



# Cambridge IGCSE™

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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  $\pi$ , 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.

## Formula List

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

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

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

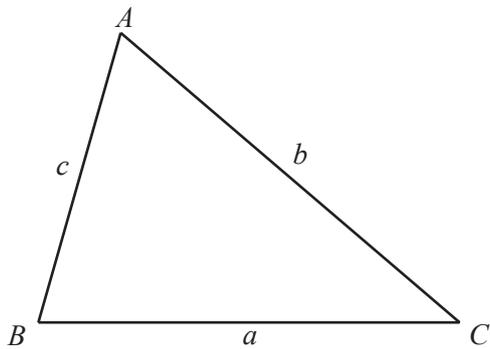
Curved surface area,  $A$ , of sphere of radius  $r$ .  $A = 4\pi r^2$

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

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

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

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



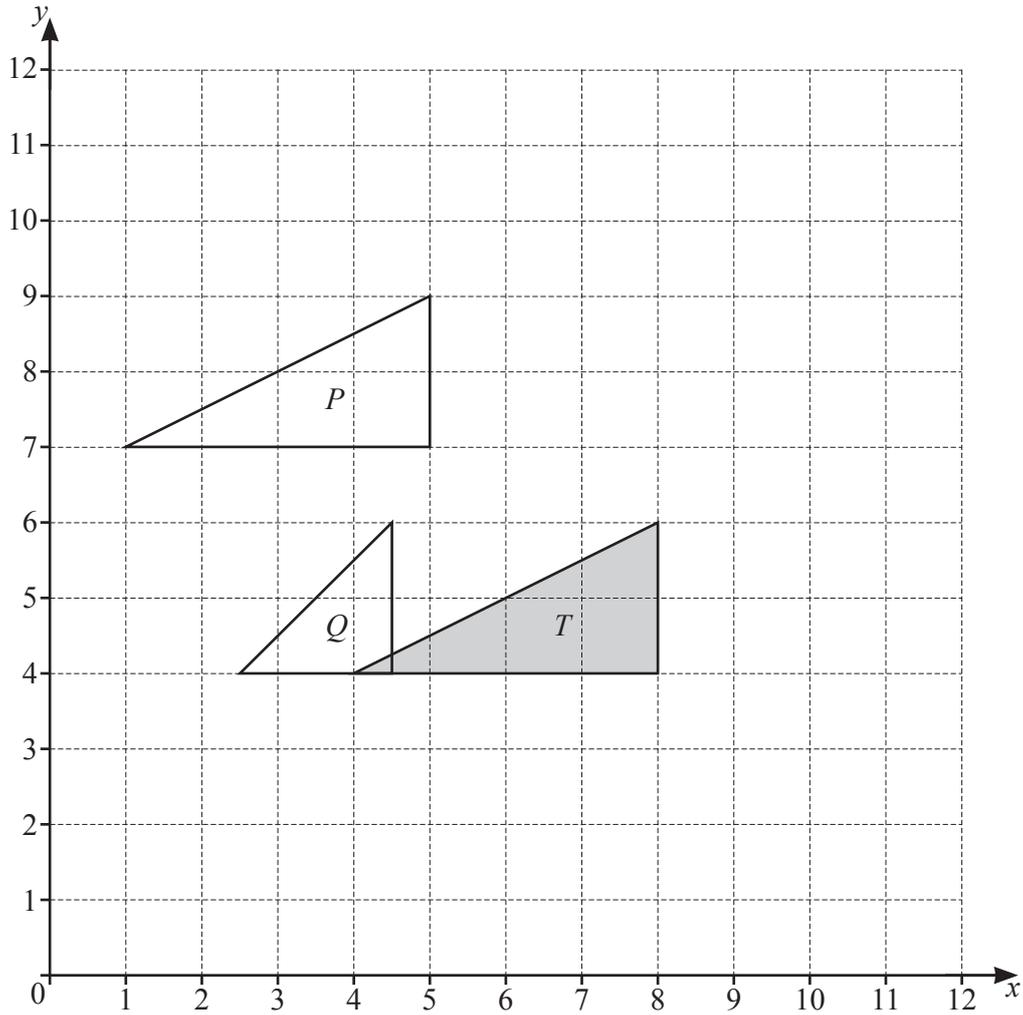
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1

