AQA

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

Higher Tier

Paper 2 Calculator

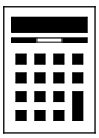
Shadow paper based on June 2024 question paper

Time allowed: 1 hour 30 minutes

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.
- 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	
TOTAL	

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

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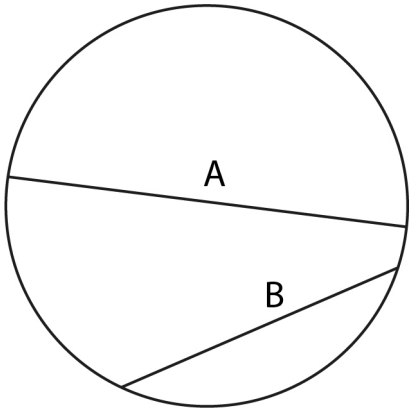
1 The diagram shows a circle, centre *O*, and two straight lines.



Use **one** word to describe each line.

Choose from

arc	chord	sector	segment	diameter

[2 marks]

Line A _____

Line B _____

Do not write outside the box

2 The mass a boulder is 2 088 000 kg

This value is a 28% reduction from the **original** mass of the boulder.

Work out the **original** mass of the boulder.

Give your answer in standard form.

[3 marks]

Answer _____ kg

Turn over for the next question

5

Do not write outside the box

3 A gardener has a bag of seeds.

He wants to

use all the seeds

plant the same number of seeds in each row.

$$R = \frac{k}{s}$$

R is the number of rows.

s is the number of seeds in each row.

3 (a) What does the constant k represent?

Tick the correct box.

[1 mark]

☐ The number of seeds in each row

☐ The number of rows

☐ The number of seeds in the bag

☐ None of the above

3 (b) Complete the table.

[2 marks]

s	30	120	
R	20		2

Do not write outside the box

4 (a) A fair spinner has eight equal sections, each with the number 1, 2, 3 or 4

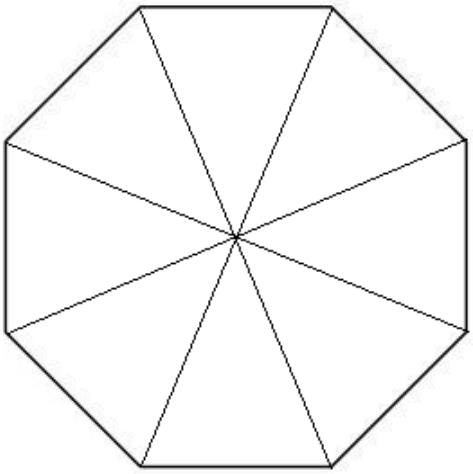
Each number appears at least once.

P(even number) = P(1)

Work out P(3)

You may use the blank spinner to help you.

[3 marks]



Answer _____

4 (b) A different spinner has four sections, each labelled A, B, C or D.

	A	**B**	**C**	**D**
Probability	0.3	0.25	0.4	0.2

Give **one** reason why there **must** be a mistake in the table.

[1 mark]

_____

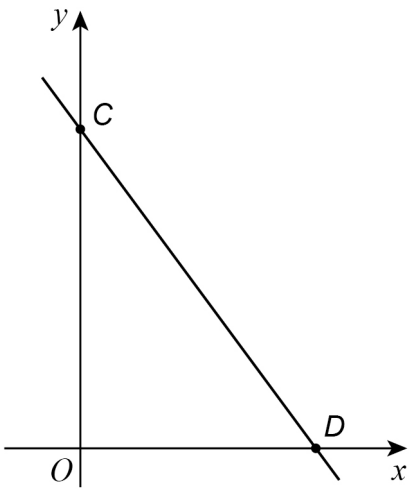
_____

_____

7

Do not write outside the box

5 (a) Here is a sketch of the graph $y = -3x + 12$

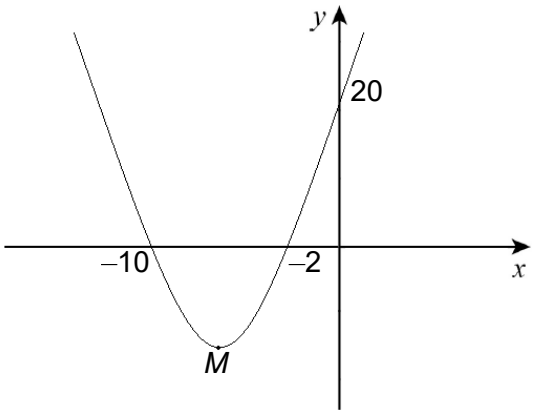


Complete the coordinates of *C* and *D*.

