Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

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8580548649

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2019**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics 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.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
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 120.

This document consists of **19** printed pages and **1** blank page.

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[Turn over

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

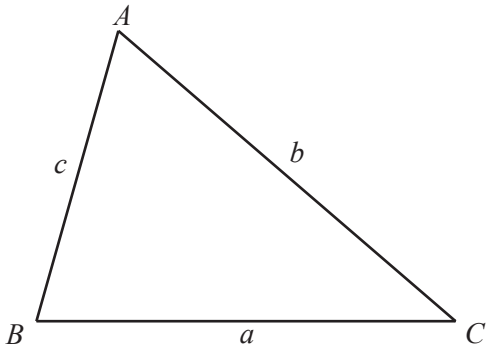
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



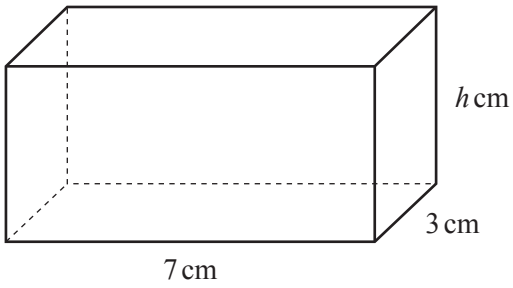
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 (a)



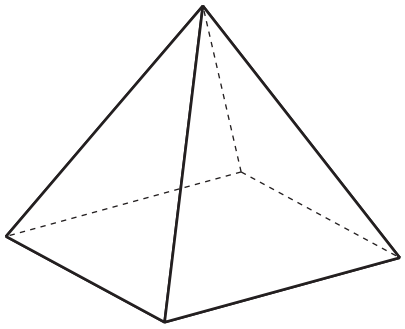
NOT TO SCALE

The diagram shows a cuboid.
The volume of this cuboid is $52.5\,cm^3$.

Find the value of h.

$h =$ ..... [2]

(b)



NOT TO SCALE

The diagram shows a pyramid.
The area of the base is $500\,m^2$.
The height of the pyramid is 27 m.

Find the volume of this pyramid.

..... m^3 [2]

2 The table shows the marks of 10 students in a physics examination and a chemistry examination.

Physics mark (x)	17	29	34	46	57	66	73	84	92	96
Chemistry mark (y)	26	42	41	56	52	61	76	65	73	80

(a) Find

(i) the mean physics mark,

..... [1]

(ii) the mean chemistry mark.

..... [1]

(b) Find the equation of the regression line for y in terms of x.

$y =$ ..... [2]

(c) Use your regression line to estimate the chemistry mark when

(i) the physics mark is 60,

..... [1]

(ii) the physics mark is 5.

..... [1]

(d) Which physics mark, 60 or 5, is likely to give the most reliable chemistry mark?
Give a reason for your answer.

.....

..... [1]

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3 There are 120 students at a school.
There are 30 students in each class.
The number of boys and the number of girls in each class is shown in the table.

	Class 1	Class 2	Class 3	Class 4
Boys	16	19	12	13
Girls	14	11	18	17

(a) A student is chosen at random from the 120 students.

Calculate the probability that the student chosen is

(i) a boy from Class 2,

..... [1]

(ii) **not** from Class 3.

..... [1]

(b) A boy is chosen at random.

Calculate the probability that he is from Class 4.

..... [2]