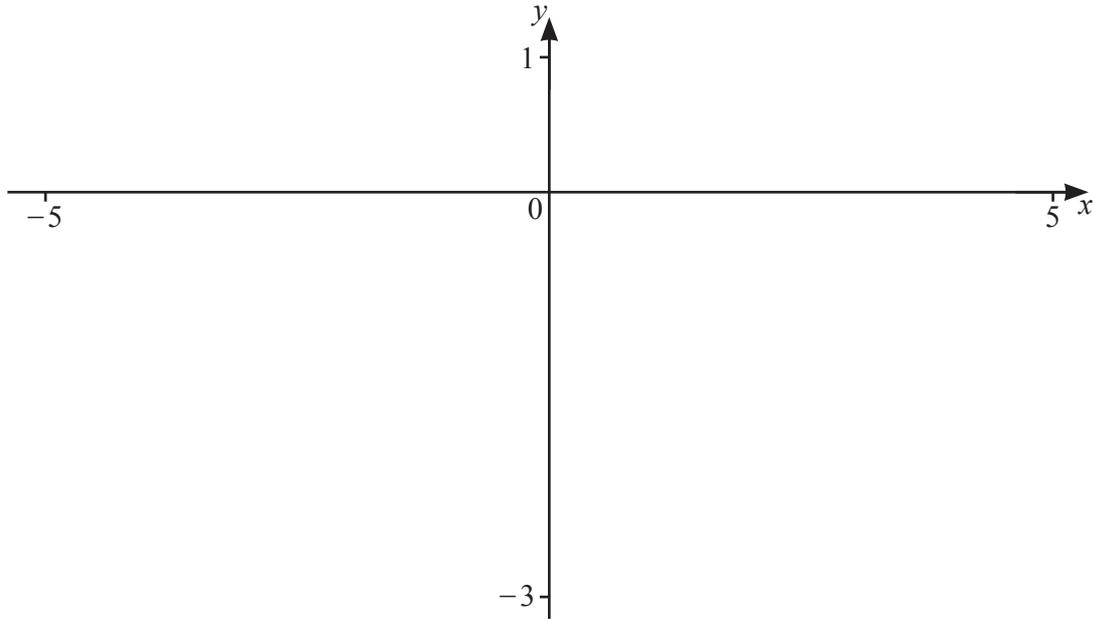


(a) Rotate triangle *T* through  $90^\circ$  clockwise about the point (9, 6). [2]

(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]



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

(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  $n$ th term of each sequence.

Sequence	1st term	2nd term	3rd term	4th term	5th term		$n$ th 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  $2\mathbf{p}$ .

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [1]$$

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

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [2]$$

(iii) Find the magnitude of  $\mathbf{p}$ .

..... [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	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 60$
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]

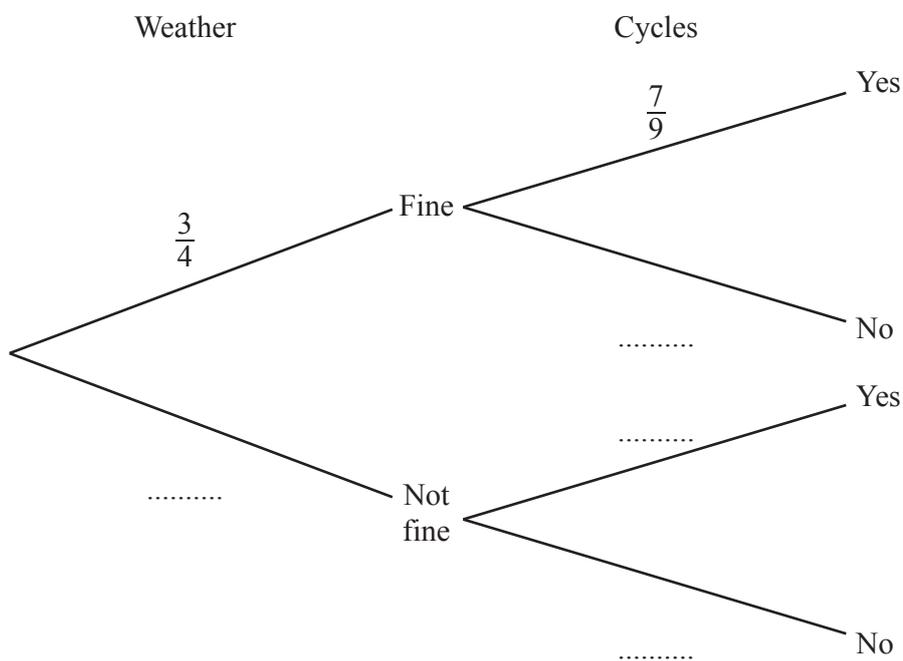
- (iv) During this week, the shopkeeper sells 700 ice creams.  
She estimates that she will sell a total of 9800 ice creams during the next 14 weeks.

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  $\frac{3}{4}$ .

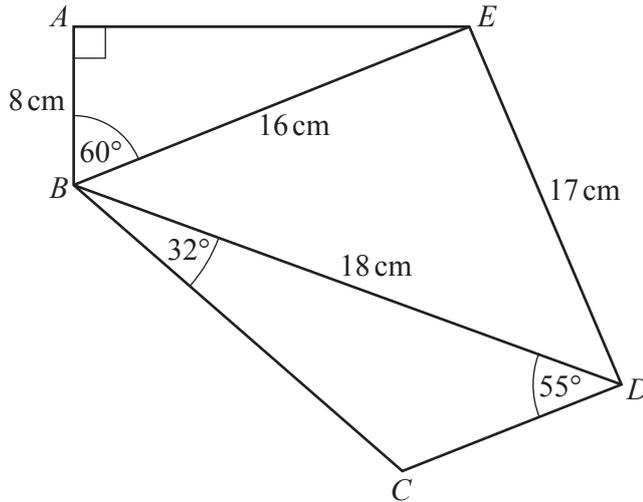
- (i) Complete the tree diagram.



[2]

- (ii) Find the probability that Lance goes cycling.

..... [3]



NOT TO SCALE

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

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

Angle  $BCD = \dots\dots\dots$  [1]

(ii) Calculate  $BC$ .

$BC = \dots\dots\dots\text{ cm}$  [3]

(b) Calculate angle  $EBD$ .

Angle  $EBD = \dots\dots\dots$  [3]

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

.....  $\text{cm}^2$  [4]

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

.....  $\text{cm}$  [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  $h(x)$ .

Amplitude = .....

Period = ..... [2]

(vi) Solve the equation  $h(x) = \sqrt{3}$  for  $0^\circ \leq x \leq 180^\circ$ .

..... [2]

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

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

..... [1]

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

$j^{-1}(x) = \dots\dots\dots$  [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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