Cambridge Assessment International Education

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MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2024**

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 **(a)** The cost of a cinema ticket is $6.30 .

View solution

(i) Work out the total cost of 4 tickets.

$ ..... [1]

View solution

(ii) The cinema sells 10 tickets for the price of 9 tickets.
A group of 10 people go to the cinema.

Work out how much each person must pay.

$ ..... [2]

View solution

(b) The cinema has 650 seats.

(i) There are 26 seats in each row.

Work out the number of rows.

..... [1]

View solution

(ii) 84% of the seats are occupied.

Work out how many seats are **not** occupied.

..... [2]

View solution

(c) Suki buys a bag of popcorn and a bottle of water.
A bag of popcorn costs twice as much as a bottle of water.
She receives $3.55 change from $10.

Work out the cost of a bag of popcorn and the cost of a bottle of water.

Bag of popcorn $ .....

Bottle of water $ ..... [3]

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(d) **(i)** A film lasts for 155 minutes.

View solution

Write 155 minutes in hours and minutes.

..... hours ..... minutes [1]

(ii) Another film starts at 1445 and lasts for 2 hours and 20 minutes.

View solution

Work out the time that this film finishes.

..... [1]

(e) The table shows the hours that Trevor works in the cinema each week.

View solution

Monday	No hours
Tuesday	No hours
Wednesday	1800 to 2200
Thursday	1800 to 2200
Friday	1200 to 1730
Saturday	1200 to 1730
Sunday	1300 to 1800

Trevor is paid $11.50 per hour for the time he works before 1800.
He is paid 30% more for the time he works after 1800.

Work out how much Trevor is paid each week.

$ ..... [4]

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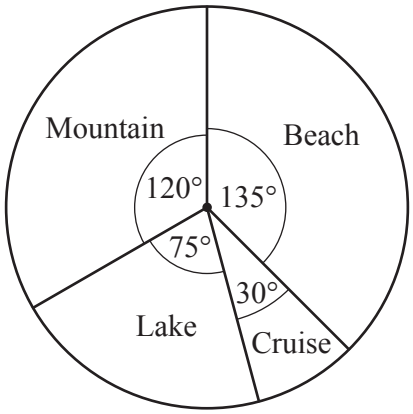
2 **(a)** Chen asks some people if they prefer a beach, cruise, lake or mountain holiday.
The pie chart shows the results.

View solution



(i) Find the fraction of people who prefer a mountain holiday.
Give your answer in its simplest form.

..... [2]

(ii) Find the percentage of people who prefer a beach holiday.

View solution

.....% [1]

(iii) Find the ratio of people who prefer each type of holiday in the form

beach : cruise : lake : mountain.

View solution

Give your answer in its simplest form.

..... : ..... : ..... : ..... [2]

(iv) One person is chosen at random.

View solution

Find the probability that this person prefers a cruise or a lake holiday.

..... [2]

(v) 675 people prefer a beach holiday.

View solution

Show that the total number of people Chen asks is 1800.

[1]

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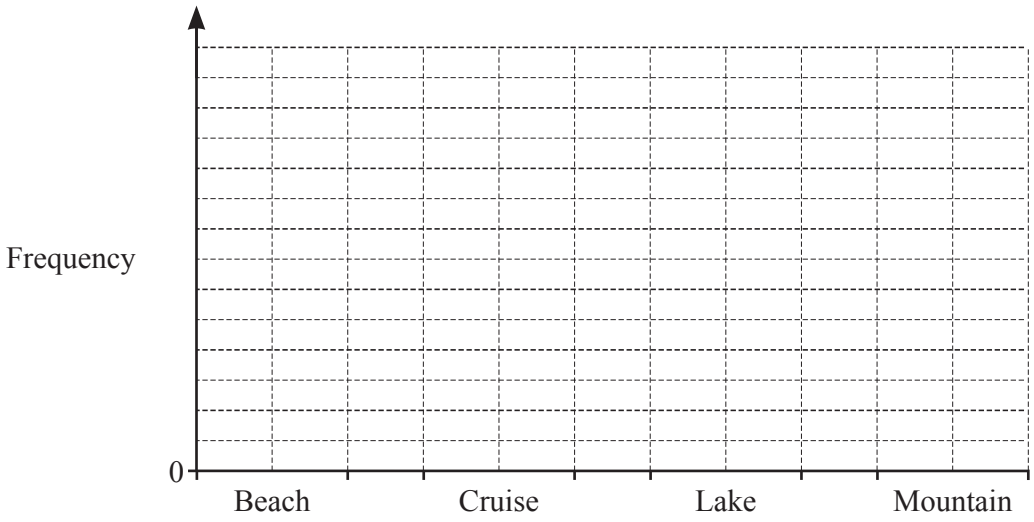
(vi) **(a)** Complete the table.

