AQA

Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE
MATHEMATICS

H

Higher Tier   Paper 3 Calculator

8300/3H

Wednesday 14 June 2023   Morning

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.
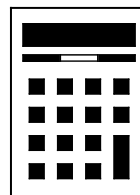
[Turn over]

MATERIALS

For this paper you must have:

- **a calculator**

- **mathematical instruments**

- **the Formulae Sheet (enclosed).**

INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**

- **Answer ALL questions.**

- **You must answer the questions in the spaces provided. Do not write 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.

DO NOT TURN OVER UNTIL TOLD TO DO SO

0 3

Answer ALL questions in the spaces provided.

1 The line with equation $y = 2x + 7$ intersects the y-axis at *A*.

Complete the coordinates of *A*. [1 mark]

Answer (0 , _____)

2 Write down a fraction equivalent to 1.875 [1 mark]

Answer _____

3   **Solve** $5x + 11 = 3x + 19$ **[2 marks]**

$x =$ _____

[Turn over]

4   A map has a scale of   1 : 5000

How many METRES are represented by a length of
4.5 cm on the map? [2 marks]

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Answer _____ m

5   **The number of hedgehogs in England is expected to REDUCE by 4% each year.**

Assume there are now 1 000 000 hedgehogs in England.

Work out the expected number of hedgehogs in England after FIVE years.
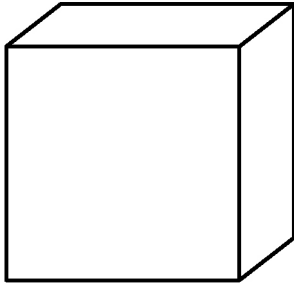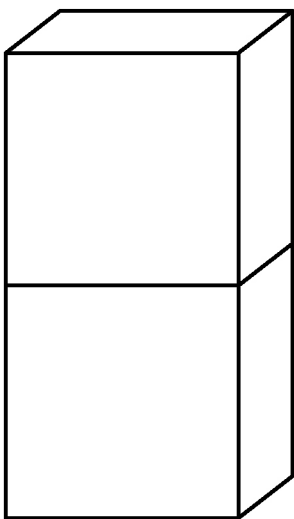
You MUST show your working. [3 marks]

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Answer _____

[Turn over]

9

6 **Here is cuboid A.**

A

Cuboid B is made from TWO of cuboid A.

B

volume of A : volume of B = 1 : 2

Matthew says,

"surface area of A : surface area of B must be 1 : 2 because B is made of 2 of A."

Is Matthew correct?

Tick ONE box.

☐ **Yes**

☐ **No**

☐ **Cannot tell**

Give a reason for your answer. [2 marks]

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0 9

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7 (a) Complete the table of values for $y = x^2 + 2x$
[2 marks]

x	−3	−2	−1	0	1
y	3		−1	0	

7 (b) Draw the graph of $y = x^2 + 2x$ for values of x from −3 to 1 [2 marks]

[Turn over]