[2 marks]

C (0 , _____) *D* (_____ , 0)

5 (b) Here is a sketch of a quadratic graph.



Complete the following statements.

[2 marks]

The value of the ***y*-intercept** is _____

The ***x*-coordinate** of the minimum point, *M*, is _____

Do not write outside the box

6 Work out $(1.25 \times 10^5)^{-2}$

Give your answer in standard form.

[1 mark]

Answer _____

7 Reece flips a biased coin a number of times.

Here is some information about the outcomes.

Total number of flips	10	100	1000	10000
Number of heads	3	37	389	3591

What is the best estimate for the probability of flipping a head?

Explain why this is the best estimate.

[2 marks]

Probability _____

Explanation _____

7

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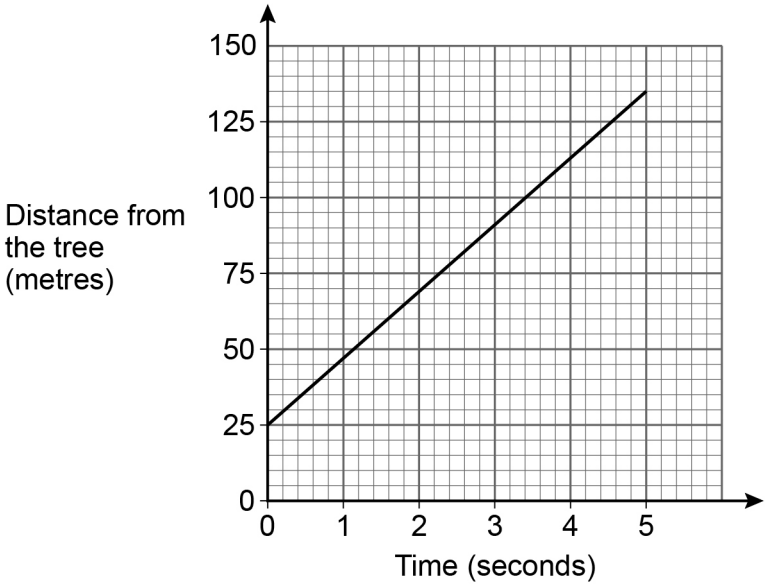
8 A cheetah is sprinting in a straight line away from a tree.

The graph shows the cheetah's distance from the tree.



Work out the speed of the cheetah in metres per second.

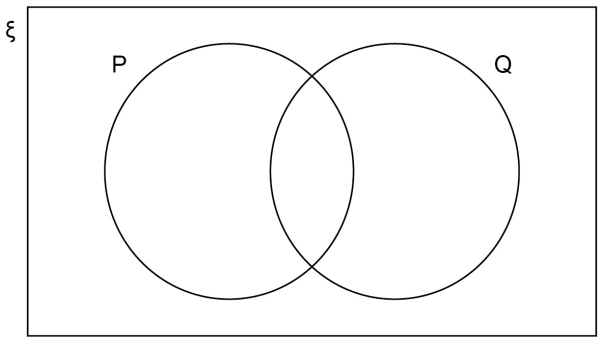
[3 marks]

Answer _____ m/s

Do not write outside the box

9 On the Venn diagram, shade the section represented by $P \cup Q$

[1 mark]



10 A company sold 80 000 units of a product last year.

The number of units sold is predicted to increase

by 4% this year

and then

by 7% next year.

Is the predicted number of units sold for **next** year more than 90 000 ?

You **must** show your working.

[3 marks]

7

Turn over ►

Do not write outside the box

11 A map has a scale of 1 : 30 000

Two parks are 12 cm apart on the map.