View solution

Type of holiday	Pie chart sector angle	Frequency
Beach	135°	675
Cruise	30°	150
Lake	75°	
Mountain	120°	

[2]

(b) Complete the bar chart, including the scale on the frequency axis.



[3]

(b) Mr Gibb pays $2208 for a holiday.
Mr Shah pays 2050 euros for the same holiday.
The exchange rate is 1 euro = $1.15 .

View solution

Work out how much more, in euros, Mr Shah pays for the holiday than Mr Gibb.

..... euros [2]

3 **(a)** Here is part of the timetable for trains from Hinton to Jarmouth.
All trains take the same time to travel from Hinton to Jarmouth.

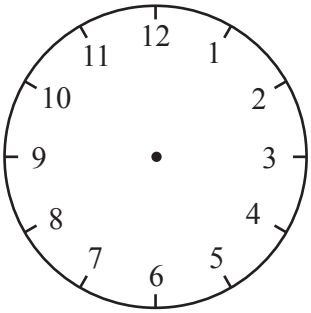
View solution

Hinton	10 47	.....
Jarmouth	11 15	12 35

(i) Complete the timetable. [2]

(ii) Marge arrives at Hinton station exactly 20 minutes before the 10 47 train leaves.

View solution



Complete the clock diagram to show the time she arrives at Hinton station. [1]

(b) Each day, a bus leaves Texford to travel to Cranbrook every 45 minutes.
The first bus leaves Texford at 07 10.
The last bus leaves Texford at 22 10.

View solution

Work out the number of buses that travel from Texford to Cranbrook each day.

..... [3]

(c) The cost of a bus pass increases every year.
On 1st January 2022 a bus pass costs $50.
On 1st January 2023 the cost of the bus pass increases by 10%.
On 1st January 2024 the cost of the bus pass increases by 5%.

View solution

Calculate the cost of the bus pass on 1st January 2024.

$ ..... [3]

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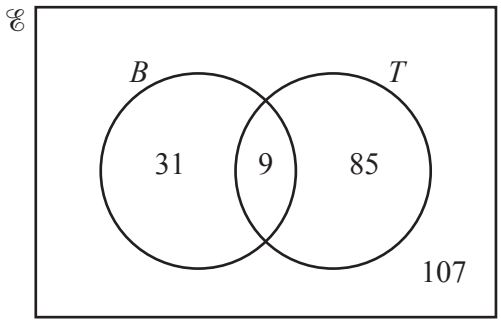
(d) The Venn diagram shows information about the number of workers in a hotel who travel to work by bus (B) and train (T).

View solution



(i) Work out the number of workers in the hotel.

..... [1]

(ii) Work out $n(B \cup T)$.

View solution

..... [1]

(iii) Explain in words what the number 85 in the Venn diagram represents.

View solution

..... [1]

(iv) One of the workers is chosen at random.

Find the probability that this worker travels to work by bus and train.

View solution

..... [1]

(e) The hotel has single and double bedrooms in the ratio single : double = 3 : 8.
There are 75 more double rooms than single rooms.

View solution

Work out the number of single rooms.

..... [2]

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4 The stem-and-leaf diagram shows the ages of the 16 workers in a shop on 1st January **2022**.

2	3	5	7		
3	4	6	6	6	9
4	1	1	7		
5	0	7	7	8	
6	1				

Key: 2 | 5 represents 25

(a) (i) Work out the range.

View solution

..... [1]

(ii) Write down the mode.

View solution

..... [1]

(iii) Work out the median.

