

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier Paper 3 Calculator

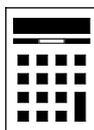
Shadow paper based on June 2023 question paper

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Answer **all** questions in the spaces provided.

1 The line with equation $y = 6x - 3$ intersects the y -axis at A .

Complete the coordinates of A .

[1 mark]

Answer (0 , _____)

2 Write down a fraction equivalent to 2.925

[1 mark]

Answer _____

3 Solve $10x - 17 = 4x + 13$

[2 marks]

$x =$ _____

4 A map has a scale of 1 : 6500

How many **metres** are represented by a length of 3.8 cm on the map?

[2 marks]

Answer _____ m

5 The number of foxes in England is expected to **increase** by 2% each year.
Assume there are now 357 000 foxes in England.

Work out the expected number of foxes in England after **six** years.

You **must** show your working.

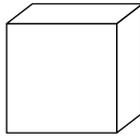
[3 marks]

Answer _____

Turn over for the next question

6 Here is a cube A.

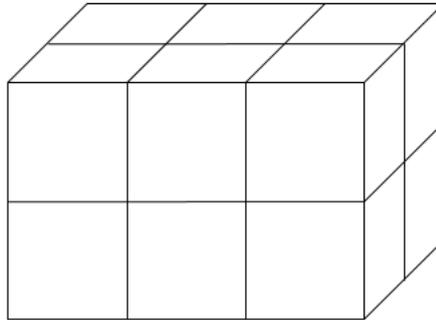
A



Not drawn
accurately

Cuboid B is made from **twelve** of cube A.

B



volume of A : volume of B = 1 : 12

Henry says,

“surface area of A : surface area of B must be 1 : 12 because cuboid B is made of 12 of A.”

Is Henry correct?

Tick **one** box.

Yes

No

Cannot tell

Give a reason for your answer.

[2 marks]

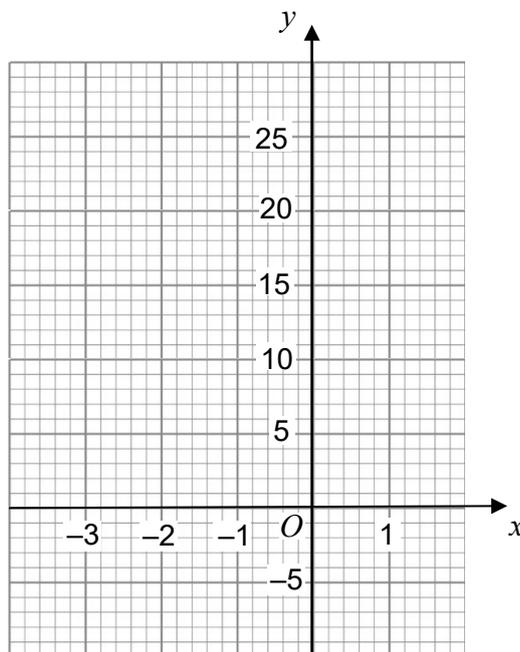
- 7 (a) Complete the table of values for $y = x^2 - 4x$

[2 marks]

x	-3	-2	-1	0	1
y	21		5	0	

- 7 (b) Draw the graph of $y = x^2 - 4x$ for values of x from -3 to 1

[2 marks]



Turn over for the next question

Turn over ►

8

Shirley has £5625

She saves some and donates the rest to charity.

money saved : money given to charity = 2 : 7

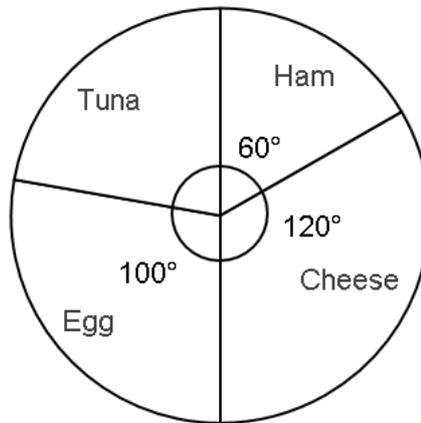
She gives each of **five** charities the **same** amount.

Does each charity receive more than £870 ?

You **must** show your working.