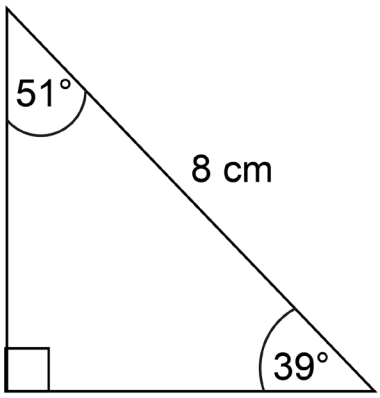
Work out the actual distance between them.

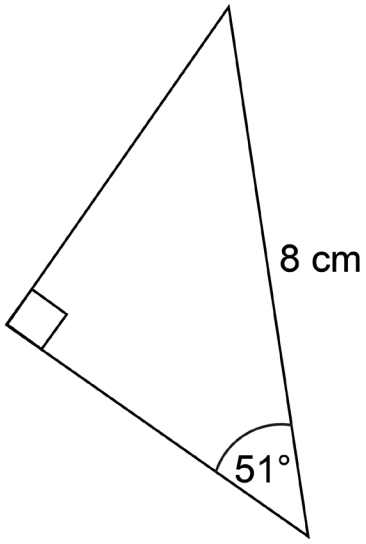
Give your answer in **kilometres**.

[3 marks]

Answer _____ km

12





Not drawn accurately

Circle the reason why these triangles are congruent.

[1 mark]

ASA RHS SAS SSS

Do not write outside the box

13 Nicola takes part in shot put competitions.

Here is some information about 50 of her throws.

Length of throw, d metres	**Number of throws**	**Midpoint**	
$12.0 \leqslant d < 12.8$	30		
$12.8 \leqslant d < 13.6$	15		
$13.6 \leqslant d < 14.4$	5		
	Total = 50		

Work out an estimate of the mean distance of these 50 throws.

Give your answer as a decimal.

[3 marks]

Answer _____ m

7

Turn over ►

Do not write outside the box

14 A graph passes through the points (2, 9) and (5, w)

14 (a) Assume that the equation of the graph is of the form $y = x^2 + c$

Work out the value of w that this would give.

[3 marks]

$w =$ _____

14 (b) In fact, the graph has a cubic equation.

What does this mean about the actual value of w?

Tick **one** box.

[1 mark]

☐ It must be the same as the value in part (a)

☐ It must be different to the value in part (a)

☐ It is impossible to tell

Do not write outside the box

15 Water is pumped into a reservoir at a rate of 19.5 litres **per second** for 45 minutes.

1 cubic metre = 1000 litres

Is more than 50 cubic metres of water pumped into the reservoir?

Tick a box.

Yes ☐ No ☐

You **must** show your working.

[4 marks]

8

Turn over ►

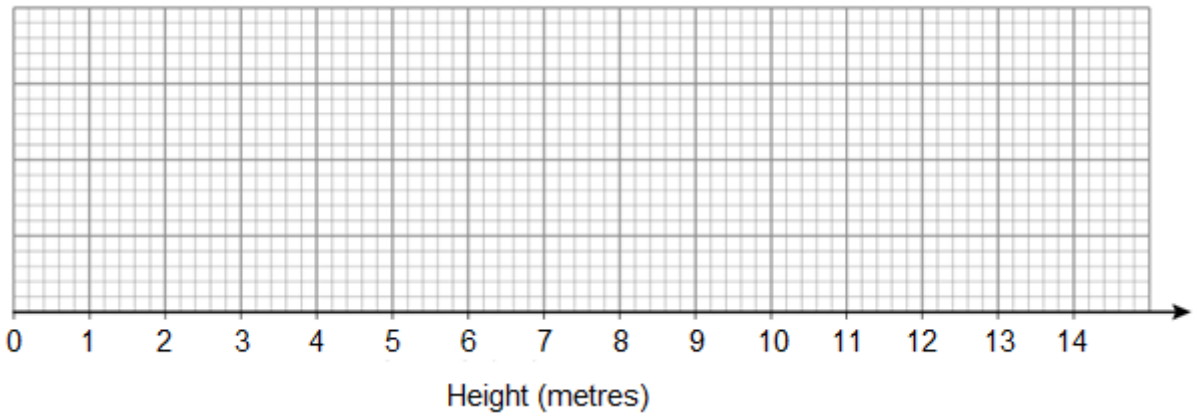
Do not write outside the box

16 Here is some information about the heights, in metres, of trees:

- Shortest height = 3
- Longest height = 12
- Upper quartile = 9
- Median height = 6
- Interquartile range = 5.4

Draw a box plot to show this information.