6
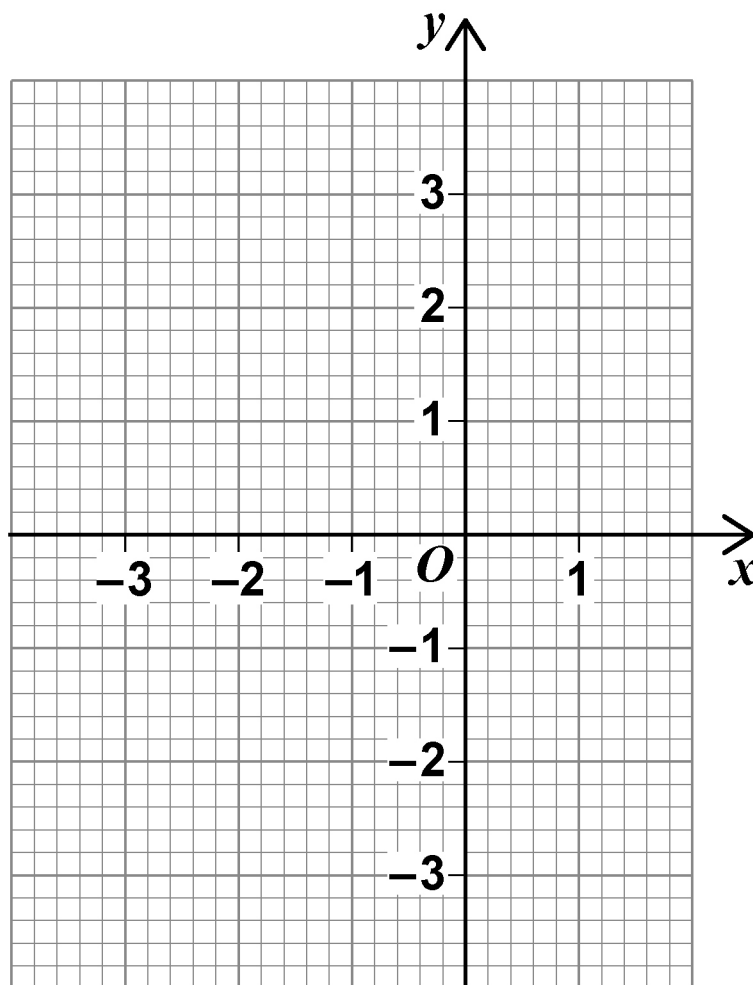
8 **Jing has £2450**

She saves some and gives the rest to her four brothers.

money saved : money given to brothers = 2 : 5

She gives each of her FOUR brothers the SAME amount.

Does each brother receive more than £430 ?
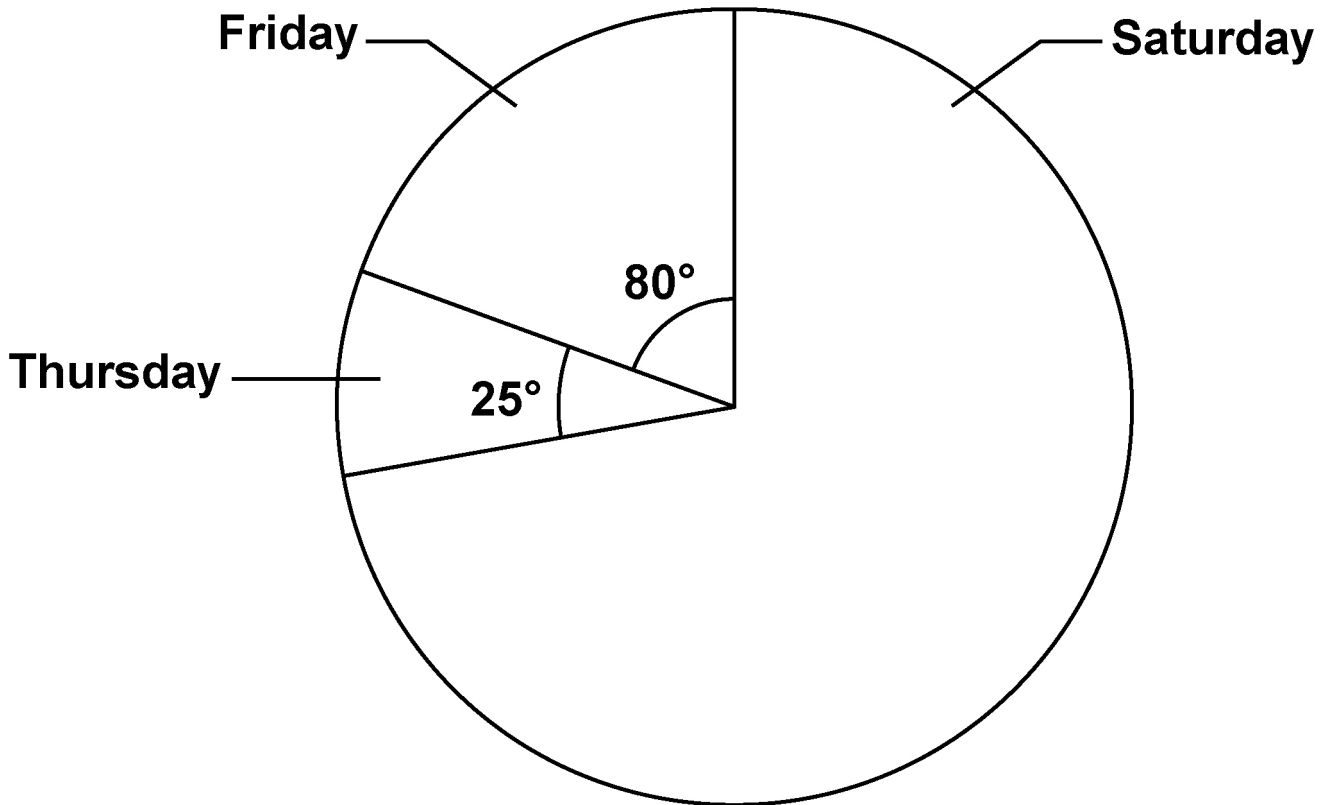
You MUST show your working. [4 marks]

