Cambridge Assessment International Education

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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 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 [ ].

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1 Helga buys some items to do some knitting.

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

View solution

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.

View solution

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.

View solution

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.

View solution

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

..... % [2]

(ii) Each square has side length 15 cm.

View solution

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

..... m [3]

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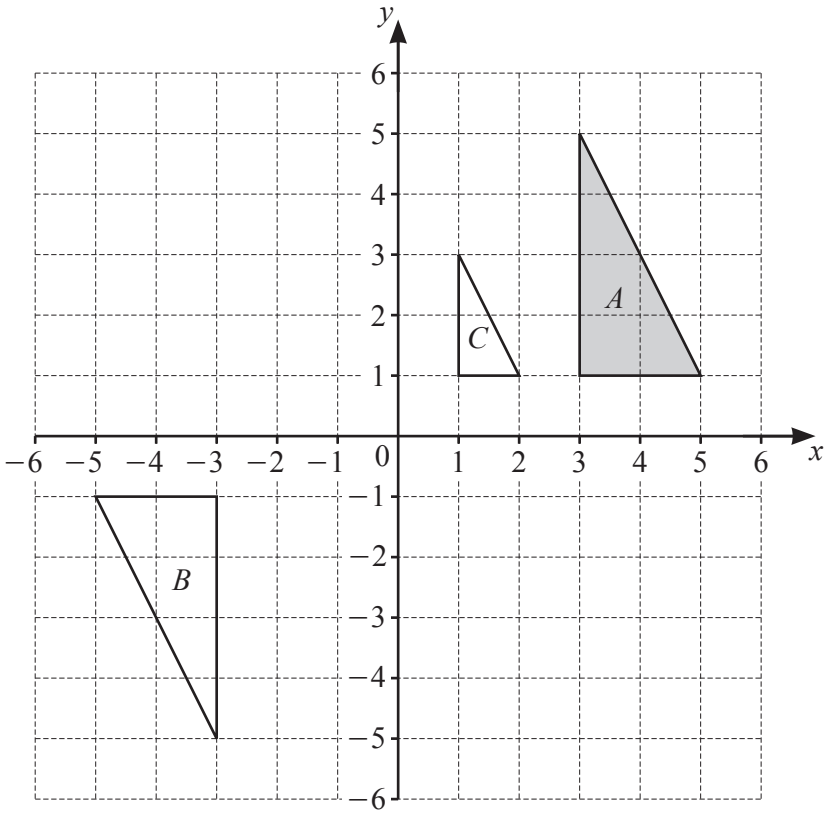
2 Triangles A, B and C are shown on the grid.



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

(i) triangle A onto triangle B,

.....

..... [3]

View solution

(ii) triangle A onto triangle C.

.....

..... [3]

View solution

(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]

View solution

View solution

3 Miguel works in an office.

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

View solution

(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.

View solution

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.

View solution

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.

View solution

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.

View solution

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

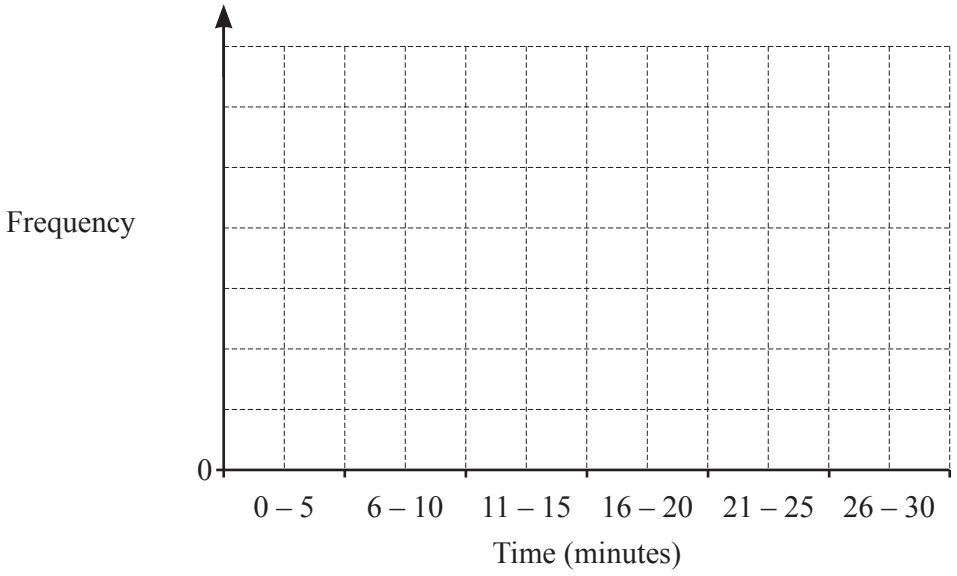
(i) Complete the frequency table.
You may use the tally column to help you.

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.

View solution



[3]

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

..... — ..... [1]

View solution

4 **(a)** Find

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

View solution

..... [1]

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

View solution

..... [1]

(iii) a cube number between 60 and 90,

View solution

..... [1]

(iv) the reciprocal of 7.

View solution

..... [1]

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

View solution

..... [1]

(c) Find the value of

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

View solution

..... [1]

(ii) 12^0.

View solution

..... [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.

View solution

..... days [2]

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(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.

View solution

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.

View solution

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.

View solution

..... [3]

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

View solution

..... [2]

(b) Carlotta buys a bicycle.

