Cambridge IGCSE[™]

CANDIDATE NAME		
CENTRE NUMBER		CANDIDATE NUMBER
MATHEMATI	CS	0580/31
Paper 3 (Core)		October/November 2023
		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.

This document has 20 pages. Any blank pages are indicated.

• 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 [].

1 (a) Write the number six and a half million in figures.

- (b) Write 37 508 correct to the nearest thousand.
-[1] 6 $\sqrt{100}$ $\sqrt{1000}$ (c) 9 28 31 32 36 From this list of numbers, write down (i) a factor of 18 (ii) a multiple of 12 (iii) a square number (iv) a prime number (v) an irrational number.

(d) Put one pair of brackets in each statement to make it correct.

- (i) $24 4 \times 3 + 2 = 62$ [1]
- (ii) $24 4 \times 3 + 2 = 4$ [1]
- (e) Write $\frac{3}{4}$ as a decimal.

......[1]

(f) Work out $\frac{3}{7}$ of 126.

......[1]

(g) Write down the value of the reciprocal of 0.5.

(h) Without using a calculator, work out $5\frac{2}{3}-2\frac{1}{5}$. You must show all your working and give your answer as a mixed number in its simplest form.

......[3]

2 (a) The diagram shows a circle.



(i) The diameter of this circle is 168 mm.

Write down the radius of this circle.

		mm	[1]
(ii)	On the diagram, draw a chord of this circle.		[1]

(b) The scale drawing shows the position of ship A and the position of ship B. The scale is 1 cm represents 6 km.



S	cale :	1	cm	to	6 km	

Another ship, C, is 45 km from ship B on a bearing of 124° .

- (i) On the scale drawing, mark the position of ship C. [2]
- (ii) Find the actual distance of ship C from ship A.

..... km [2]

[1]

[1]

(c) (i) Show that the interior angle of a regular octagon is 135°.

(ii)



NOT TO SCALE

Show that two regular octagons and a square meet at a point without any gaps.

(d)



The diagram shows points D, E and F on the circumference of a circle. DF is a diameter of the circle.

Find angle EDF.

Angle $EDF = \dots$ [2]

3 (a) The bar chart shows the country in which each of 80 students live.



(i) How many of these students live in Brazil?

		[1]
(ii)	In which country do the largest number of these students live?	
		[1]
(iii)	How many more of these students live in China than live in Australia?	
		F 1 7
		[1]
(iv)	Find the percentage of these students who live in the USA.	

.....% [2]

- (b) In Hobart, the temperature at 8 am was -3 °C and the temperature at 3 pm was 7 °C.
 - (i) Find the difference in the temperatures between 8 am and 3 pm.
 -°C [1]
 - (ii) The temperature at 10 pm was 12 °C lower than at 3 pm.

Find the temperature at 10 pm.

.....°C [1]

(c) The table shows the favourite language that each of 80 students studies.

Language	Frequency
French	12
Spanish	26
English	42
Total	80

Complete the pie chart to show this information.



[4]

4 (a) The diagram shows a cuboid.



(i) On the 1 cm² grid, complete the net of the cuboid. One face has been drawn for you.

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[3]

(ii) Calculate the surface area of the cuboid.

(b) The diagram shows two solids: a cube and a right-angled triangular prism.



Both solids have the same volume.

Calculate the value of *x*.

 $x = \dots$ [4]

5 A railway line has three stations, Town, Port and Cove. Train *A* leaves Town for Cove and train *B* leaves Cove for Town. Both trains stop at Port.



(a) Write down the time that train *B* leaves Cove.

......[1]

(b) Write down how long train A stops at Port.

- min [1]
- (c) How many more minutes does train A take to complete the whole journey than train B?
 - min [2]

(d) Write down the time that the two trains pass each other.

- (e) Work out the average speed of train *A* between Town and Cove in kilometres per hour.





7 (a) Simplify. 5a+3b+2a-4b

......[2]

(b) P = 8x + 3y

Find the value of x when P = 21 and y = -5.

(c) Make v the subject of the formula $S = kv^2$.

(d) Multiply out and simplify. (x-3)(x+5)

.....[2]

(e) Nasser has *x* marbles. Selina has 15 more marbles than Nasser. Hanif has 3 times as many marbles as Selina. In total they have 150 marbles.

13

Find the value of *x*.

 $x = \dots [5]$

8



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

[1]

- (b) (i) On the grid, draw the line y = x.
 - (ii) Write down the coordinates of the point where the line y = x intersects line L.

(.....) [1]

(c)	(i)	Complete the table of values for $y = \frac{8}{r}$
()	(1)	Complete the table of values for $y = \frac{x}{x}$

x	-5	-4	-3	-2	-1	1	2	3	4	5
У	-1.6		-2.7					2.7		1.6

(ii) On the grid, draw the graph of $y = \frac{8}{x}$ for $-5 \le x \le -1$ and $1 \le x \le 5$.



[4]

[3]

9 (a) Pure gold costs \$42 per gram.

The fraction of pure gold in an object is measured in carats. One carat means $\frac{1}{24}$ of the mass of an object is pure gold.

Henry buys a 9-carat gold bracelet weighing 16 g. The price of the bracelet is \$204.

Is the price of the bracelet more or less than the cost of the pure gold in it? You must show your working.

(b) A clock made of metals has a mass of 1080 g. The mass of each metal in the clock is in the ratio copper : zinc : other metals = 21 : 14 : 1.

Calculate the mass of copper in this clock.

..... g [2]

(c) There are 110 people in a group.

 $G = \{ \text{ people who own gold jewellery } \}$ $S = \{ \text{ people who own silver jewellery } \}$

- 18 people own both gold jewellery and silver jewellery.
- 46 people own gold jewellery.
- 11 people own no gold jewellery and no silver jewellery.



- (i) Complete the Venn diagram.
- (ii) Write down $n(G \cap S)$.

......[1]

[2]

(iii) One of the 110 people is chosen at random.

Write down the probability that this person owns gold jewellery but not silver jewellery.

(d)



Use set notation to describe the shaded region.

......[1]



10 (a)



Triangle *PQR* is mathematically similar to triangle *UVW*.

Calculate VW.

(b) *ABC* is a right-angled triangle.



Calculate BC.

(c) *DEF* is a right-angled triangle.



Calculate EF.

EF =cm [2]

(d) *JKL* is a right-angled triangle.



Calculate angle *JKL*.

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