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[Turn over]

9 **The pie chart shows information about people at a fair during three days.**

The diagram is not drawn accurately.

Friday

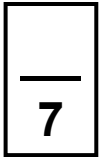Saturday

80°

Thursday

25°

There were 132 MORE people on Friday than on Thursday.

Work out the number of people on Saturday.
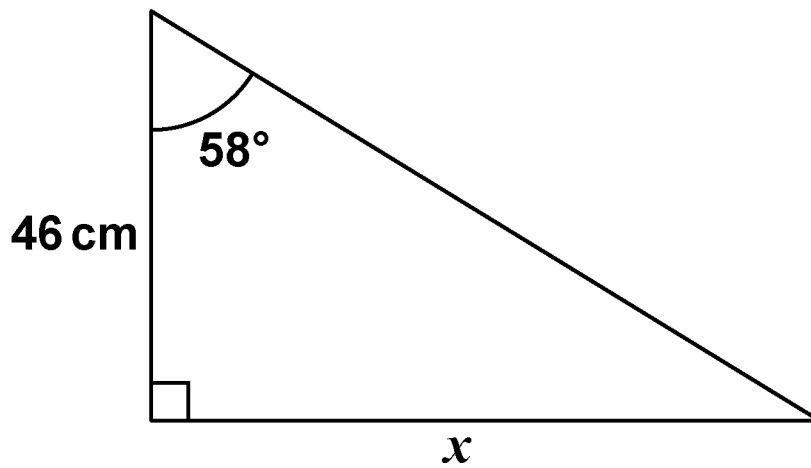**[3 marks]**

Answer

[Turn over]

7

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10 **Use trigonometry to work out the value of x.**

The diagram is not drawn accurately. **[3 marks]**

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$x =$ _____ **cm**

[Turn over]

11 **Millie is estimating the value of**

$$\frac{1}{\left(\sqrt[3]{8.34}\right)^2 \times 10.21}$$

She rounds each decimal number to 1 significant figure.

11 (a) **Work out Millie's estimate.**

You MUST show your working. **[2 marks]**

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Answer _____

11 (b)   **Millie says,**

"**My estimate must be more than the exact value.**"

WITHOUT WORKING OUT THE EXACT VALUE, give a reason how she can know this. [1 mark]

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[Turn over]

6

12 **Here is a BIASED spinner.**
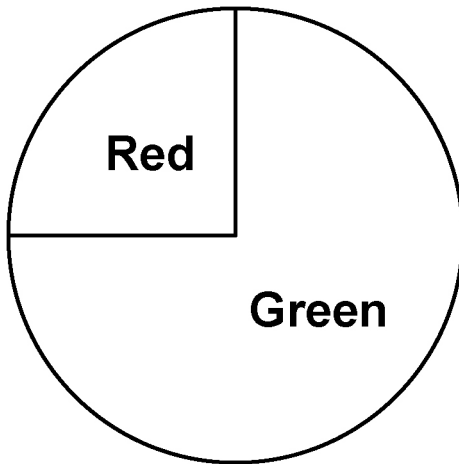
12(a) **Ali, Ben and Cary want to know the probability of spinning red on the biased spinner.**

They each spin it and count how many times it lands on red and divide by the total number of spins.