[4 marks]

- 9 The pie chart shows information about customers choice of sandwich filling.



Not drawn
accurately

12 **more** customers chose egg than chose ham.

Work out the number of customers who chose tuna.

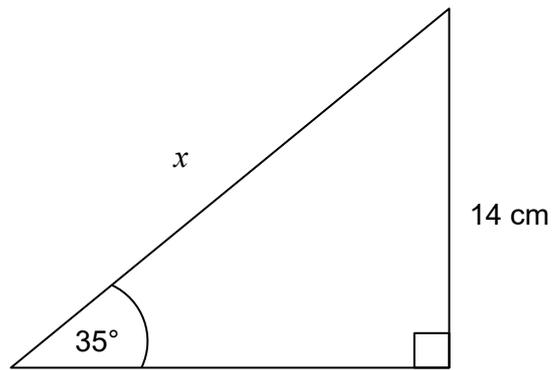
[3 marks]

Answer _____

Turn over for the next question

Turn over ►

10

Use trigonometry to work out the value of x .Not drawn
accurately**[3 marks]**

 $x =$ _____ cm

- 11 Aiza is estimating the value of $\frac{2}{(\sqrt{4.36})^3 \times 5.49}$
She rounds each decimal number to 1 significant figure.

- 11 (a) Work out Aiza's estimate.
You **must** show your working.

[2 marks]

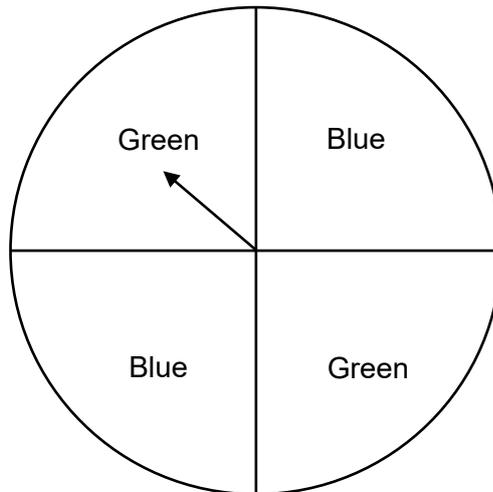
Answer _____

- 11 (b) Aiza says,
"My estimate must be larger than the exact value."
Without working out the exact value, give a reason how she can know this.

[1 mark]

Turn over for the next question

12 Here is a **biased** spinner.



12 (a) Ann, Bill and Celine want to know the probability of spinning blue on the biased spinner. They each spin it and count how many times it lands on blue and divide by the total number of spins.

Ann says

I spun blue the most times

Bill says

I spun the spinner the most times

Celine says

My relative frequency of blue is 0.50

Who had the best estimate for the probability of spinning blue?

Give a reason for your answer.

[1 mark]

12 (b) David spins the spinner 100 times.

He says,

“My relative frequency of blue is $\frac{1}{3}$ ”

Give a reason why his relative frequency must be wrong.

[1 mark]

12 (c) Emily spins the spinner 175 times.

The relative frequency of blue is 0.64

Work out how many times the spinner landed on **green**.

[2 marks]

