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CANDIDATE NAME

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4063838096

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2024**

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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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. $\quad A = \pi rl$

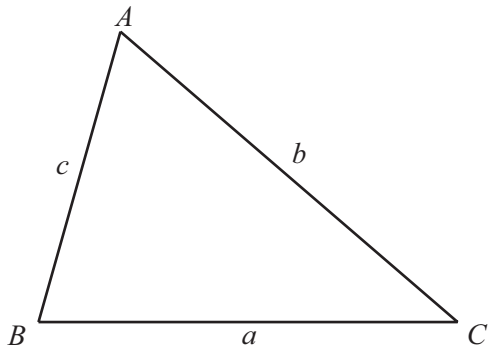
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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. $\quad V = \frac{4}{3}\pi r^3$



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

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

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

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Answer **all** the questions.

1 **(a)** The line $2x+3y=12$ crosses the x-axis at P and the y-axis at Q.

Find the coordinates of P and the coordinates of Q.

P (..... , ...)

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

(b) **(i)** A is the point $(-2, 5)$ and B is the point $(4, -1)$.

Find the column vector of the translation from point A to point B.

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

(ii) Find the coordinates of the mid-point of AB.

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

(c) Find the magnitude of $\begin{pmatrix} 7 \\ 9 \end{pmatrix}$.

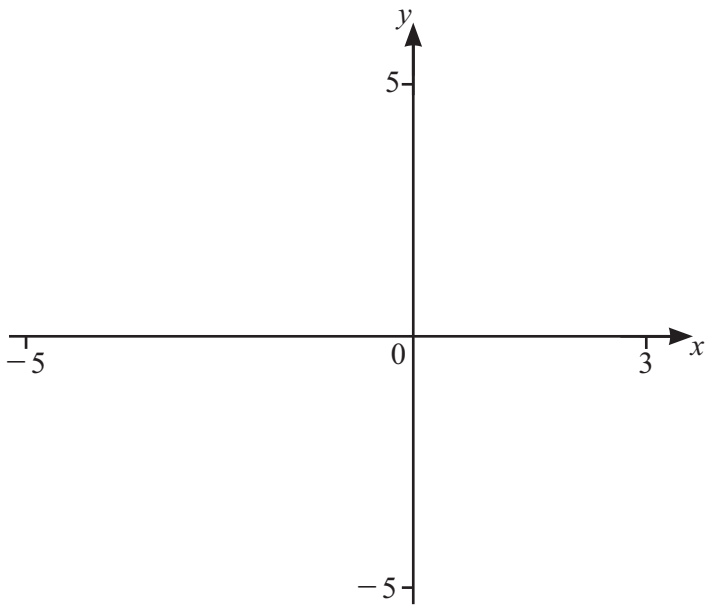
..... [2]

(d) The line L has gradient 3 and passes through the point $(-2, 7)$.

Find the equation of line L.
Give your answer in the form $y = mx+c$.

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

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$$f(x) = \frac{4}{(x+2)} - x$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -5 and 3. [2]

(b) On the diagram, draw the asymptote to the graph of $y = f(x)$. [1]

(c) Solve the equation $f(x) = -1$.

..... [2]

(d) (i) Solve the equation $f(x) = x^2 - 1$.

..... [2]

(ii) Solve the inequality $f(x) < x^2 - 1$.

..... [2]

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3 **(a)** Write $1\frac{1}{25}$ as a percentage.

..... % [1]

(b) In a sale, all prices are reduced by 15%.
Lola buys a jacket which has an original price of \$64.

Calculate the sale price of this jacket.

\$ ..... [2]

(c) Nina invests \$$x$ at a rate of 1.8% per year compound interest.
At the end of 3 years the value of this investment is \$3375.93, correct to the nearest cent.

Calculate the value of x.

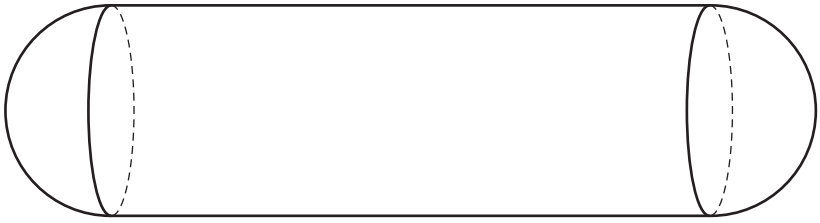
$x =$ ..... [2]

(d) Olav buys a car for \$13 000.
Each year the value of the car decreases by 12% of its value in the previous year.

