Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

MATHEMATICS **0980/31**

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 π, 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.

DC (DE) 320377

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.

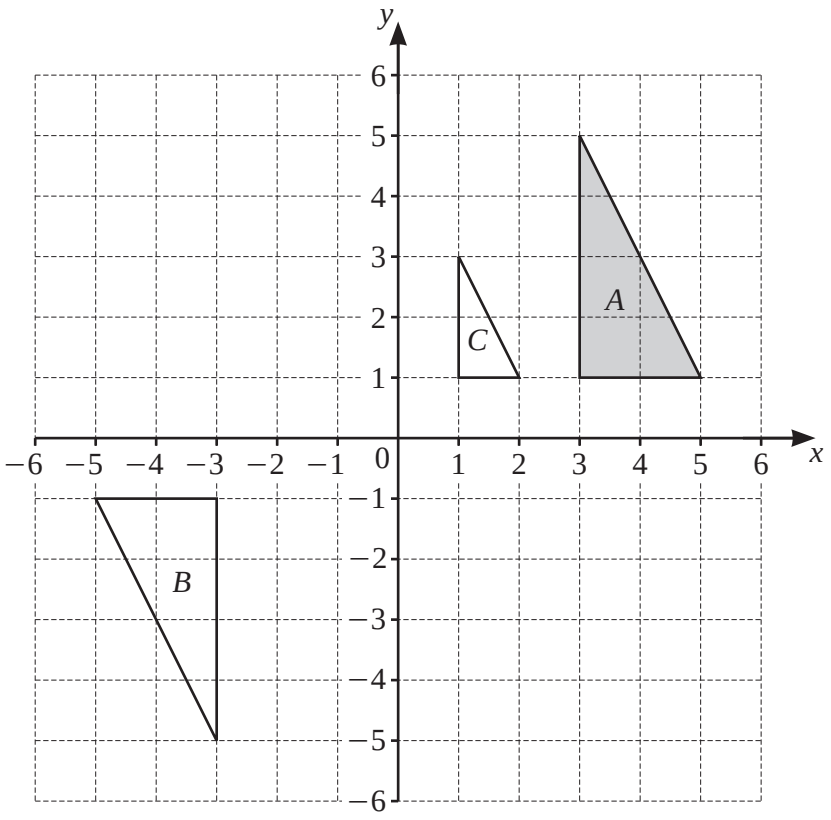
..... % [2]

(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.

..... cm^2 [3]

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

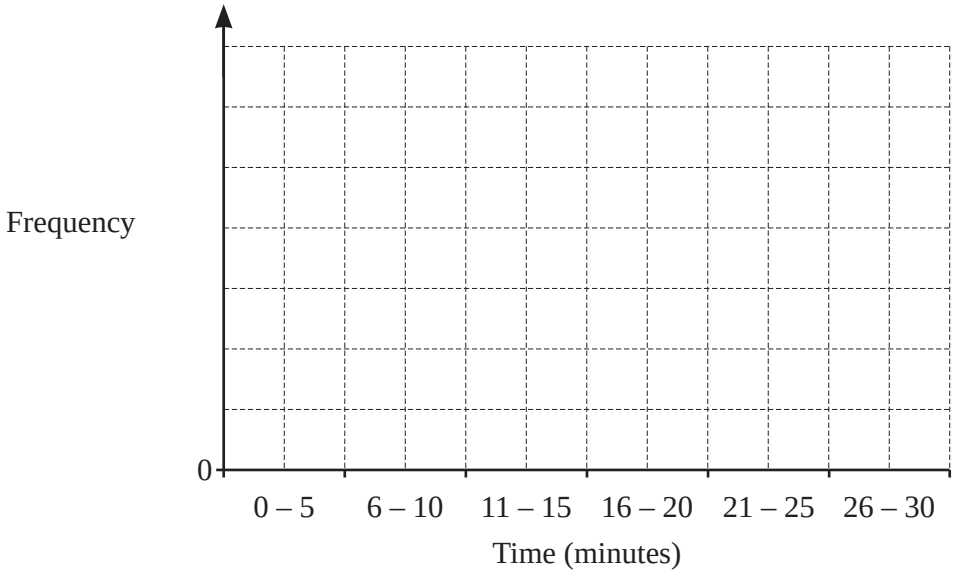
7	15	6	28	8	21	17	19	20	12
11	19	12	3	20	23	14	9	4	18

(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 0800.

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.

