Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2022**

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.

DC (LK/SG) 303255/2

Formula List

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

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

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

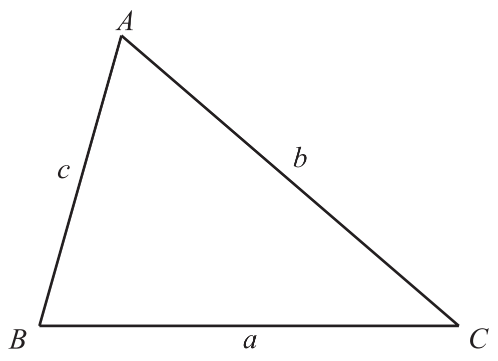
Curved surface area, A, of sphere of radius r. $\qquad A = 4\pi r^2$

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

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

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

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



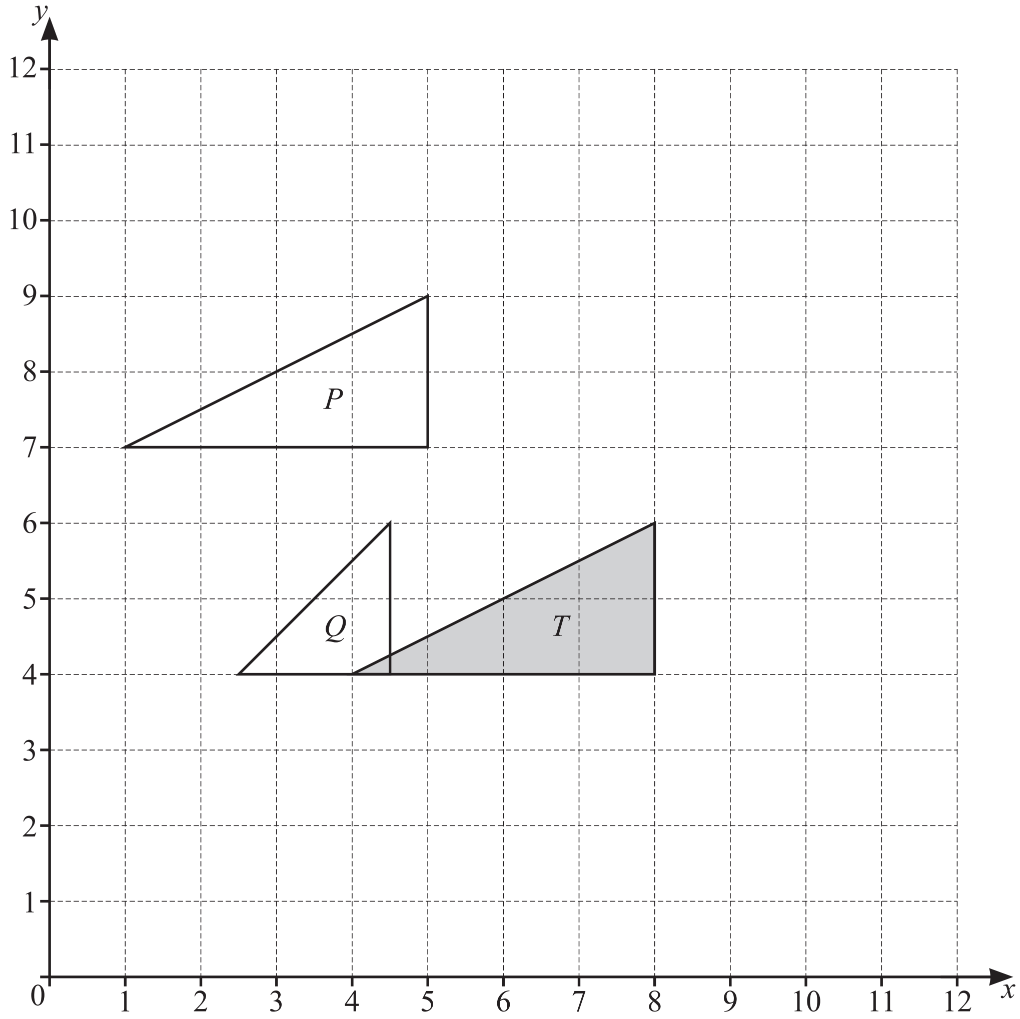
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



(a) Rotate triangle T through 90° clockwise about the point (9, 6). [2]

(b) Enlarge triangle T with scale factor $\frac{1}{2}$, centre (0, 0). [2]

(c) Describe fully the **single** transformation that maps triangle T onto triangle P.