Calculate the number of complete years it takes for the value of Olav's car to first become less than \$5000.

..... [4]

4 (a)



NOT TO SCALE

The diagram shows a solid metal shape made from a cylinder and two hemispheres.
The radius of the cylinder and of the hemispheres is 3 cm.
The length of the cylinder is 15 cm.

(i) Show that the total volume of the shape is 537 cm^3, correct to 3 significant figures.

[3]

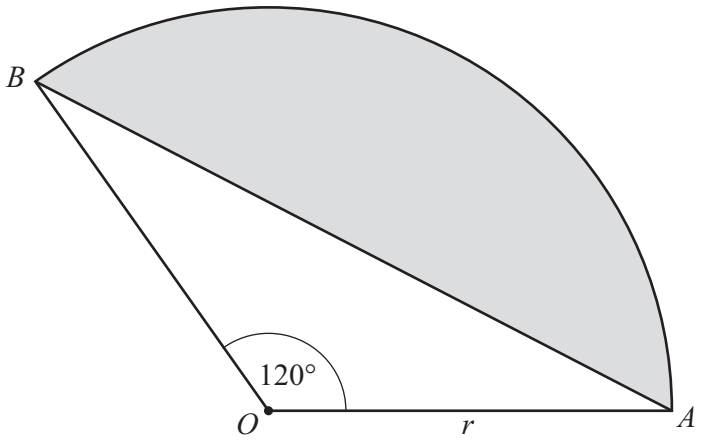
(ii) The shape is melted and all the metal is used to make 600 identical small cubes.

Calculate the side length of one of these cubes.
Give your answer in millimetres.

..... mm [3]

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(b)



NOT TO SCALE

The diagram shows a sector OAB with radius r cm and centre O.
The sector angle is 120°.
The shaded segment has an area of 18.4 cm^2.

Calculate the length of the arc AB.

..... cm [5]

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5 **(a)** $v^2 = u^2 - 2as$

(i) Find the value of v when $u = 7$, $a = 1.5$ and $s = 10$.

$v =$ ..... [2]

(ii) Rearrange the formula to write u in terms of v, a and s.

$u =$ ..... [2]

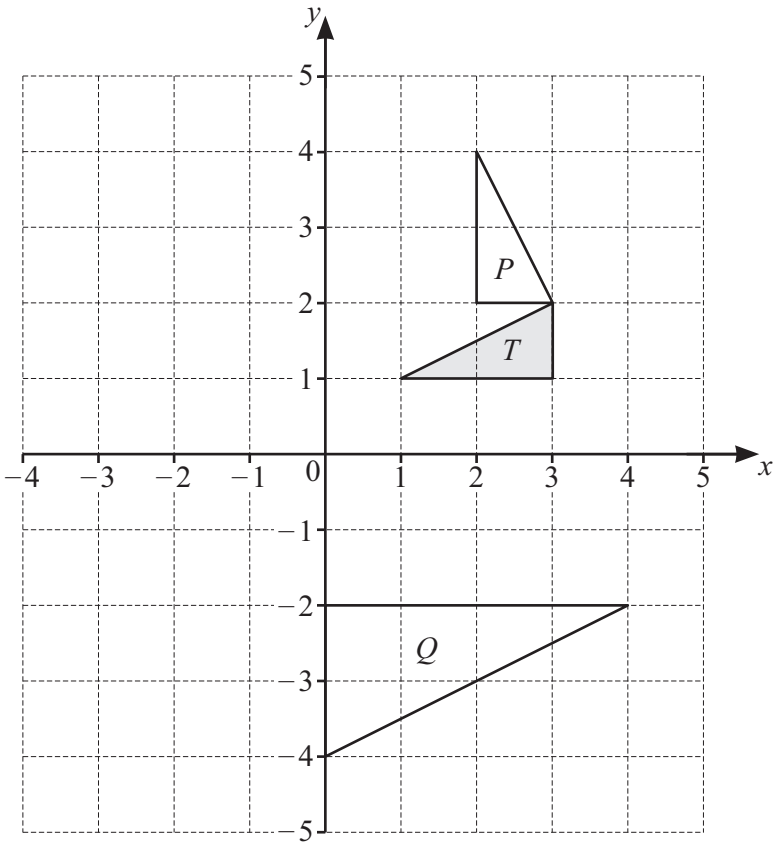
(b) Complete the table for sequences A, B and C.