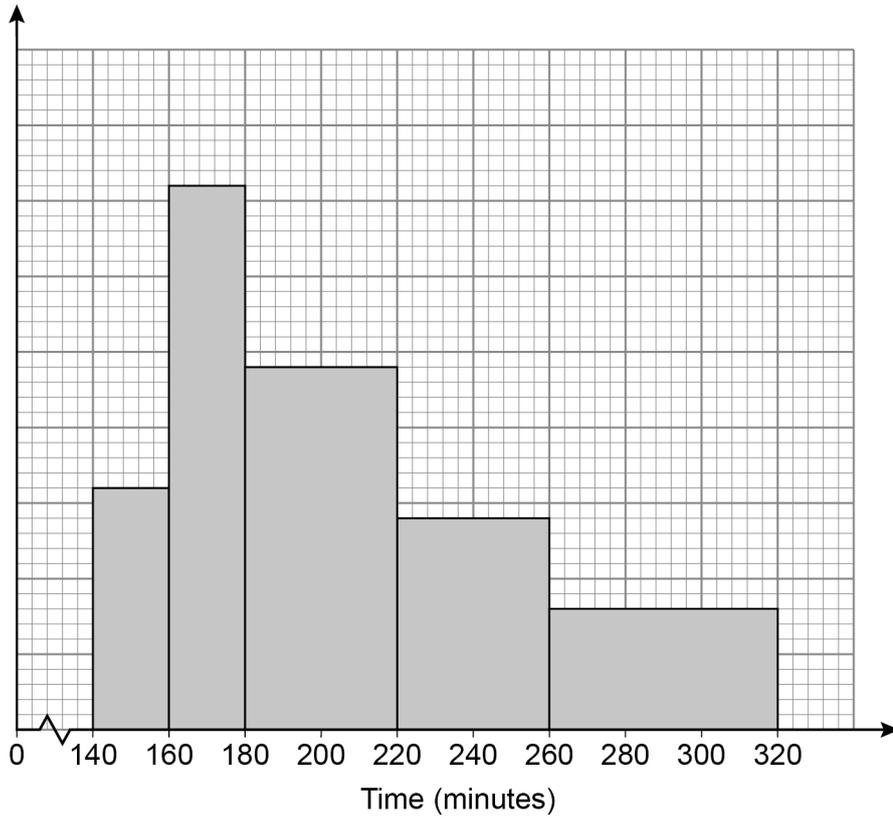
Answer _____

Turn over for the next question

15 Some runners from Coventry Running Club entered a marathon.

15 (a) The histogram represents the times of the runners from the club who completed the marathon.

48 runners finished the marathon between 260 and 320 minutes.



How many runners finished in under 220 minutes?

[3 marks]

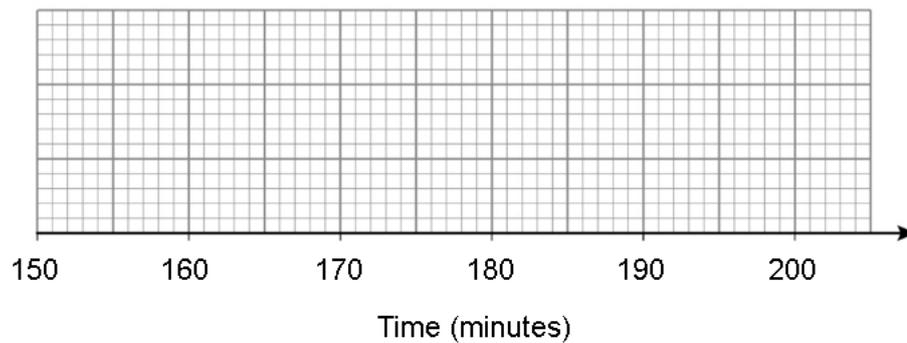
Answer _____

- 15 (b)** The table shows information about the runners who completed the marathon from Leicester Running Club.

	Time (minutes)
Least time	150
Greatest time	200
Lower quartile	163
Median	172
Interquartile range	24

Draw a box plot to represent the information.

[3 marks]



Turn over for the next question

18 $f(x) = 3x^2 - x$
 $g(x) = x + 3$

18 (a) Show that $fg(x) = 3x^2 + 17x + 24$

[3 marks]