....

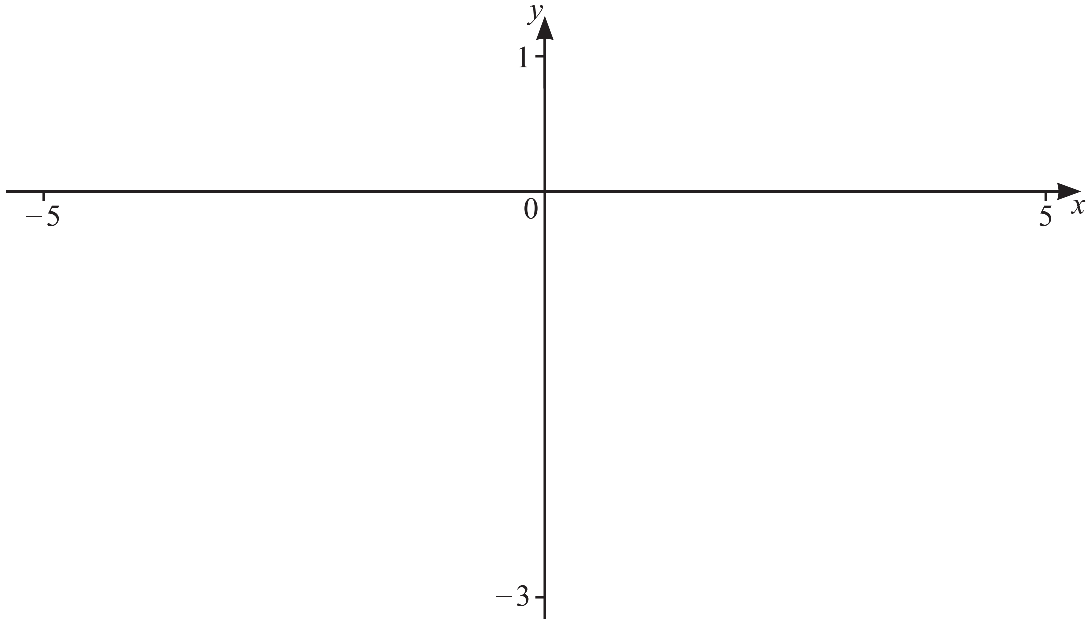
.... [2]

(d) Describe fully the **single** transformation that maps triangle T onto triangle Q.

....

.... [3]

2



$$f(x) = \frac{1}{x} - \frac{1}{x^2}$$

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

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

.... [1]

(c) Solve the equation $f(x) = 0$.

$x =$ .... [1]

(d) Find the maximum value of $f(x)$.

.... [1]

(e) Write down the equation of each asymptote.

.... [2]

(f) **(i)** Solve the equation.

$$\frac{1}{x}-\frac{1}{x^2}=x^2-2$$

.... [3]

(ii) The equation $\frac{1}{x}-\frac{1}{x^2}=x^2-2$ can be rearranged to the form $x^4+ax^2+bx+c=0$.

Find the values of a, b and c.

$a =$ ....

$b =$ ....

$c =$ .... [2]

3 **(a)** Amira buys a magazine that costs $\$n$ and a book that costs $\$(2n + 5)$.
She pays with a \$20 note and receives \$1.62 change.

Find the cost of a magazine.

\$ .... [3]

(b) The cost of a bar of chocolate is $\$x$ and the cost of a bag of sweets is $\$y$.

Bruce buys 2 bars of chocolate and 1 bag of sweets for a total of \$3.60 .
Charlie buys 3 bars of chocolate and 2 bags of sweets for a total of \$6.05 .

Find the total cost of 1 bar of chocolate and 3 bags of sweets.
You must show all your working.