Ali says

I spun red the most times

Ben says

I spun the spinner the most times

Cary says

My relative frequency of red is 0.25

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

Give a reason for your answer. [1 mark]

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12 (b)   Dev spins the spinner 80 times.

He says,

"My relative frequency of red is 0.185"

Give a reason why his relative frequency must be wrong. [1 mark]

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[Turn over]

12 (c)   Elena spins the spinner 125 times.

The relative frequency of red is 0.32

Work out how many times the spinner landed on GREEN. [2 marks]

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Answer _____

4

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[Turn over]

13 **Charlie is driving 293 miles home.**

He

- **leaves at 9.00 am**

- **travels the first 176 miles at an average speed of 48 mph**

- **drives the rest of the way at an average speed of 65 mph**

Will he be home by 2.30 pm?

You MUST show your working. [4 marks]

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14 **Kiran paid Income Tax and National Insurance on her annual salary.**

INCOME TAX

0% of the first £12 570 of her annual salary

20% of the rest of her annual salary

NATIONAL INSURANCE

0% of the first £9880 of her annual salary

13.25% of the rest of her annual salary

Kiran paid £5186 Income Tax.
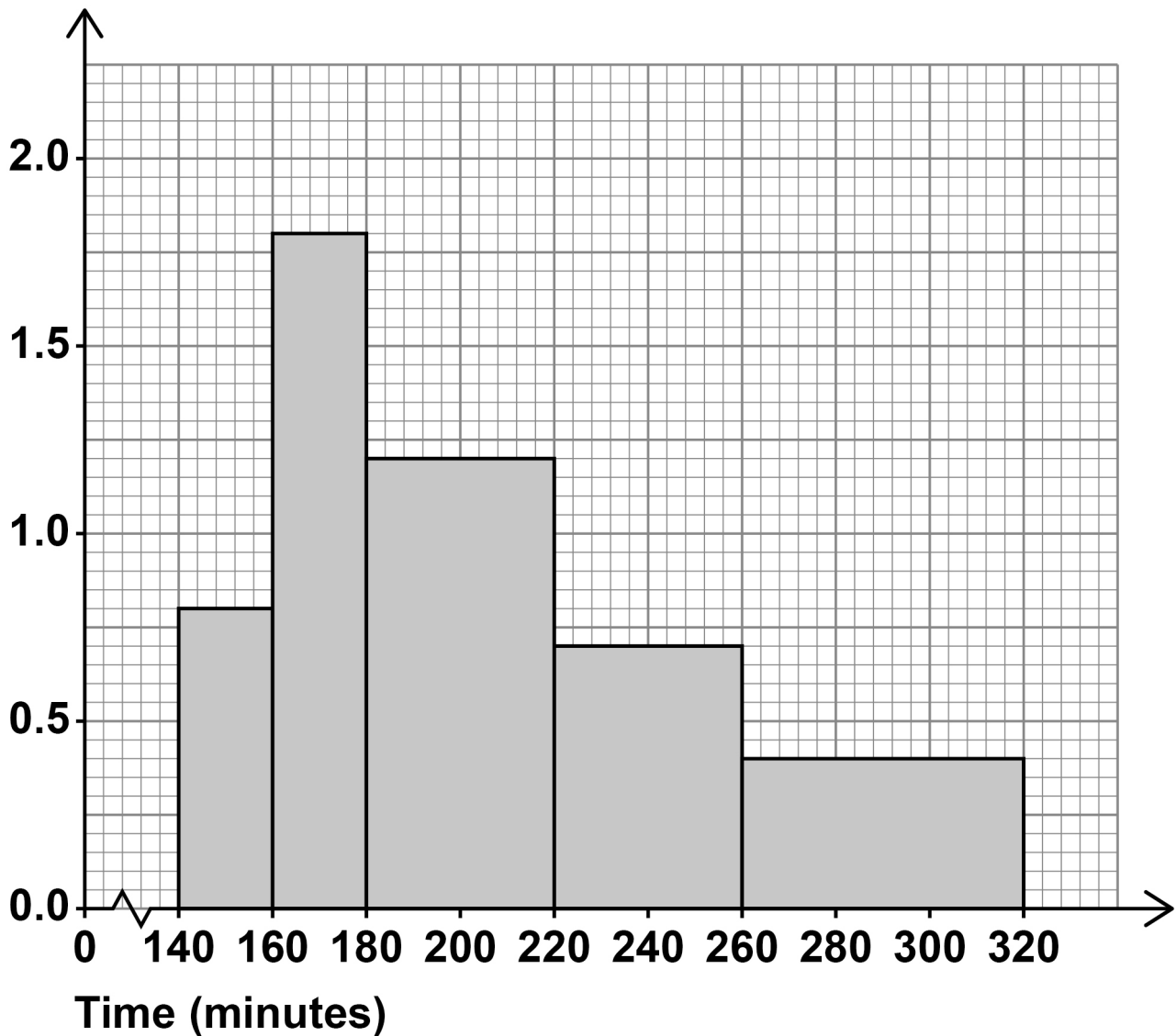
How much National Insurance did she pay?
[4 marks]