View solution

(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]

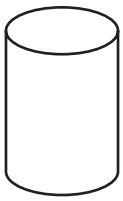
View solution

(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)

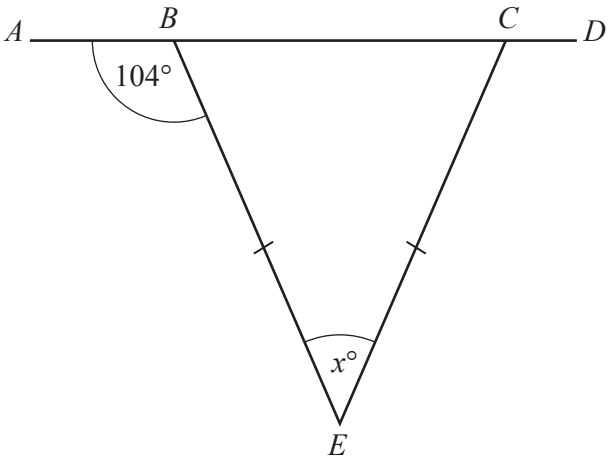


View solution

Write down the mathematical name of this solid.

..... [1]

(b)



View solution

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]

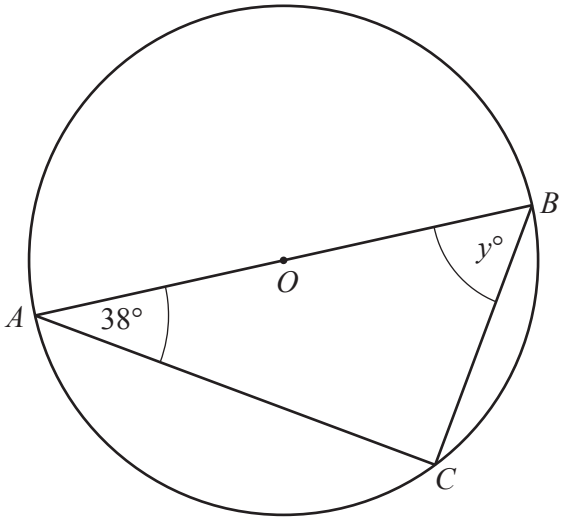
(c) Work out the size of one interior angle of a regular polygon with 15 sides.

View solution

..... [2]

(d)

View solution



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]

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7 **(a)** Simplify.

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

View solution

..... [2]

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

View solution

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

$j =$ ..... [2]

(c) Factorise completely.

$$14x^3+49x$$

View solution

..... [2]

(d) Solve.

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

View solution

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

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

View solution

Find the value of w.

$w =$ ..... [1]

(ii) $4x^2 = 256$

View solution

Find the value of x.

$x =$ ..... [1]

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(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.

View solution

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

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

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

View solution

Work out.

(i) $4\mathbf{a}$

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

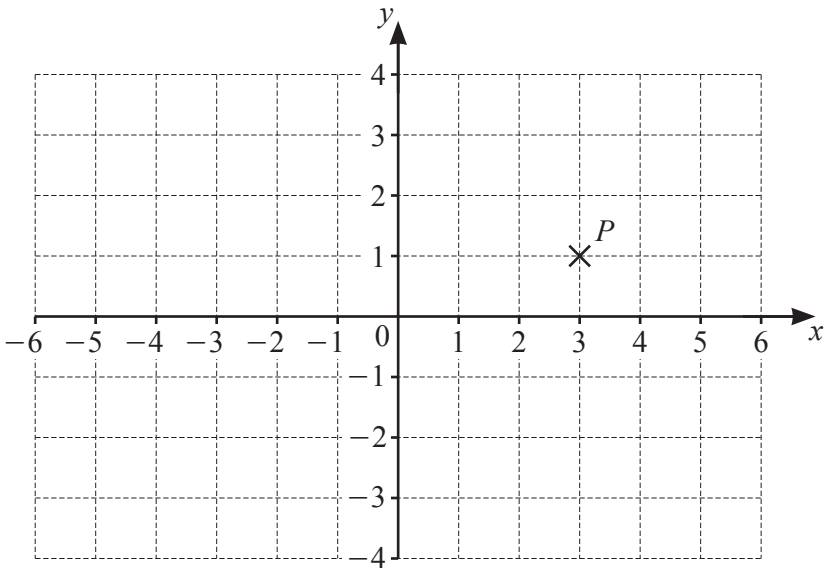
(ii) $2\mathbf{a} - \mathbf{b}$

View solution

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

View solution

(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]

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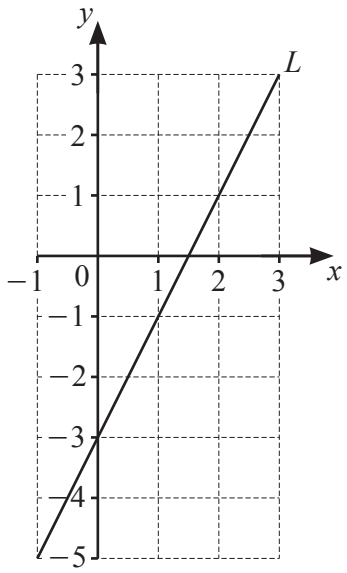
(c)

View solution



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.

View solution

$y =$ ..... [1]

Question 9 is printed on the next page.

9 **(a)** Sami buys a new car.

View solution

(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]

View solution

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

Calculate the percentage loss.

..... % [2]

View solution

(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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