18 (b) Solve $fg(x) = 5$

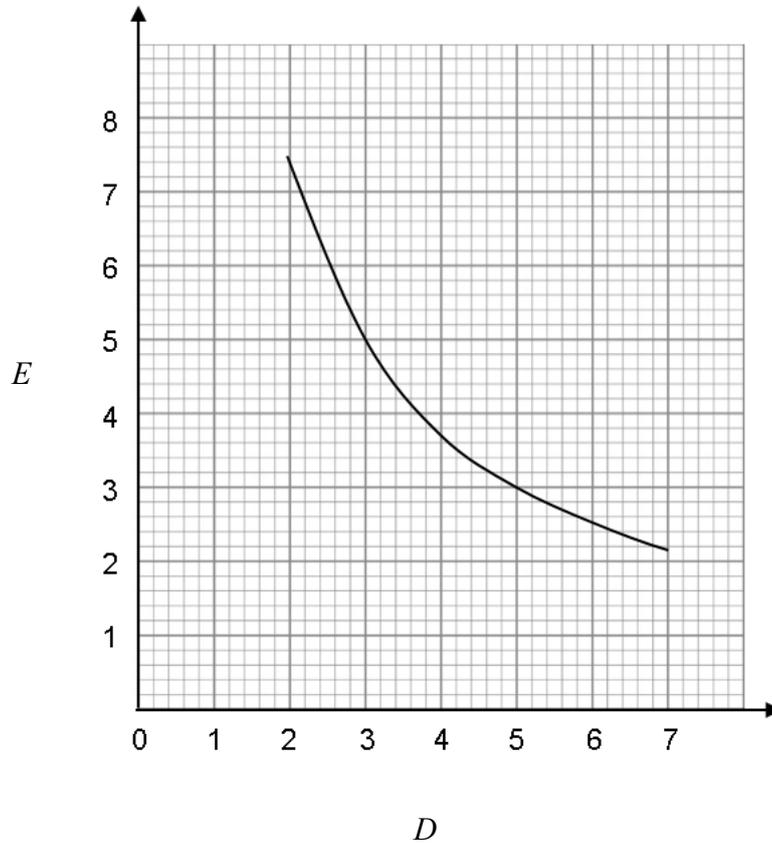
Give your answers correct to 2 decimal places.

[3 marks]

Answer _____

20 (a) Sunil thinks that E and D are linked by the equation $E = \frac{14}{D}$

The graph shows the values of D and E for $2 \leq D \leq 7$



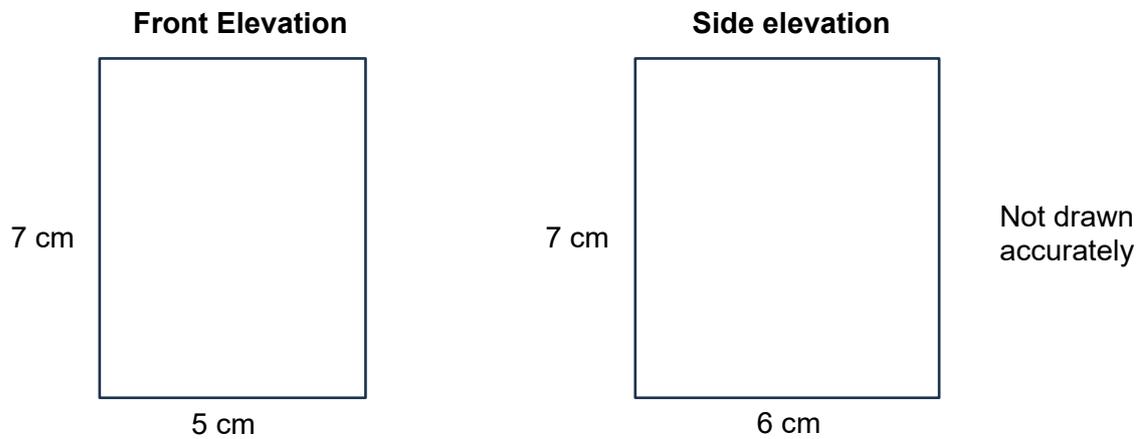
Choose **one** point on the graph and state if Sunil's equation is correct for that point.

[1 mark]

21

A solid shape is made from centimetre cubes.

The front elevation and side elevation of the shape are shown.