Sequence	1st term	2nd term	3rd term	4th term	5th term		nth term
A	11	8	5	2			
B	3	8	15				$n^2 + 2n$
C	4	1	$\frac{1}{4}$	$\frac{1}{16}$			

[8]

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(a) Describe fully the **single** transformation that maps

(i) triangle T onto triangle P

.....

..... [3]

(ii) triangle T onto triangle Q.

.....

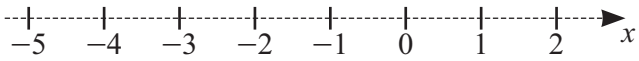
..... [3]

(b) Stretch triangle T by factor 2 with invariant line $x = 5$. [2]

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7 **(a)** $-3 < x \leqslant 1$

Show this inequality on the number line.



[2]

(b) **(i)** Solve the inequality $-7 \leqslant 2x + 1 < 5$.

..... [2]

(ii) Write down the integers that satisfy the inequality $-7 \leqslant 2x + 1 < 5$.

..... [2]

(c) Solve.

$7(x - 3) - 3(2x + 1) = 1$

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

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(d) $\frac{1}{y}+\frac{8}{y+5}=1$

(i) Show that $y^2-4y-5=0$.

[3]

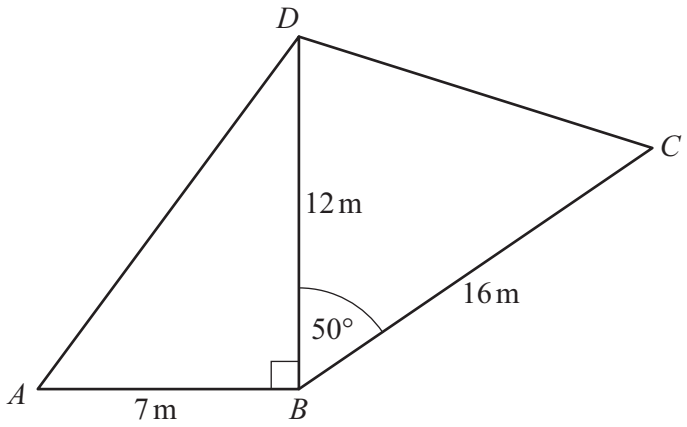
(ii) Solve by factorisation.

$$y^2-4y-5=0$$

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

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NOT TO SCALE

The diagram shows four points, A, B, C and D, on horizontal ground.

(a) Calculate AD.

$AD =$ ..... m [2]

(b) Calculate angle DAB.

Angle $DAB =$ ..... [2]

(c) Calculate CD.

$CD =$ ..... m [3]

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(d) The point P lies on BC and is the nearest point to D.

Calculate BP.

$BP =$ ..... m [3]

(e) D is due north of B.

Calculate the bearing of C from A.

..... [5]

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9 $f(x) = x^3 + 1$ $g(x) = \tan x$ $h(x) = 3^x + 1$