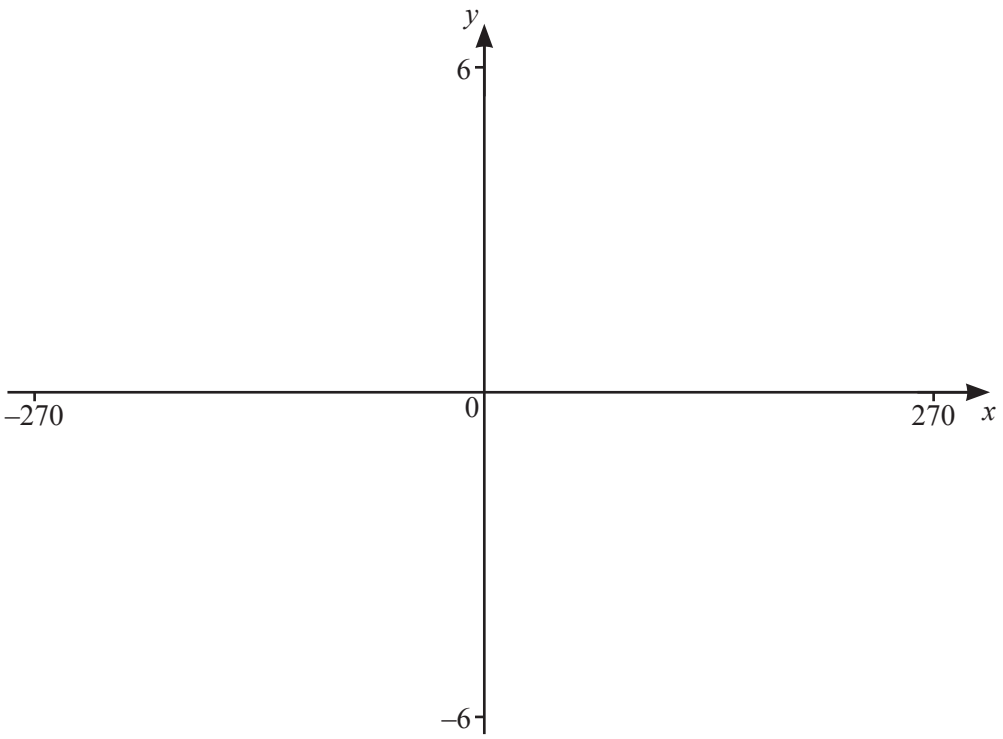
(c) Three students from Class 1 are chosen at random.

Calculate the probability 3 girls are chosen.

..... [3]

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4



(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$ where

$$\mathrm{f}(x) = \frac{1}{\cos x} \quad \text{for values of } x \text{ between } -270 \text{ and } 270 .$$

[3]

(b) Write down the range of $\mathrm{f}(x)$.

..... [2]

(c) **(i)** On the same diagram, sketch the graph of $y = \mathrm{g}(x)$ where

$$\mathrm{g}(x) = \frac{(720 + x)}{2x} \text{ for values of } x \text{ between } -270 \text{ and } 270 .$$

[2]

(ii) Find the values of the x co-ordinates of the points of intersection of the two graphs.

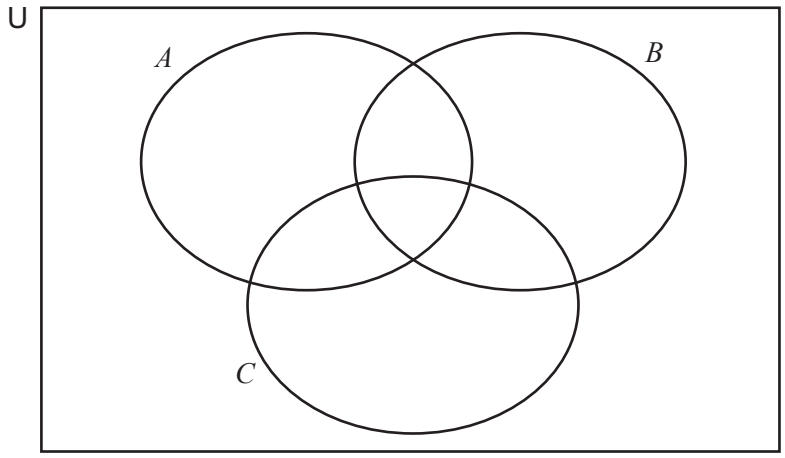
$x =$ ..... or $x =$ ..... or $x =$ ..... [3]

(iii) Find the equation of each asymptote of the graph of $y = \mathrm{g}(x)$.

..... [2]

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5 The Venn diagram shows the sets A, B and C.



$\mathsf{U} = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$
$A = \{\text{prime numbers}\}$
$B = \{\text{factors of } 12\}$
$C = \{\text{multiples of } 3\}$

(a) List the elements of set A.

