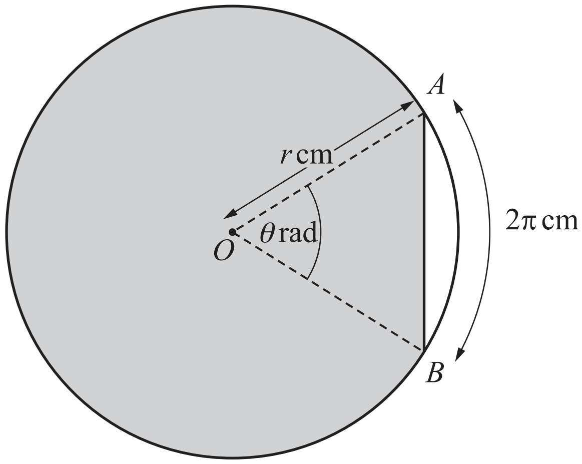
6 The first three terms of the binomial expansion of $(2-ax)^n$ are $64-16bx+100bx^2$. Find the value of each of the integers n, a and b. [7]

7 Differentiate with respect to x,

(i) $(1+4x)^{10}\cos x$, [4]

(ii) $\dfrac{e^{4x-5}}{\tan x}$. [4]

8



The diagram shows a circle, centre O of radius r cm, and a chord AB. Angle $AOB = \theta$ radians. The length of the major arc AB is 5 times the length of the minor arc AB. The minor arc AB has length 2π cm.

(i) Find the value of θ and of r. [2]

(ii) Calculate the exact perimeter of the shaded segment. [2]

(iii) Calculate the exact area of the shaded segment. [4]

9 The functions f and g are defined, for $x > 1$, by

$$\mathrm{f}(x) = 9\sqrt{x-1},$$
$$\mathrm{g}(x) = x^2 + 2.$$

(i) Find an expression for $\mathrm{f}^{-1}(x)$, stating its domain. [3]

(ii) Find the exact value of fg(7). [2]

(iii) Solve $\mathrm{gf}(x) = 5x^2 + 83x - 95$. [4]

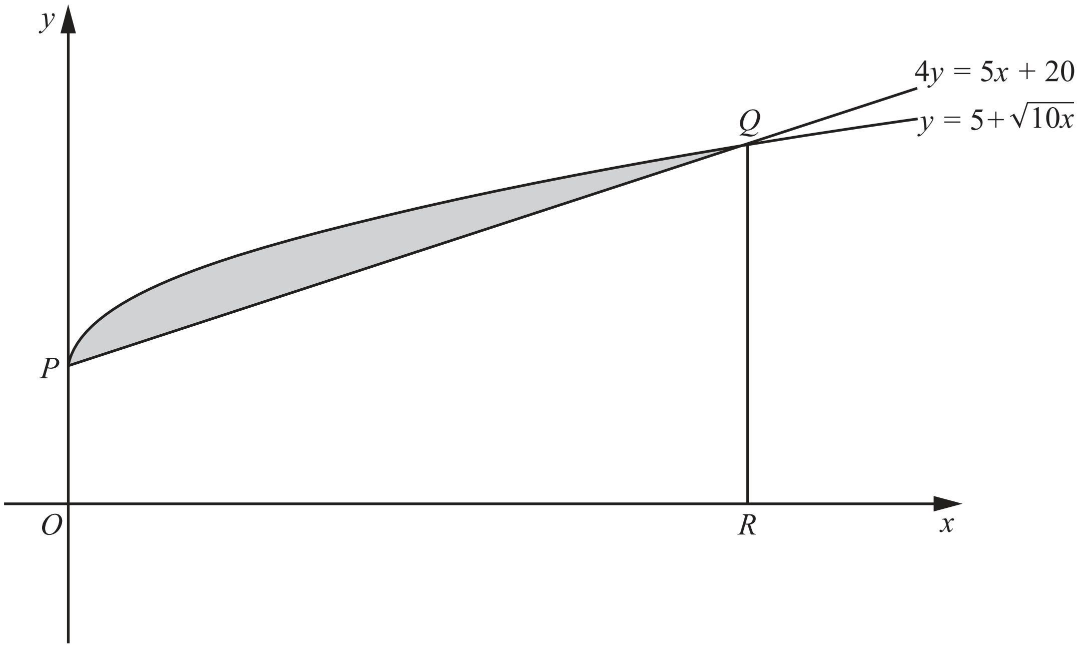
10 Solve the equation

(a) $2|\sin x| = 1$ for $-\pi \leqslant x \leqslant \pi$ radians, [3]

(b) $3\tan(2y + 15^\circ) = 1$ for $0^\circ \leqslant y \leqslant 180^\circ$, [4]

(c) $3\cot^2 z = \operatorname{cosec}^2 z - 7\operatorname{cosec} z + 1$ for $0° \leqslant z \leqslant 360°$. [5]

11



The diagram shows part of the curve $y = 5 + \sqrt{10x}$ and the line $4y = 5x + 20$. The line and curve intersect at the points $P(0, 5)$ and Q. The line QR is parallel to the y-axis.

(i) Find the coordinates of Q. [4]

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

BLANK PAGE