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Answer £ _____

8

15 **180 runners STARTED a marathon.**

Some of the runners did not complete it.

15 (a) **The histogram represents the times of the runners who did complete the marathon.**

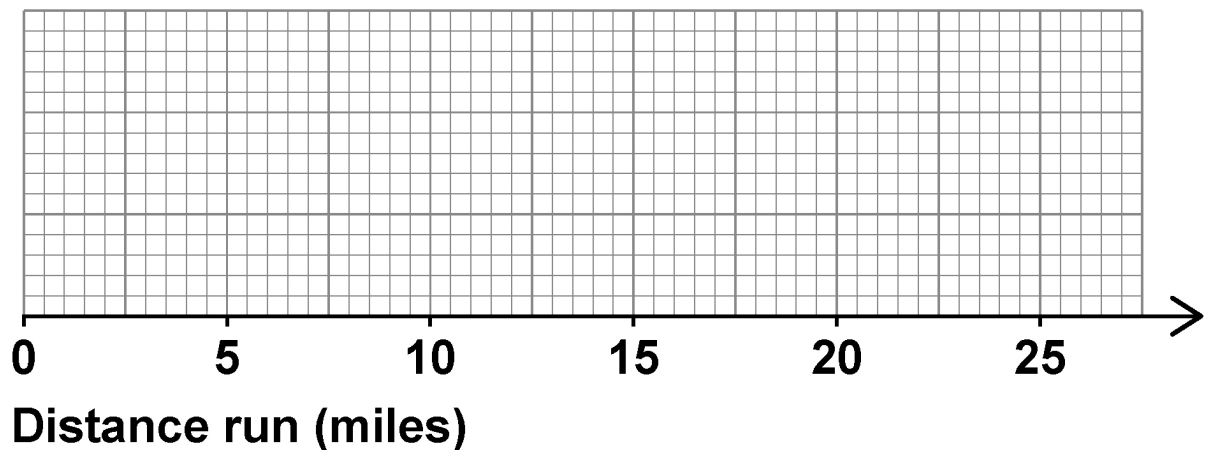How many runners did NOT complete the marathon? [3 marks]

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Answer _____

[Turn over]

15 (b) The table shows information about the runners who did NOT complete the marathon.