..... [1]

(b) Write all the elements of U in the correct parts of the Venn diagram above. [3]

(c) List the elements of $(A \cup B)'$.

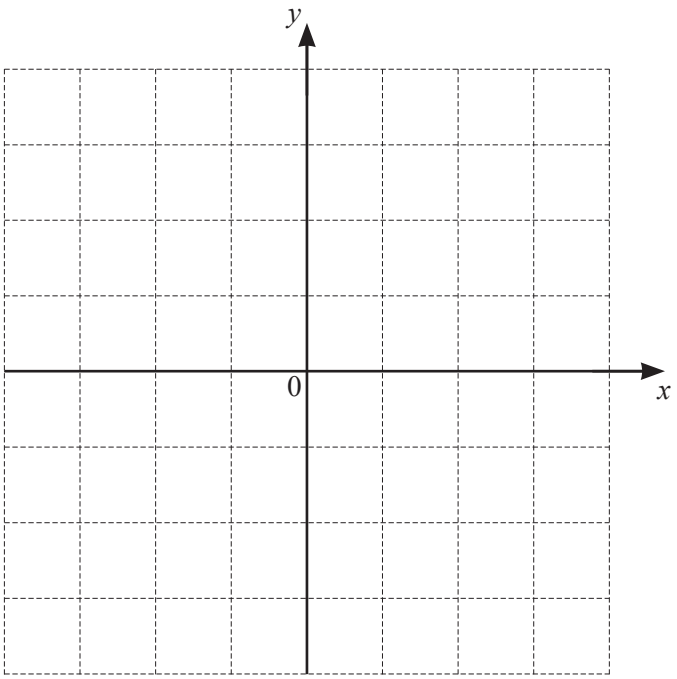
..... [1]

(d) Find $\text{n}((B \cup C) \cap A')$.

..... [1]

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6 You may use this grid to help you answer this question.



The transformation P is a reflection in the line $y = x$.

The transformation Q is a rotation of 180° about the origin.

The transformation R is a stretch, scale factor 2 with x-axis invariant.

The transformation S is a stretch, scale factor 2 with y-axis invariant.

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(a) (i) Find the co-ordinates of the image of the point (5, 1) under the transformation P.

(..... , ...) [1]

(ii) Find the co-ordinates of the image of the point (x, y) under the transformation P followed by the transformation Q.

(..... , ...) [2]

(iii) Describe fully the **single** transformation equivalent to P followed by Q.

.....

..... [2]

(b) Describe fully the **single** transformation equivalent to R followed by S.

.....

..... [3]

(c) Describe fully the **single** transformation equivalent to the inverse of R.

.....

..... [2]

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7 **(a)** Sergio invests \$2000 at a rate of 3% per year compound interest.

(i) Find the value of his investment at the end of 5 years.

\$ ..... [3]

(ii) After how many complete years is the value of his investment greater than \$4000?

..... [3]

(b) Anna invests \$2000 at a rate of 0.24% per **month** compound interest.

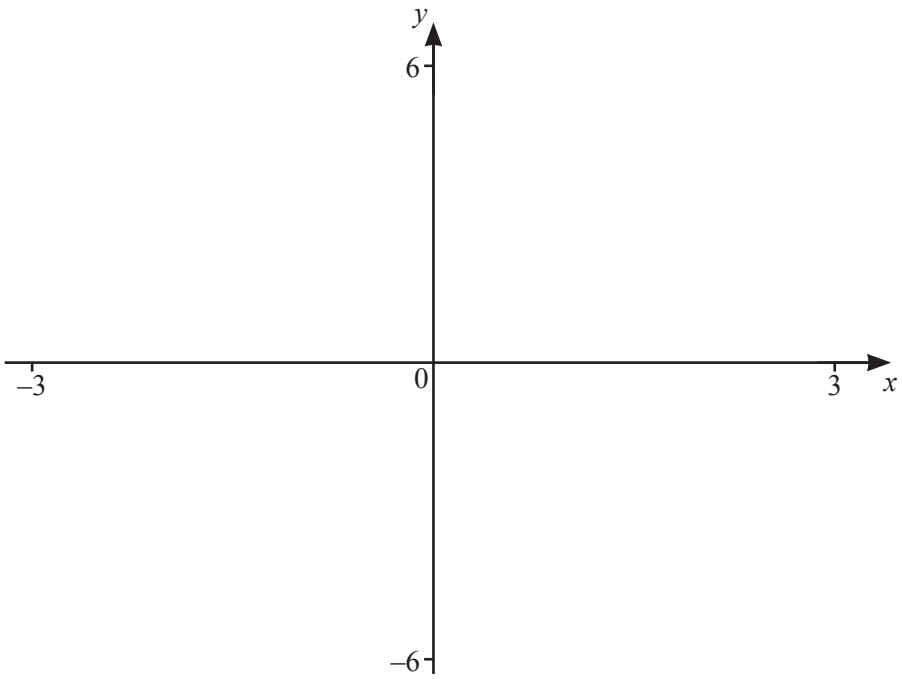
Find the value of her investment at the end of 5 years.

