



# Cambridge IGCSE™

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**MATHEMATICS**

**0580/31**

Paper 3 (Core)

**October/November 2022**

**2 hours**

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 calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- 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 either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

1 Helga buys some items to do some knitting.

(a) Complete Helga's bill from one shop.

Item	Cost (\$)
2 pairs of knitting needles at \$4.95 a pair	
6 buttons at \$0.65 each	
1 knitting pattern at \$3.60	3.60
Total	

[3]

(b) Helga also buys 8 balls of wool from another shop.  
Each ball costs \$3.12 .  
Helga pays with a \$50 note.

Work out the amount of change she receives.

\$ ..... [2]

(c) Helga knits some squares.  
Each square is either white, pink or blue.  
The number of squares are in the ratio white : pink : blue = 5 : 3 : 2.  
30 squares are blue.

Show that Helga knits 150 squares.

[2]

(d) Helga uses some of the squares to make a rectangular blanket.  
The blanket is 6 squares long and 4 squares wide.

(i) Calculate the percentage of the 150 squares she uses to make this blanket.

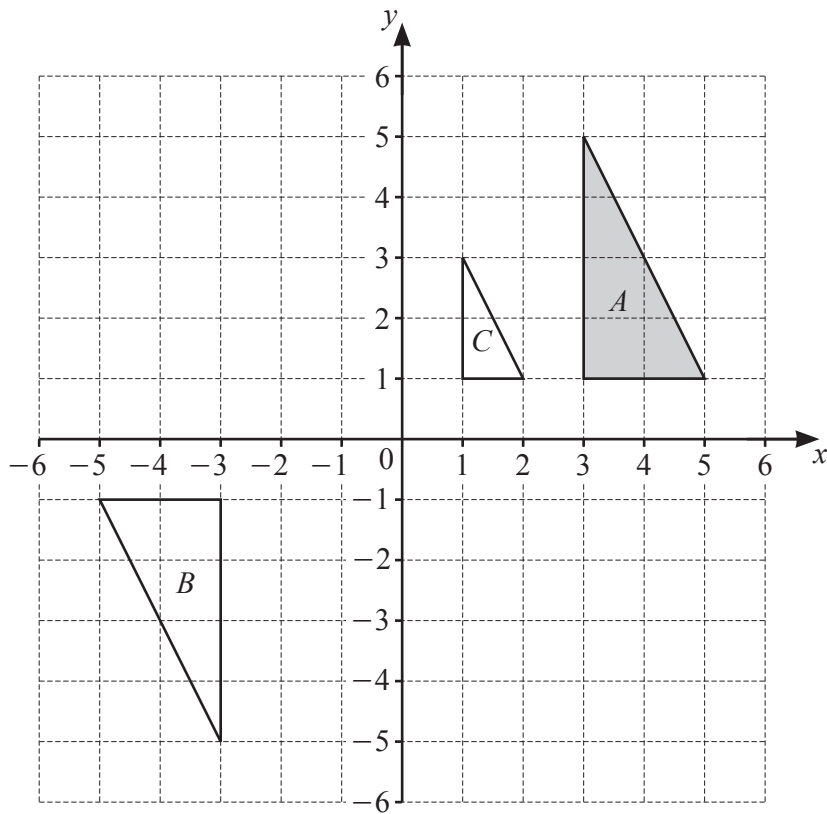
..... % [2]

(ii) Each square has side length 15 cm.

Work out the perimeter of this blanket.  
Give your answer in metres.

..... m [3]

2 Triangles  $A$ ,  $B$  and  $C$  are shown on the grid.



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

(i) triangle  $A$  onto triangle  $B$ ,

.....  
 ..... [3]

(ii) triangle  $A$  onto triangle  $C$ .

.....  
 ..... [3]

(b) On the grid,

(i) reflect triangle  $A$  in the line  $y = 0$ ,

[2]

(ii) translate triangle  $A$  by the vector  $\begin{pmatrix} -7 \\ 1 \end{pmatrix}$ .

[2]

3 Miguel works in an office.

(a) It takes Miguel 40 minutes to drive to work.