	DISTANCE RUN (MILES)
Least distance	5
Greatest distance	23
Lower quartile	11
Median	18
Interquartile range	9

Draw a box plot to represent the information.
[3 marks]

Distance run (miles)

___
6

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[Turn over]

16   **The diagram is not drawn accurately.**
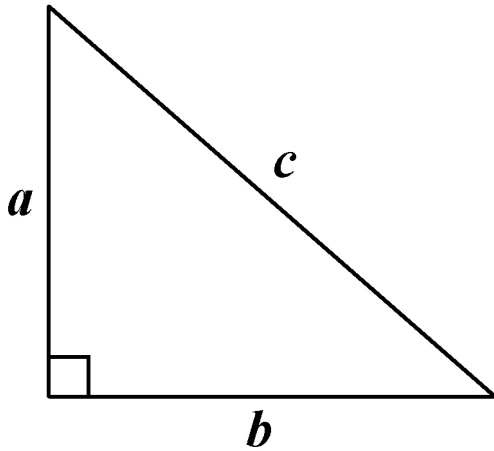
In this right-angled triangle,

a = 16 cm

$a : c$ = 4 : 5

Work out the area of the triangle.   [4 marks]

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Answer _____ cm^2

[Turn over]

17 **Solve** $\dfrac{x+8}{2} + \dfrac{9-x}{5} = 4$ **[4 marks]**

x =

[Turn over]

8

18 $f(x) = x^2 + 6x$

$g(x) = 2x + 4$

18 (a)   **Show that** $fg(x) = 4x^2 + 28x + 40$ **[3 marks]**

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18 (b)   **Solve   fg(x) = –5   [3 marks]**

Answer _____

[Turn over]

19   **Two integers have a difference of 6**

The integers are multiplied together.

9 is then added.

Prove algebraically that the result is always a square number. [3 marks]

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[Turn over]

$\dfrac{}{9}$

20 (a) Sunil thinks that E and D are linked by the equation $E = \dfrac{36}{D}$

The graph shows the values of D and E for $2 \leqslant D \leqslant 6$

Choose ONE point on the graph and state if Sunil's equation is correct for that point.
[1 mark]

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20 (b) G is directly proportional to the square root of H.

$G : H = 3 : 2$ when $H = 16$

Work out $G : H$ **when** $H = 100$ [4 marks]

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Answer _____ : _____

5

21   **A solid shape is made from centimetre cubes.**

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

The diagram is not drawn accurately.

FRONT ELEVATION   SIDE ELEVATION

9 cm

12 cm

5 cm

9 cm

7 cm

8 cm
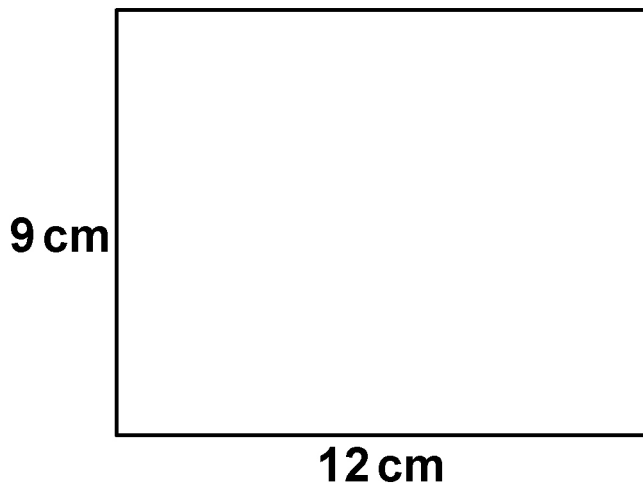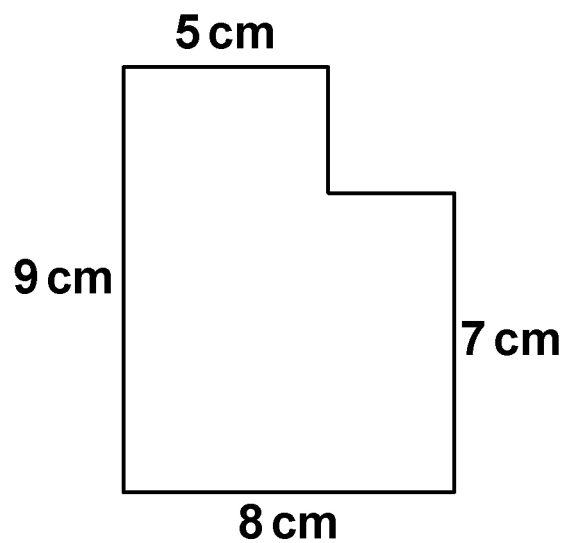
Work out