\$ ..... [3]

(c) Calculate the **monthly** compound interest rate that is equal to a compound interest rate of 3% per year.

.....% [3]

8



(a) On the diagram, sketch the graph of $y = f(x)$, where

$$f(x) = |x^2 - 4| \text{ for values of } x \text{ between } -3 \text{ and } 3.$$

[3]

(b) Write down the equation of the line of symmetry of the graph.

..... [1]

(c) Write down the zeroes of $f(x)$.

..... and ..... [1]

(d) (i) Find the value of k when $y = k$ meets the curve $y = |x^2 - 4|$ three times.

$k =$ ..... [1]

(ii) Find the range of values of k when $y = k$ meets the curve $y = |x^2 - 4|$ four times.

..... [2]

9 **(a)** Solve the following equations.

(i) $\frac{135}{x} = 5$

$x =$ ..... [1]

(ii) $3x + 5 = 7x + 25$

$x =$ ..... [2]

(iii) $8x^2 = 11 - 2x$

$x =$ ..... or $x =$ ..... [4]

(b) Solve the following inequalities.

(i) $6 - 2x \geqslant 10$

..... [2]

(ii) $\frac{1}{x-2} > 3$

..... [3]

(c) Solve the simultaneous equations.
You must show all your working.

$$3x + 5y = -3$$
$$5x - 2y = 26$$

$x =$ .....

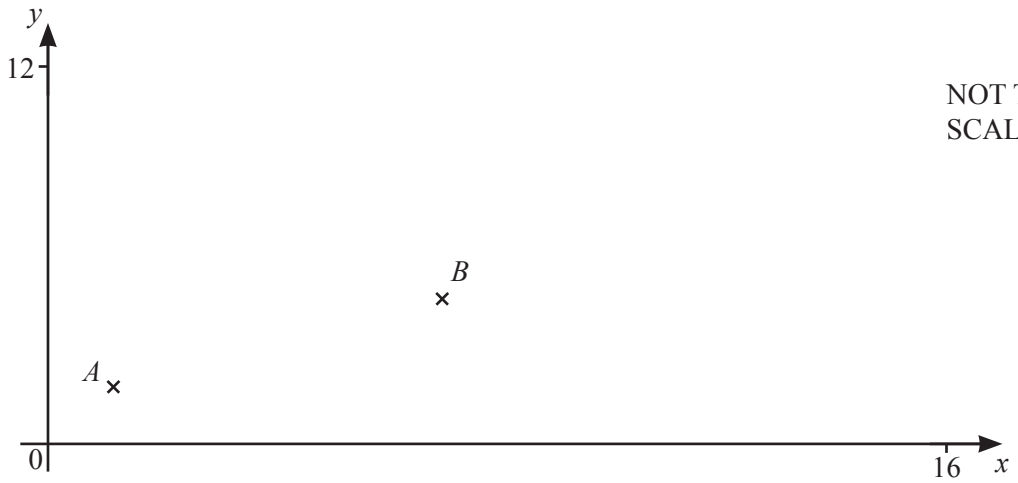
$y =$ ..... [4]

(d) Solve the equation.

$$\log x + 4 \log 2 = \log 13$$

$x =$ ..... [3]

10 The points A (1, 2) and B (7, 5) are shown on the diagram below.



(a) Write $\overrightarrow{AB}$ as a column vector.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) Calculate the length of the line AB.