[3 marks]



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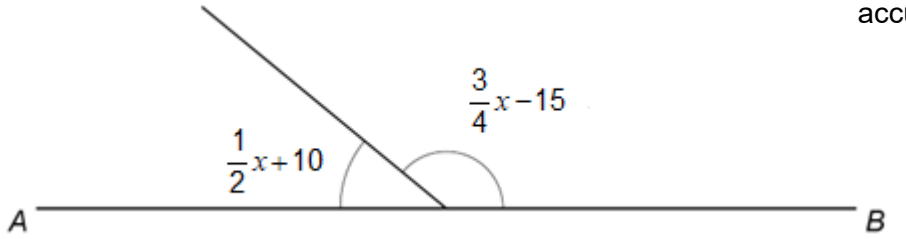
17 *AB* is a straight line.

Both angles are given in degrees.

Not drawn accurately



By working out the value of x,

work out the ratio smaller angle : larger angle

[4 marks]

Answer _____ : _____

7

Turn over ►

Do not write outside the box

18 A diagonal of a rectangle is 31.2 cm long.

The diagonal makes an angle of 48° with a side of length x cm

Work out the value of x.

[3 marks]

$x =$ _____

Do not write outside the box

19 (a) Show that $9x(2x + 3) - 3x^2\left(6 - \frac{12}{x}\right) - 7x\left(9 + \frac{5}{x}\right)$ simplifies to an integer.

[3 marks]

19 (b) Factorise $12x^2 - 19x - 10$

[2 marks]

Answer _____

8

Turn over ►

Do not write outside the box

20 $(x-6)=\dfrac{5(12-x^2)}{x+3}$ and $x=\dfrac{d\pm\sqrt{e}}{f}$

Work out one set of possible values for d, e and f.

[4 marks]

$d=$ _____

$e=$ _____

$f=$ _____

Do not write outside the box

21 At a music festival, people are divided into four areas: food court, merchandise, rest area and main stage.

Of the people at the festival,

$\frac{1}{6}$ are in the food court

$\frac{3}{10}$ are in merchandise

number in rest area : number in main stage = 3 : 4

There are 2400 people in the main stage.

How many people are at the music festival?

[4 marks]

Answer _____

Turn over for the next question

8

Do not write outside the box

22

$$x_{n+1} = 9 - \frac{2}{x_n}$$

Use $x_1 = 2$ to work out an approximate solution to $x = 9 - \frac{2}{x}$

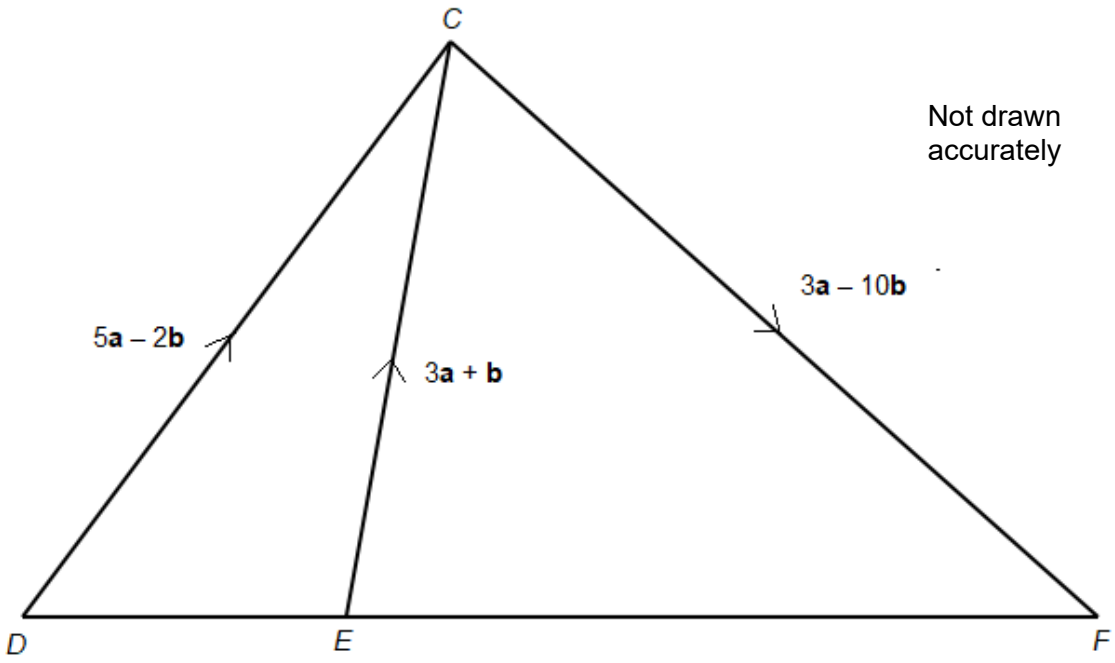
Give your answer to 4 significant figures.