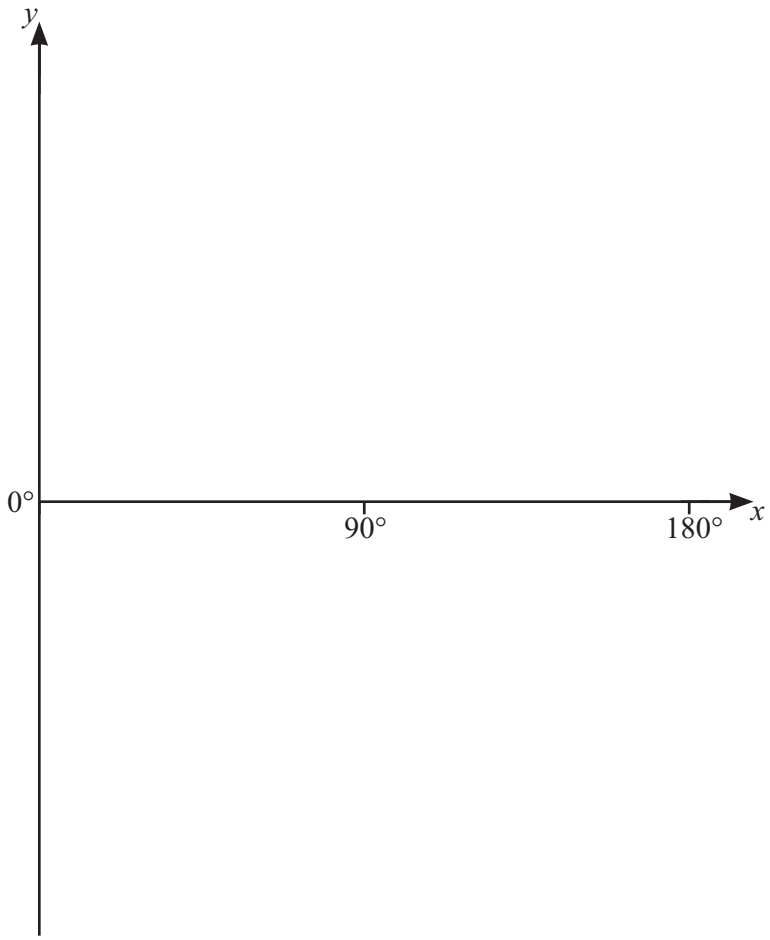
(a) Find $f(-2)$.

..... [1]

(b) Find the exact value of g(120).

..... [1]

(c) On the diagram, sketch the graph of $y = g(x)$ for values of x between 0° and 180°.



[2]

(d) Find x when $h(x) = 82$.

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

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(e) Find $h^{-1}(x)$.

$h^{-1}(x) =$ ..... [2]

(f) Simplify fully.

$$f(x) - \frac{1}{f(x)}$$

Give your answer as a single fraction.

..... [3]

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10 (a) Zola measures the height of each of 100 plants in her garden.
The table shows her results.

Height (h cm)	$0 < h \leqslant 10$	$10 < h \leqslant 15$	$15 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 60$
Frequency	13	21	25	19	22

(i) Calculate an estimate of the mean.

..... cm [2]

(ii) One of the plants is chosen at random.

Find the probability that the plant has a height greater than 15 cm.

..... [1]

(iii) Two of the 100 plants are chosen at random without replacement.

Find the probability that one plant has a height of 15 cm or less and one has a height greater than 30 cm.

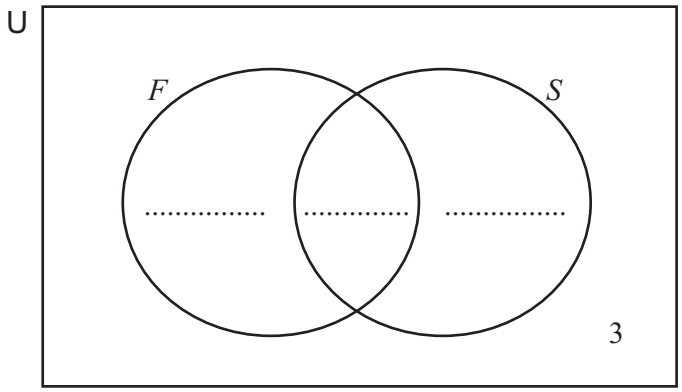
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(b) 50 students are asked if they like football (F) and if they like swimming (S).

3 do not like football and do not like swimming.
38 like football.
16 like swimming.

(i) Complete the Venn diagram.



[2]

(ii) Write down the number of students who like football and swimming.

..... [1]

(iii) One of the 50 students is chosen at random.

Find the probability that this student likes football or swimming but not both.

..... [1]

(iv) Two of the students who like swimming are chosen at random.

Find the probability that they both like football.

..... [2]

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11 **(a)** a is a positive integer.

Rationalise the denominator.

$$\frac{3}{\sqrt{a}-1}$$

..... [2]

(b) $(g+h\sqrt{3})(h-g\sqrt{3}) = p+q\sqrt{3}$

Find p and q in terms of g and h.

$p =$ .....

$q =$ ..... [3]

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(c) (i) d is an integer.

Work out $3 \times 10^{d} + 3 \times 10^{d-2}$, giving your answer in standard form.

..... [2]

(ii) Find $\sqrt[3]{8 \times 10^{2000}}$.
Give your answer in standard form.

..... [2]

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