..... [2]

(c) The point C has co-ordinates $(10, k)$.
$AB = BC$ and $k > 0$.

Show that $k = 11$.

[3]

(d) Find the equation of the line that is perpendicular to AC that passes through the midpoint of AC. Give your answer in the form $y = mx + c$.

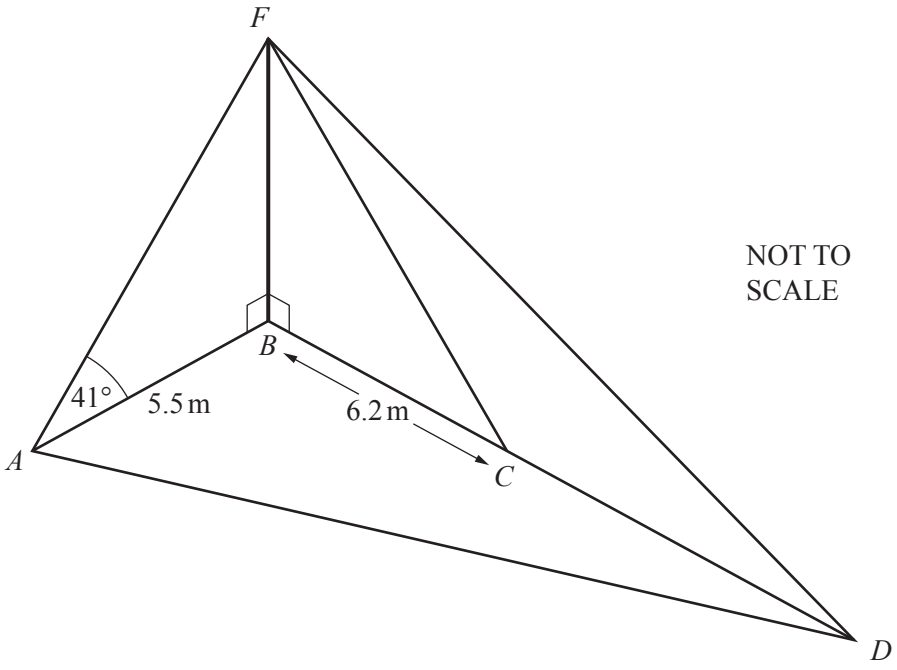
$y =$ ..... [4]

(e) The points A, B, C and D form a rhombus.

Find the co-ordinates of D.

(..... , ...) [3]

11



The diagram shows four points *A, B*, *C* and *D* on horizontal ground.
There is a vertical flagpole, *FB,* held in place by straight wires *AF*, *CF* and *DF*.
BCD is a straight line, $AB = 5.5\,\text{m}$, $BC = 6.2\,\text{m}$ and angle $FAB = 41°$.

(a) Show that $FB = 4.781\,\text{m}$, correct to 3 decimal places.

[2]

(b) Calculate angle *FCB*.

Angle *FCB* = ... [2]

(c) Angle $CDF = 18°$.

Show that $CD = 8.514$, correct to 3 decimal places.

[3]

(d) Angle $ABC = 78°$.

Find AD.

$AD =$ ..... m [3]

(e) Find the area of triangle ABD.

..... m^2 [2]

12 **(a)** y varies directly as the square root of $(x + 1)$.
$y = 8$ when $x = 24$.

(i) Find the value of y when $x = 15$.

$y =$ ..... [3]

(ii) Find the value of x when $y = 16$.

$x =$ ..... [2]

(b) Find the next term in each of the following sequences.

(i) 18, 13, 8, 3, –2, …

..... [1]

(ii) 3, 6, 11, 18, 27, …

..... [1]

(iii) –1000, 100, –10, 1, …

..... [1]

(iv) 0, 0, 0, 6, 24, 60, …

..... [2]

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