the MAXIMUM possible number of cubes in the shape

and

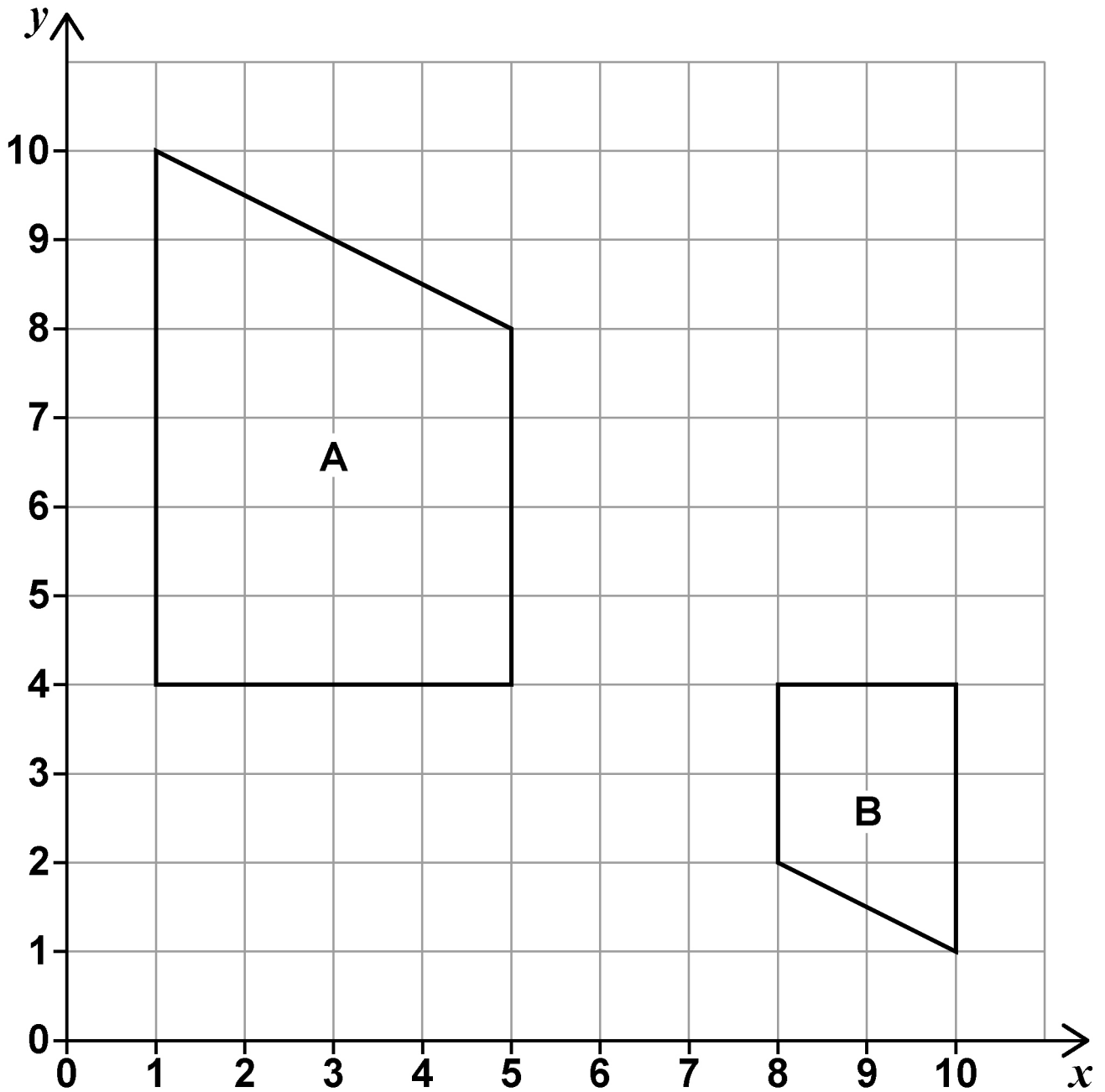**the MINIMUM possible number of cubes in the shape.**