View solution

..... [1]

(iv) Work out the percentage of workers that are older than 40 but younger than 60.

View solution

.....% [2]

(b) On 1st January **2023** the shop has the same 16 workers.

View solution

Write down the range, the mode and the median on 1st January **2023**.

Range .....

Mode .....

Median ..... [2]

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(c) On 1st January **2024** the oldest worker leaves.
His replacement is a new worker born on 12th November 1970.
There are no other changes to the workers.

View solution

Complete the stem-and-leaf diagram for 1st January **2024**.

2	5	7	9	
3	6	8	8	8
4				
5				
6				

Key: 2 | 5 represents 25

[2]

(d) The shop owner is x years old.

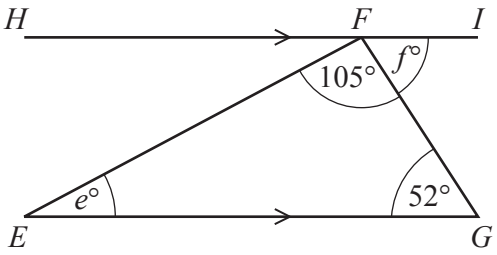
View solution

x is a prime number.
$x + 2$ is a square number.
$x - 2$ is a multiple of 9.

Find the value of x.

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

5 (a)



NOT TO SCALE

View solution

The diagram shows a triangle *EFG* and a straight line *HFI*.
HFI is parallel to *EG*.

(i) Angle *EFG* = 105°.

Write down the mathematical name for this type of angle.

..... [1]

(ii) Work out the value of *e*.
Give a geometrical reason for your answer.

View solution

e = ... because .....

..... [2]

(iii) Find the value of *f*.
Give a geometrical reason for your answer.

View solution

f = ... because .....

..... [2]

(b) Calculate the interior angle of a regular 7-sided polygon.
Give your answer correct to 2 decimal places.

View solution

..... [3]

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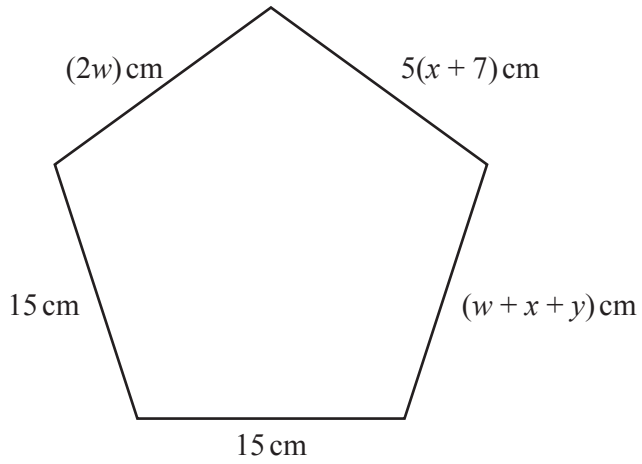
(c) The diagram shows a regular pentagon with sides 15 cm.