[3 marks]

$x =$ _____

Do not write outside the box

23



Prove that *DEF* is a straight line.

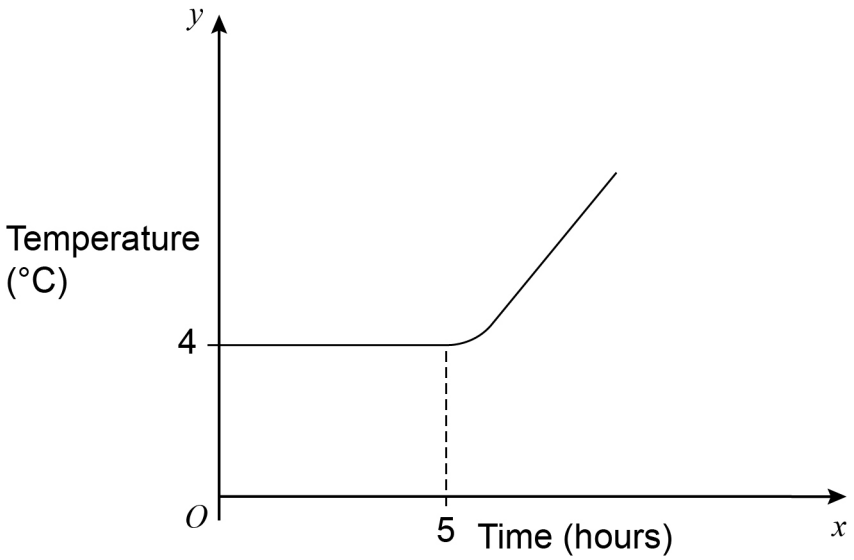
[4 marks]

7

Turn over ►

Do not write outside the box

24 A refrigerator is set to keep its internal temperature at a constant 4° C for 5 hours.
After this period, the refrigerator is unplugged, and the temperature inside begins to rise.
Below is a graph showing the temperature, y°C, inside the refrigerator at time x hours.



24 (a) Assume the equation of the curved part is $y = kx^2 + 1$ where k is a constant.

Work out the value of y when $x = 10$

[2 marks]

$y =$ _____

Do not write outside the box

24 (b) In fact,

the equation of the curved part is $y = A \times \left(\frac{4}{3}\right)^{\frac{1}{5}x}$ where A is a **different** constant.

How does this affect the value of y when $x = 10$?

Tick **one** box.

You **must** show working to support your answer.

[2 marks]

☐ The value of y is greater than the answer to part (a).

☐ The value of y is less than the answer to part (a).

☐ The value of y is the same as the answer to part (a).

Turn over for the next question

4

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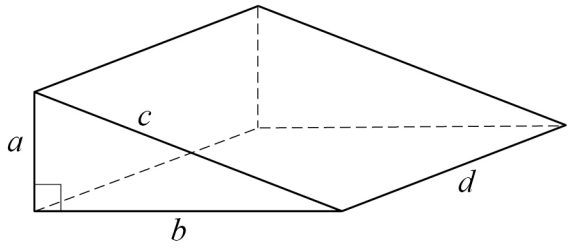
25 Here is a right-angled triangular prism.



The ratio of the edges is $a : b : c : d = 8 : 15 : 17 : 12$

The **volume** of the prism is $2430\,\text{cm}^3$

Work out the total length of **all** of the edges of the prism.

[5 marks]

Answer _____ cm

END OF QUESTIONS

5

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There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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