(i) He leaves home at 07 45.

What time does he arrive at work?

..... [1]

(ii) Miguel drives to work at an average speed of 57 km/h.

Show that he drives 38 km.

[2]

(b) White paper costs  $w$  cents per sheet and pink paper costs  $p$  cents per sheet.  
Miguel uses 56 sheets of white paper and 21 sheets of pink paper.

Write down an expression, in terms of  $w$  and  $p$ , for the total cost, in cents, of the paper he uses.

..... cents [2]

(c) Miguel has a closed box of pens.

The box is in the shape of a cuboid measuring 20 cm by 12 cm by 7 cm.

Calculate the surface area of the box.

.....  $\text{cm}^2$  [3]

(d) Miguel records the length of time of each telephone call he receives, correct to the nearest minute.

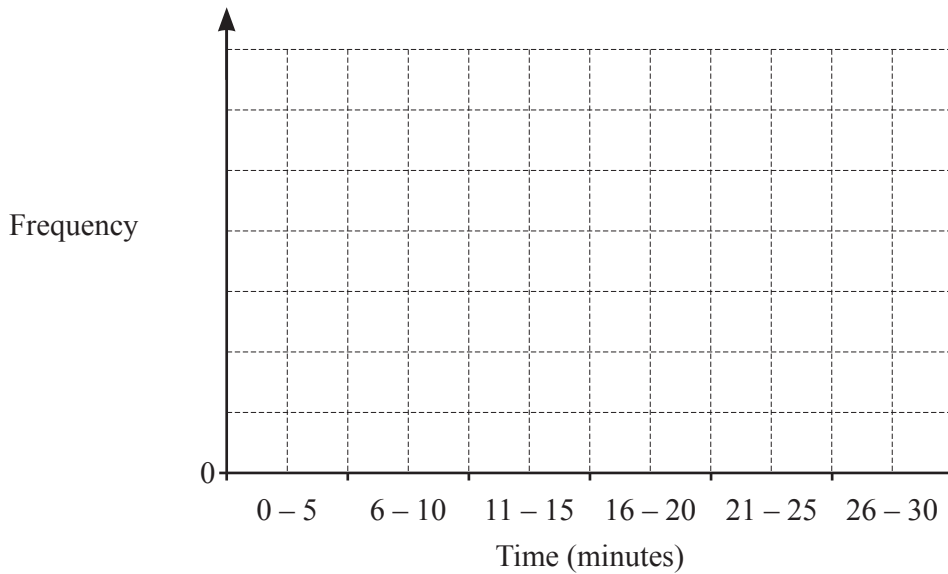
7    15    6    28    8    21    17    19    20    12  
 11    19    12    3    20    23    14    9    4    18

- (i) Complete the frequency table.  
 You may use the tally column to help you.

Time (minutes)	Tally	Frequency
0 – 5		
6 – 10		
11 – 15		
16 – 20		
21 – 25		
26 – 30		

[2]

- (ii) Draw a bar chart to show this information.  
 Complete the scale on the frequency axis.



[3]

- (iii) Use the bar chart to write down the modal group.

..... — ..... [1]

4 (a) Find

(i) a multiple of 3 between 70 and 80,

..... [1]

(ii) a factor of 63 between 5 and 10,

..... [1]

(iii) a cube number between 60 and 90,

..... [1]

(iv) the reciprocal of 7.

..... [1]

(b) Work out  $\frac{2}{7}$  of 84.

..... [1]

(c) Find the value of

(i)  $\sqrt[3]{3375}$ ,

..... [1]

(ii)  $12^0$ .

..... [1]

(d) Rana hires a car.  
The cost is \$74 per day plus a delivery cost of \$17.50 .  
Rana pays a total of \$461.50 .

Calculate the number of days that Rana hires the car.

..... days [2]

- (e) A train to town  $A$  leaves a station every 25 minutes.  
A train to town  $B$  leaves the same station every 45 minutes.  
Both trains leave at 08 00.

Find the next time both trains leave together.

..... [3]

- 5 (a) The table shows the number of items sold to each of 60 customers in a shop.