Work out

the **maximum** possible number of cubes in the shape

and

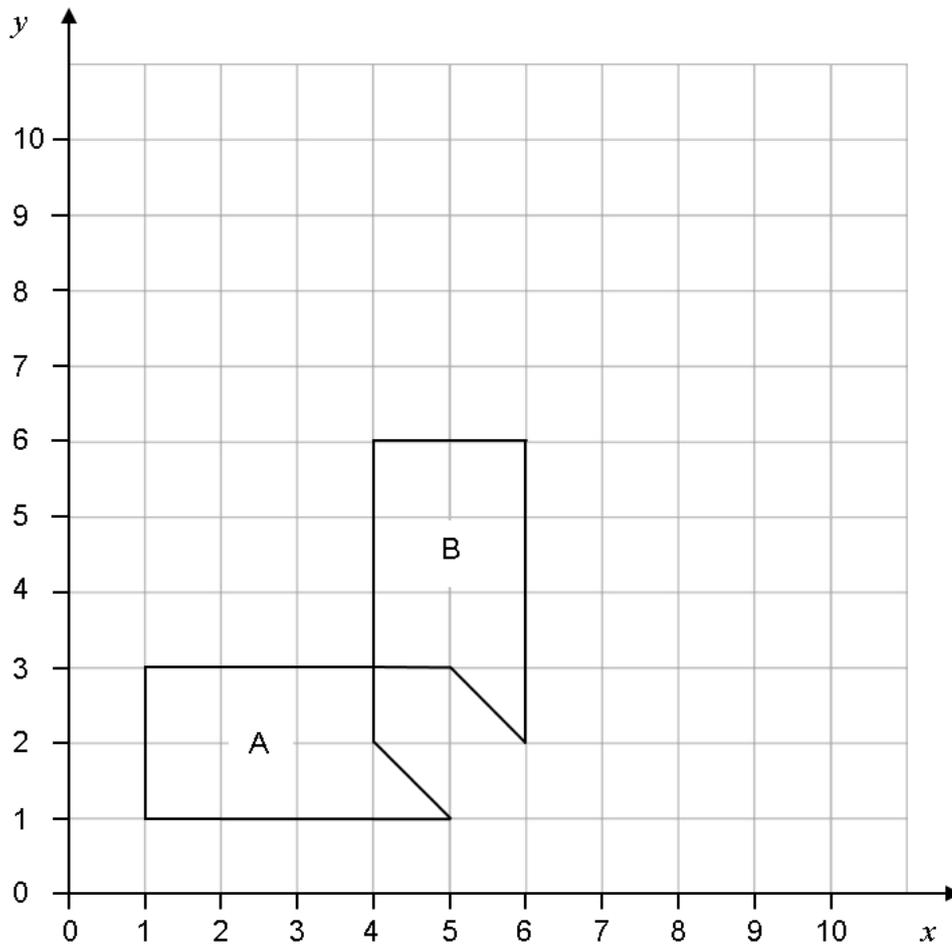
the **minimum** possible number of cubes in the shape.

[3 marks]

Maximum _____ Minimum _____

22

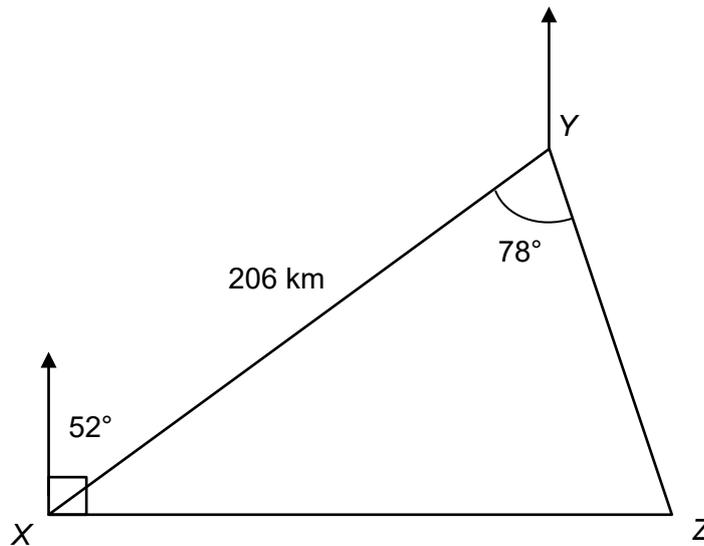
Shape A and shape B are shown on the grid.

Describe the **single** transformation that maps shape A to shape B.**[3 marks]**

Turn over for the next question

Turn over ►

23

Not drawn
accurately

A plane flies 206 km on a bearing of 052° from X to Y .

From Y the plane flies to Z , which is due East of X , and then back to X .

- 23 (a)** Show that the distance the plane flies from Y to Z is 141 km to the nearest km.
You **must** show your working.

[2 marks]

There are no questions printed on this page

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outside the
box*

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ANSWER IN THE SPACES PROVIDED**

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