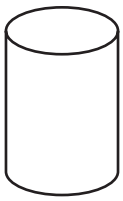
..... $\leqslant l <$ ..... [2]

(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]

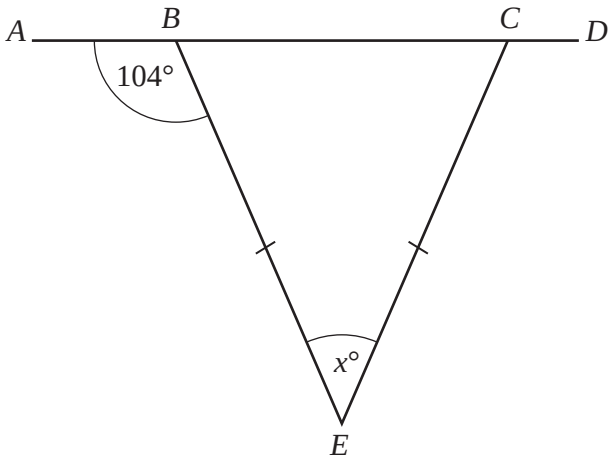
6 (a)



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 $ABE = 104°$.

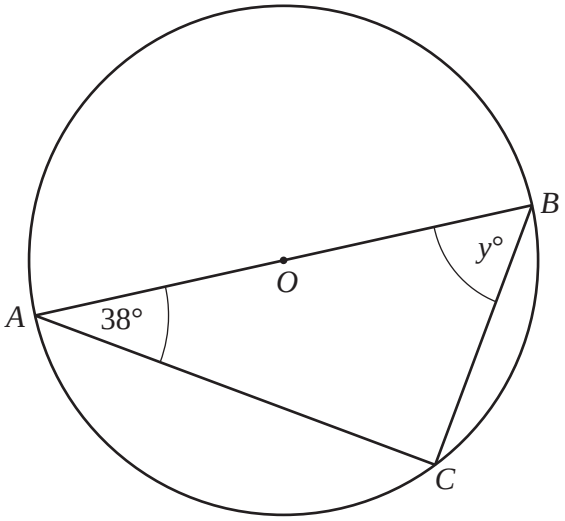
Find the value of x.

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

(iv) Find the value of *y*.

y = ... [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.

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

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

Work out.

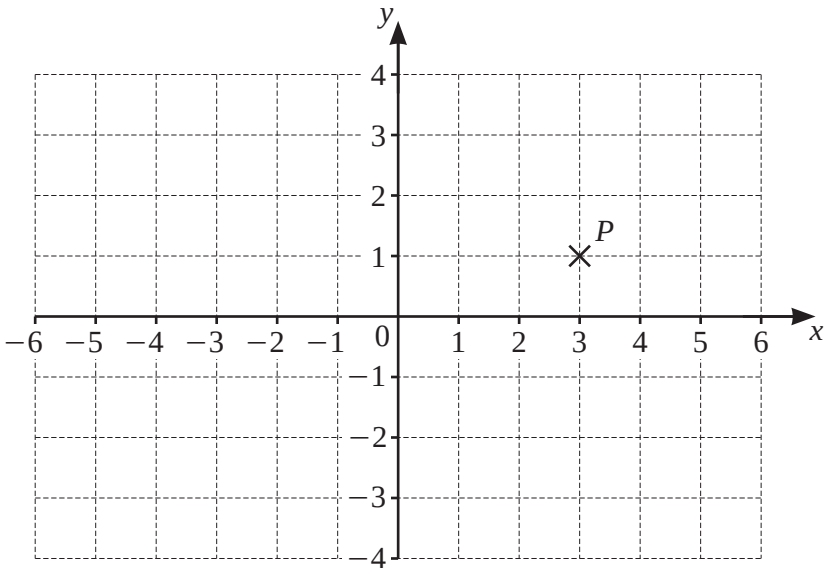
(i) $4\mathbf{a}$

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

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

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

(b)



(i) Write down the coordinates of point P.

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

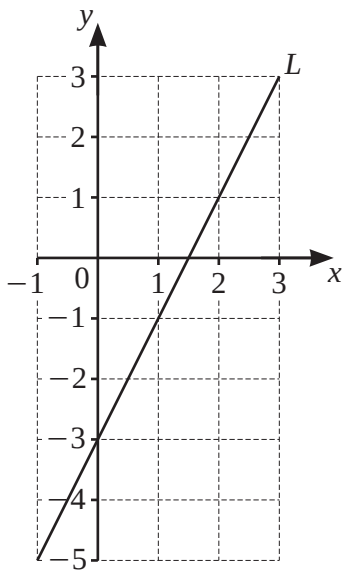
(ii) On the grid, plot point Q at $(-4, 2)$. [1]

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

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 $y = mx + c$.

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

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

$y =$ ..... [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]