[3 marks]

Maximum _____

Minimum _____

[Turn over]

22   **Shape A and shape B are shown on the grid.**

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

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[Turn over]

6

23 **The diagram is not drawn accurately.**

N

65 km

80°

N

B

35 km

A

C
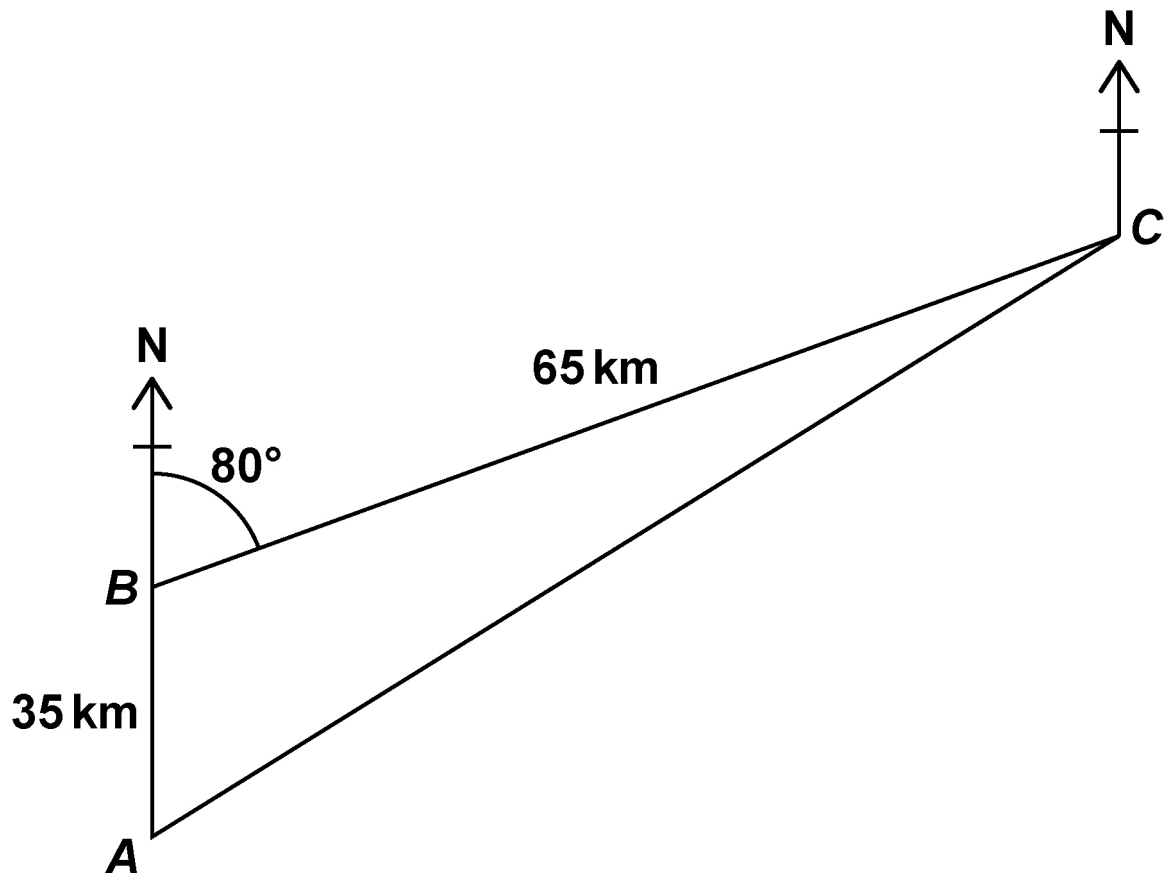
A boat sails 35 km North from *A* to *B*.

From *B* the boat sails to *C* and then back to *A*.

23 (a) **Show that the distance the boat sails from *C* to *A* is 79 km to the nearest km**

You MUST show your working. [2 marks]

[Turn over]

23 (b) **Work out the bearing of *A* from *C*. [4 marks]**

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Answer _____ °

END OF QUESTIONS

$$\frac{}{6}$$

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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