\$ .... [5]

4 Complete the table for the 5th term and the nth term of each sequence.

Sequence	1st term	2nd term	3rd term	4th term	5th term		nth term
A	3	5	7	9			
B	1	8	27	64			
C	$\frac{1}{4}$	$\frac{1}{2}$	1	2			
D	0	2	6	12			

[11]

5 **(a)** Kris and Laila share \$200 in the ratio 2 : 3.

(i) Show that Kris receives \$80.

[1]

(ii) Kris spends 30.8% of his \$80 on a book.

Calculate the cost of the book.

\$ .... [2]

(iii) Laila invests her \$120 at a rate of 1.16% per year simple interest.

Calculate the total amount Laila has at the end of 5 years.

\$ .... [3]

(b) On 1 January 2020, Sangita invests an amount of money at a rate of 2% per year compound interest.
On 1 January 2023 the value of the investment is $5306.04 .

(i) Calculate the amount Sangita invested on 1 January 2020.

$ .... [2]

(ii) Calculate the value of the investment on 1 January 2025.

$ .... [2]

(c) Tomas invests an amount of money at a rate of 1.4% per year compound interest.

Find the number of complete years it takes for the value of his investment to increase by 50%.

.... [4]

6 **(a)** $\mathbf{p} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ $\mathbf{r} = \begin{pmatrix} -1 \\ 7 \end{pmatrix}$

(i) Find 2**p**.

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

(ii) Find $\frac{1}{4}\mathbf{p} - \mathbf{r}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(iii) Find the magnitude of **p**.

.... [2]

(b) K is the point (3, 4).

(i) The vector from K to L is $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$.

Find the coordinates of L.

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

(ii) The vector from J to K is $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$.

Find the coordinates of J.

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

(c) A is the point $(-1, 3)$ and B is the point $(5, 7)$.
The perpendicular bisector of the line AB meets the x-axis at C.

Find the coordinates of C.

(.................... , ...) [7]

7 **(a)** The time, t hours, spent watching television in one week by each of 100 students is shown in the table.

Time, t hours	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 25$	$25 < t \leqslant 30$	$30 < t \leqslant 60$
Frequency	3	11	42	40	4

(i) A pie chart is drawn to show the results.

Calculate the sector angle for the number of students who spend more than 30 hours watching television.

.... [2]

(ii) Calculate an estimate of the mean.

.... h [2]

(b) A shopkeeper records the midday temperature, t °C, and the number of ice creams, n, sold each day in one week.
The table shows the results.

Midday temperature, t °C	20	24	20	17	18	20	25
Number of ice creams, n	103	106	95	91	93	98	114

(i) Write down the type of correlation shown in the table.

.... [1]

(ii) Find the equation of the regression line, giving n in terms of t.

$n =$ .... [2]

(iii) Use your answer to **part(b)(ii)** to find the number of ice creams expected to be sold when the midday temperature is 22 °C.

.... [1]

(iv) During this week, the shopkeeper sells 700 ice creams.
She estimates that she will sell a total of 9800 ice creams during the next 14 weeks.

Give a reason why this may not be a good estimate.

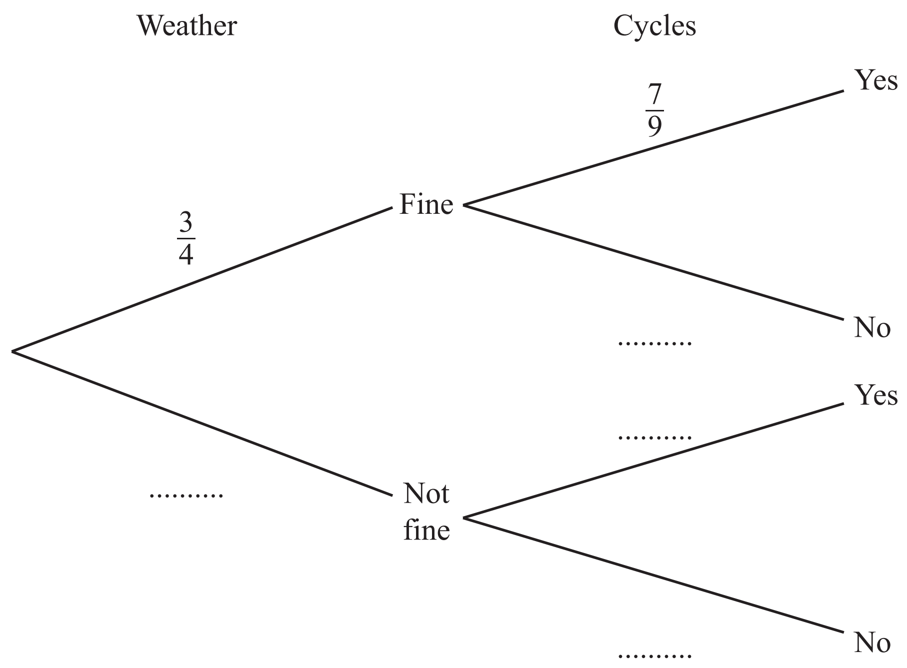
.... [1]