View solution



NOT TO SCALE

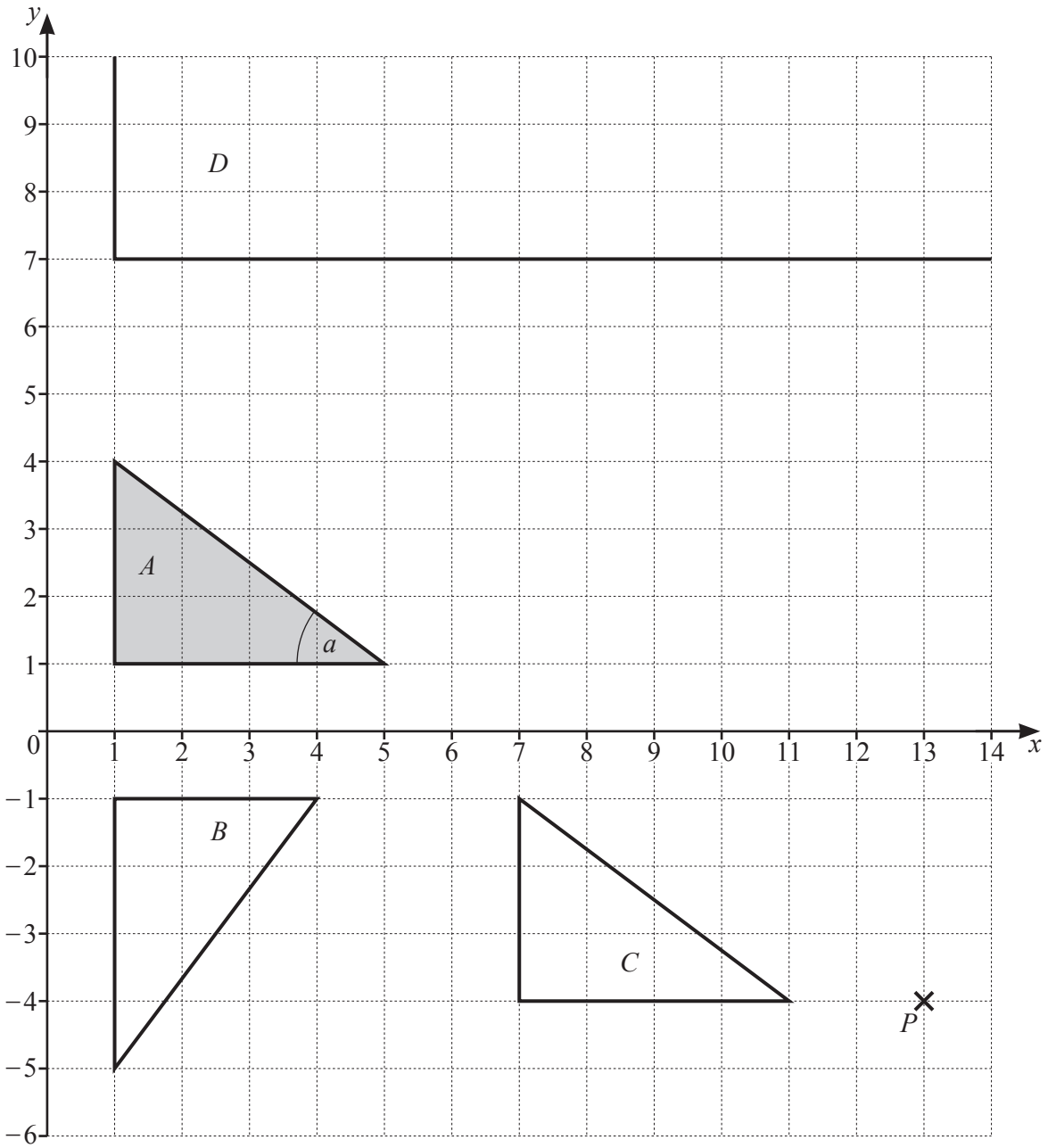
Work out the values of w, x and y.

$w =$ .....

$x =$ .....

$y =$ ..... [5]

6 The diagram shows a point, P, three triangles, A, B and C, and part of triangle D on a 1 cm^2 grid.



View solution

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(a) On the grid, mark the image of point P after a reflection in the line $y = 0$. [1]

(b) Use trigonometry to calculate angle a.

View solution

Angle $a =$ ..... [2]

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

View solution

(i) triangle A onto triangle B

.....

..... [3]

(ii) triangle A onto triangle C.

View solution

.....

..... [2]

(d) Triangle A has been enlarged with centre (1, 0) to give triangle D.
The grid is only large enough to show one vertex and part of two of the sides of triangle D.

View solution

(i) Write down the scale factor of the enlargement.

..... [1]

(ii) Find the coordinates of the other two vertices of triangle D.

View solution

(..... , ...) and (..... , ...) [2]

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7 **(a)** The scale drawing shows the position of a castle, C.
The scale is 1 centimetre represents 2 kilometres.

View solution



Scale: 1 cm to 2 km

Micah walks at 4.8 km/h for 3 hours on a bearing of 236° from C, to his house, H.

Mark the position of H on the scale drawing.

[3]

(b) A restaurant, R, is on a bearing of 083° from C.

View solution

(i) Work out the bearing of C from R.

..... [2]

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(ii) The distance, d km, from R to C is 5 km, correct to the nearest kilometre.