Number of items sold	Frequency
0	3
1	6
2	12
3	8
4	14
5	10
6	3
7	4

- (i) Find the range.

..... [1]

- (ii) Calculate the mean.

..... [3]

- (iii) Find the probability that a customer picked at random buys more than 4 items.

..... [2]



(b) Carlotta buys a bicycle.

(i) The length,  $l$  cm, of the bicycle is 96 cm, correct to the nearest centimetre.

Complete this statement about the value of  $l$ .

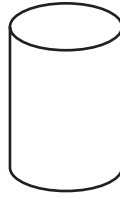
.....  $\leq l <$  ..... [2]

(ii) The diameter of each bicycle wheel is 46 cm.  
Carlotta rides the bicycle a distance of 1.4 km.

Calculate the number of complete revolutions that a wheel makes during this journey.

..... [5]

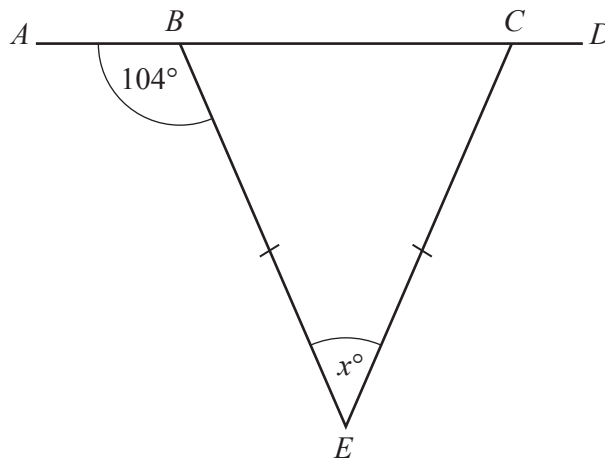
6 (a)



Write down the mathematical name of this solid.

..... [1]

(b)



NOT TO SCALE

The diagram shows triangle  $BCE$  and a straight line  $ABCD$ .  
 $BE = CE$  and angle  $ABE = 104^\circ$ .

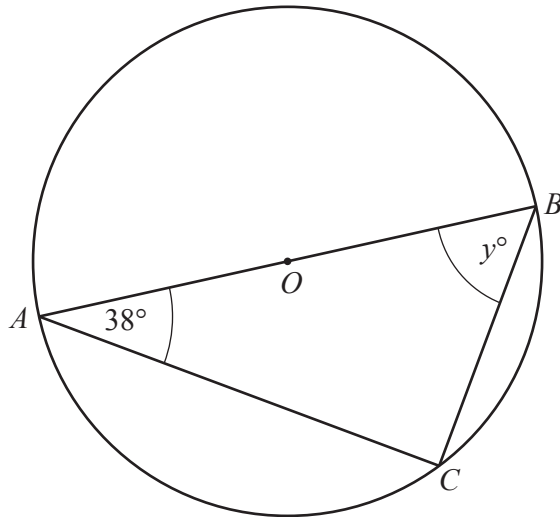
Find the value of  $x$ .

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

(c) Work out the size of one interior angle of a regular polygon with 15 sides.

..... [2]

(d)



NOT TO SCALE

$A$ ,  $B$  and  $C$  are points on a circle, centre  $O$ .

(i) Write down the mathematical name of the line  $BC$ .

..... [1]

(ii) Draw a tangent to the circle at point  $B$ .

[1]

(iii) The area of the circle is  $245.5 \text{ cm}^2$ .

Calculate  $AB$ .

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

(iv) Find the value of  $y$ .

$y = \dots\dots\dots$  [2]

7 (a) Simplify.

$$5g - 3h - 7g + 6h$$

..... [2]

(b)  $j = 4k + 7m$

Find the value of  $j$  when  $k = -5$  and  $m = 6$ . $j =$  ..... [2]

(c) Factorise completely.

$$14x^3 + 49x$$

..... [2]

(d) Solve.

$$8(3t - 9) = 108$$

 $t =$  ..... [3]

(e) (i)  $9^{24} \div 9^w = 9^5$

Find the value of  $w$ . $w =$  ..... [1]

(ii)  $4x^2 = 256$

Find the value of  $x$ . $x =$  ..... [1]

- (f) Ranjit's age is  $x$  years.  
Suzi's age is 3 times Ranjit's age.  
Juan's age is 4 years more than Suzi's age.  
The total of their ages is 46 years.