(c) When the weather is fine, the probability that Lance goes cycling is $\frac{7}{9}$.

When the weather is not fine, the probability that Lance goes cycling is $\frac{1}{5}$.

The probability that the weather is fine is $\frac{3}{4}$.

(i) Complete the tree diagram.

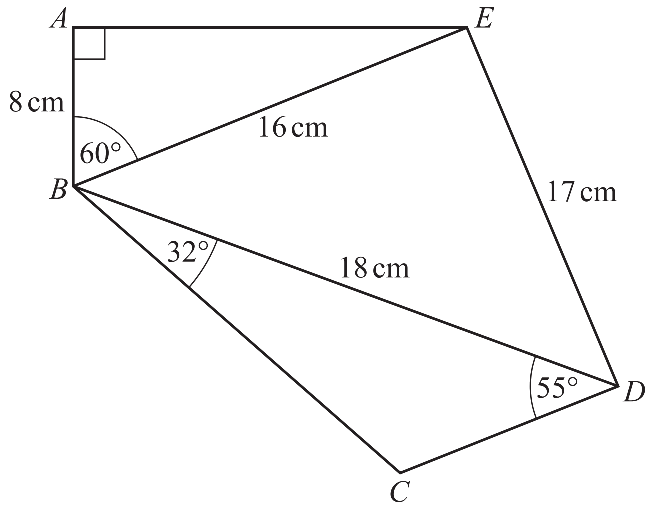


[2]

(ii) Find the probability that Lance goes cycling.

.... [3]

8



The diagram shows a pentagon *ABCDE* and diagonals *BD* and *BE*.

(a) **(i)** Calculate angle *BCD*.

Angle *BCD* = ... [1]

(ii) Calculate *BC*.

BC = ... cm [3]

(b) Calculate angle *EBD*.

Angle *EBD* = ... [3]

(c) Calculate the area of the pentagon *ABCDE*.

.... cm^2 [4]

(d) Calculate the shortest distance from *C* to *AE*.

.... cm [4]

9 **(a)** $f(x) = 2x + 3$ $g(x) = x^2 + 1$ $h(x) = 2\sin(2x)$

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

.... [1]

(ii) Find $f^{-1}(x)$.

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

(iii) Find x when $g(x) = 2f(x)$.

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

(iv) Find $g(f(x))$, giving your answer in the form $ax^2 + bx + c$.

.... [3]

(v) Find the amplitude and period of $\mathrm{h}(x)$.

Amplitude = ...

Period = ... [2]

(vi) Solve the equation $\mathrm{h}(x) = \sqrt{3}$ for $0° \leqslant x \leqslant 180°$.

.... [2]

(b) $\mathrm{j}(x) = \log_a x, \ x > 0$

(i) Find the value of $\mathrm{j}\left(\sqrt[3]{a}\right)$.

.... [1]

(ii) Find $\mathrm{j}^{-1}(x)$.

$\mathrm{j}^{-1}(x) =$ .... [2]

10 **(a)** A machine lays a pipe of length 2.5 km in 18 hours.
The machine always works at the same rate.

Calculate the time it takes to lay a pipe of length 4 km.

.... hours [2]

(b) t varies inversely as the square root of x.
x varies directly as the square of y.

When $x = 4$, $t = 3$.
When $y = 4$, $x = 81$.

$ty = h$

Find the value of h.

$h =$ .... [5]

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