View solution

Complete this statement about the value of d.

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

(c) A model of the castle is made.
On the model, the length of one of the castle walls is 5 centimetres.
The actual length of the wall is 90 metres.

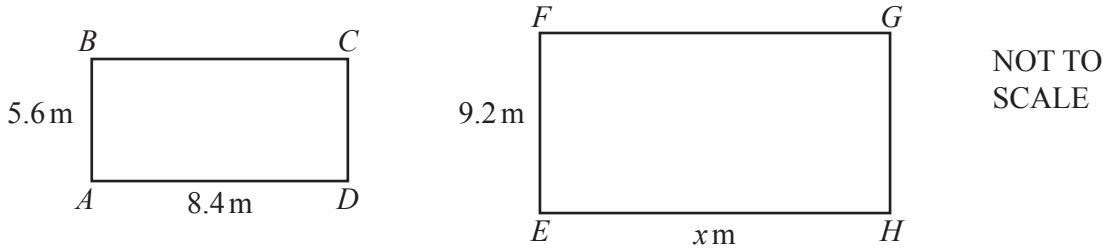
View solution

Find the scale of the model in the form $1 : n$.

1 : ..... [2]

(d) The castle has two kitchens with rectangular floors.

View solution



Rectangle $ABCD$ is mathematically similar to rectangle $EFGH$.

Calculate the value of x.

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

(e) The castle has a cylindrical tower.
The tower has a radius of 2.4 m and a height of 25 m.

View solution

Calculate the curved surface area of the tower.
Give the units of your answer.

.... [3]

Question 8 is printed on the next page.

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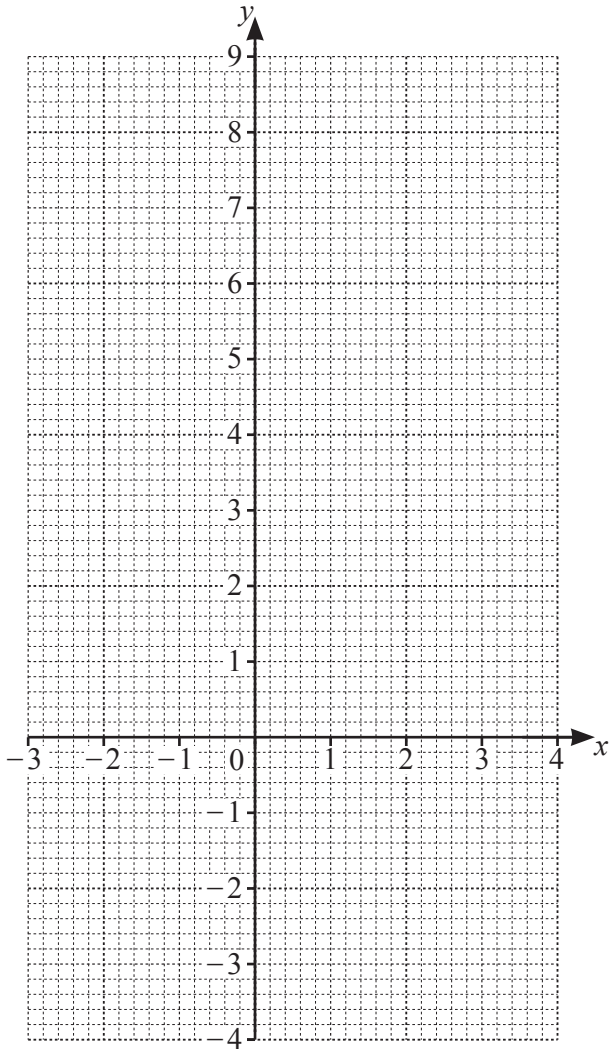
8 The table shows some values for $y = x^2 - x - 3$.

x	-3	-2	-1	0	1	2	3	4
y			-1			-1		9

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = x^2 - x - 3$ for $-3 \leqslant x \leqslant 4$.

View solution



[4]

(c) Write down the coordinates of the lowest point on the graph.

View solution

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

(d) Use your graph to solve the equation $x^2 - x - 3 = 7$.

View solution

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

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