Use this information to write down an equation and solve it to find the value of  $x$ .

$$x = \dots\dots\dots [4]$$

8 (a)  $\mathbf{a} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$        $\mathbf{b} = \begin{pmatrix} 7 \\ -4 \end{pmatrix}$

Work out.

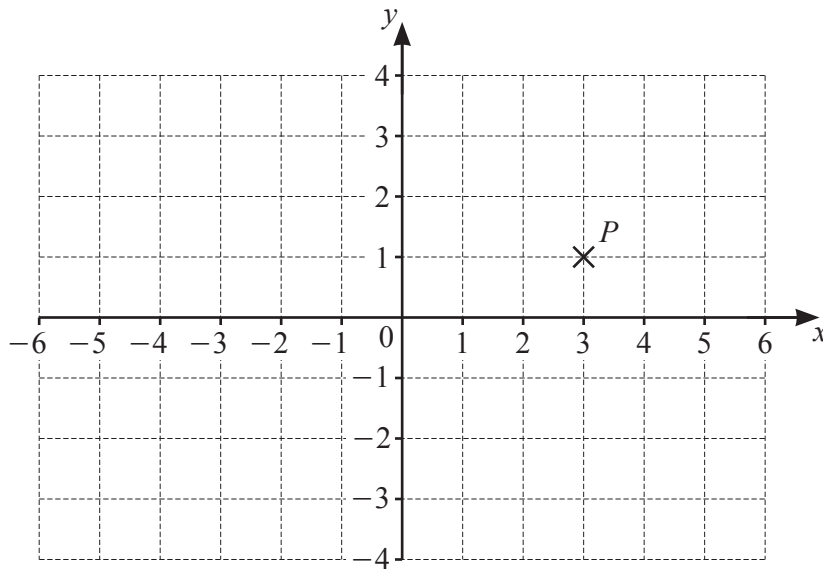
(i)  $4\mathbf{a}$

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

(ii)  $2\mathbf{a} - \mathbf{b}$

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

(b)



(i) Write down the coordinates of point  $P$ .

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

(ii) On the grid, plot point  $Q$  at  $(-4, 2)$ .

[1]

(iii)  $\vec{PR} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$

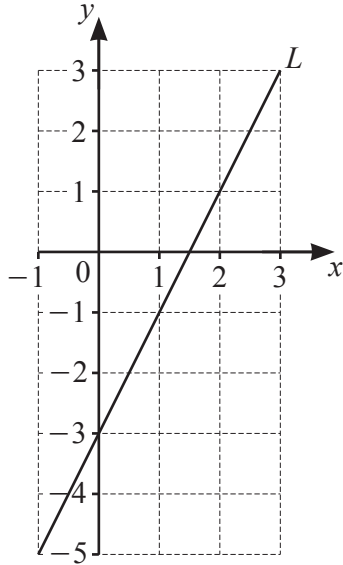
On the grid, plot point  $R$ .

[1]

(iv) On the grid, draw the line  $y = 3$ .

[1]

(c)



Line  $L$  is shown on the grid.

(i) Find the equation of line  $L$  in the form  $y = mx + c$ .

$$y = \dots\dots\dots [2]$$

(ii) Write down the equation of a line parallel to line  $L$ .

$$y = \dots\dots\dots [1]$$

**Question 9 is printed on the next page.**

9 (a) Sami buys a new car.

(i) She pays a deposit of \$2250 and 36 equal monthly payments of \$437.50 .

Show that she pays a total amount of \$18 000.

[2]

(ii) Sami later sells the car for \$13 680.

Calculate the percentage loss.

..... % [2]

(b) Sami invests \$12 750 for 6 years at a rate of 1.8% per year compound interest.

Calculate the value of her investment at the end of the 6 years.

\$ ..... [2]

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