Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

H

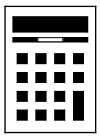
Higher Tier Paper 2 Calculator

Friday 8 November 2024 Morning 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	
TOTAL	

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

Do not write outside the box

1 Choose a word from the list below to complete each sentence.

arc	centre	circumference	diameter
radius	sector	segment	tangent

1 (a) The length of the _____ is double the length of the radius.

[1 mark]

1 (b) A _____ is a region created by drawing a chord through a circle.

[1 mark]

1 (c) A radius meets a _____ at a right angle.

[1 mark]

Do not write outside the box

2 Here is a grouped frequency table.

Value, v	Frequency	Midpoint	
$0 \leqslant v < 10$	16	5	
$10 \leqslant v < 20$	22	15	
$20 \leqslant v < 30$	13	25	
$30 \leqslant v < 40$	9	35	
	Total = 60		

Work out an estimate of the mean value.

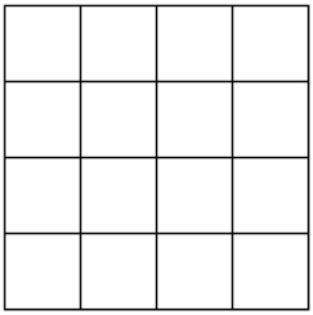
[3 marks]

Answer _____

3 In the grid below, shade **one quarter** of the squares so that the grid has exactly **two** lines of symmetry.

Shade complete squares only.

[2 marks]



8

Turn over ►

Do not write outside the box

4 A map has a scale of 1 : 4000

On the map, the distance from a station to a museum is 7 cm

Is the **actual** distance from the station to the museum **more** than 300 m?

Tick a box.

Yes ☐ No ☐

Show working to support your answer.

[3 marks]

5 X is inversely proportional to Y.

Circle the correct statement.

[1 mark]

X is directly proportional to Y

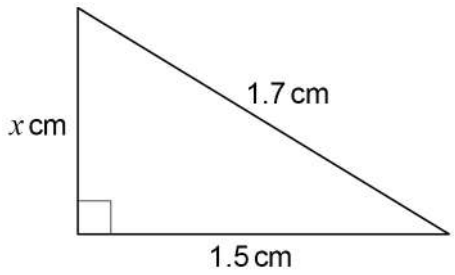
X is directly proportional to $\frac{1}{Y}$

X is directly proportional to $2Y$

X is directly proportional to $\sqrt{Y}$

Do not write outside the box

6 Here is a right-angled triangle.



Not drawn accurately

Use Pythagoras' theorem to show that $x = 0.8$

[2 marks]

Turn over for the next question

6

Do not write outside the box

7 Beth and Lynn each spin the same biased coin a number of times.

The table shows information about the results.

	Beth	**Lynn**
Number of spins	125	80
Relative frequency of Heads	0.32	0.35

7 (a) How many **more** Heads did Beth spin than Lynn?

[2 marks]

Answer _____

7 (b) Lynn says,

"My estimate of the probability of the coin landing on Heads must be the best, because 0.35 is greater than 0.32"

Is she correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

Do not write outside the box

8 Some oil has

a mass of 537 g

a density of 895 000 g/m^3

1 m^3 = 1000 litres

Work out the volume of the oil.

Give your answer in litres.

[2 marks]

Answer _____ litres

9 The length of a wall is 9 metres to the nearest metre.

Complete the error interval for the length of the wall.

[2 marks]

Answer _____ m ⩽ length < _____ m

Turn over for the next question

7

Do not write outside the box

10 384 000 electric cars were sold this year.

This is 20% **more** than last year.

How many were sold **last year**?

[3 marks]

Answer _____

11 Here are three terms.

xy x^2 $5y^2$

Alec multiplies two of these terms.

Work out the **three** possible fully simplified answers.

[3 marks]

Answer _____

Answer _____

Answer _____

Do not write outside the box

12 At a music festival, four types of instrument are played.

guitars keyboards drums trumpets

- The total number of instruments is 80
- Half of the instruments are guitars.
- keyboards : drums : trumpets = 3 : 4 : 1

How many **keyboards** are there?

[4 marks]

Answer _____

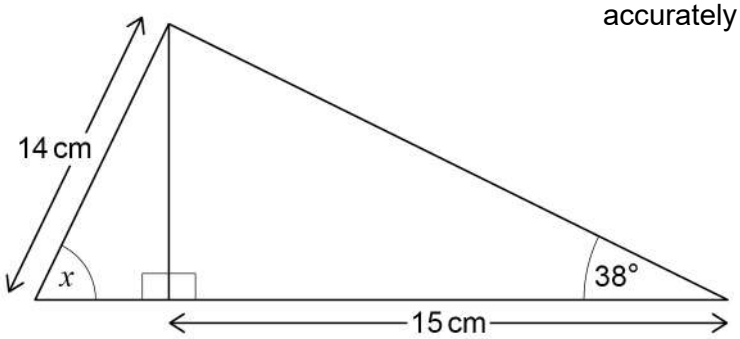
Turn over for the next question

10

Do not write outside the box

13 Two right-angled triangles are joined to make a larger triangle.

Not drawn accurately



Work out the size of angle x.

[4 marks]

$x =$ _____ °

Do not write outside the box

14 Here is a sign in a shop.

SALE

20% OFF ALL ITEMS

TODAY ONLY 10% OFF THE REDUCED PRICE

THAT MEANS YOU SAVE 30%

Is the sign correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

Turn over for the next question

5

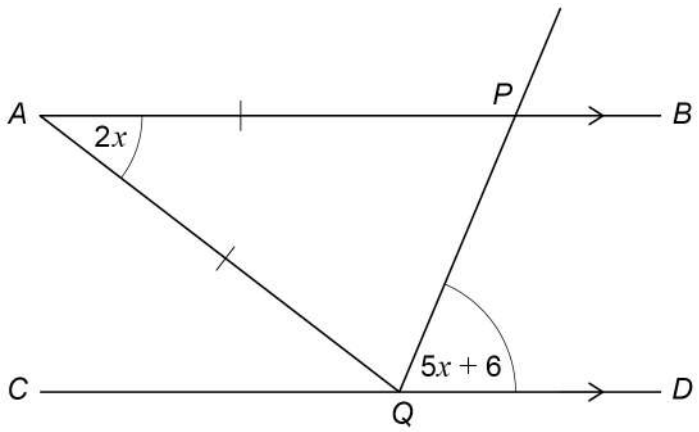
15 *AB* and *CD* are straight, parallel lines.

P is a point on *AB*.

Q is a point on *CD*.

$AP = AQ$

Not drawn accurately



Work out the value of x.

[4 marks]

$x =$ _____ °

Do not write outside the box

16 Solve $(x + 2)(x - 5) = 6x$

[4 marks]

Answer _____

17 Straight line *LM* has equation $y = 4x - 7$

Straight line *ST* has equation $y = \frac{9 - x}{4}$

Are the lines *LM* and *ST* perpendicular?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[2 marks]

10

Do not write outside the box

18 Two types of battery, P and Q, were tested.

100 of each type were put into clocks.

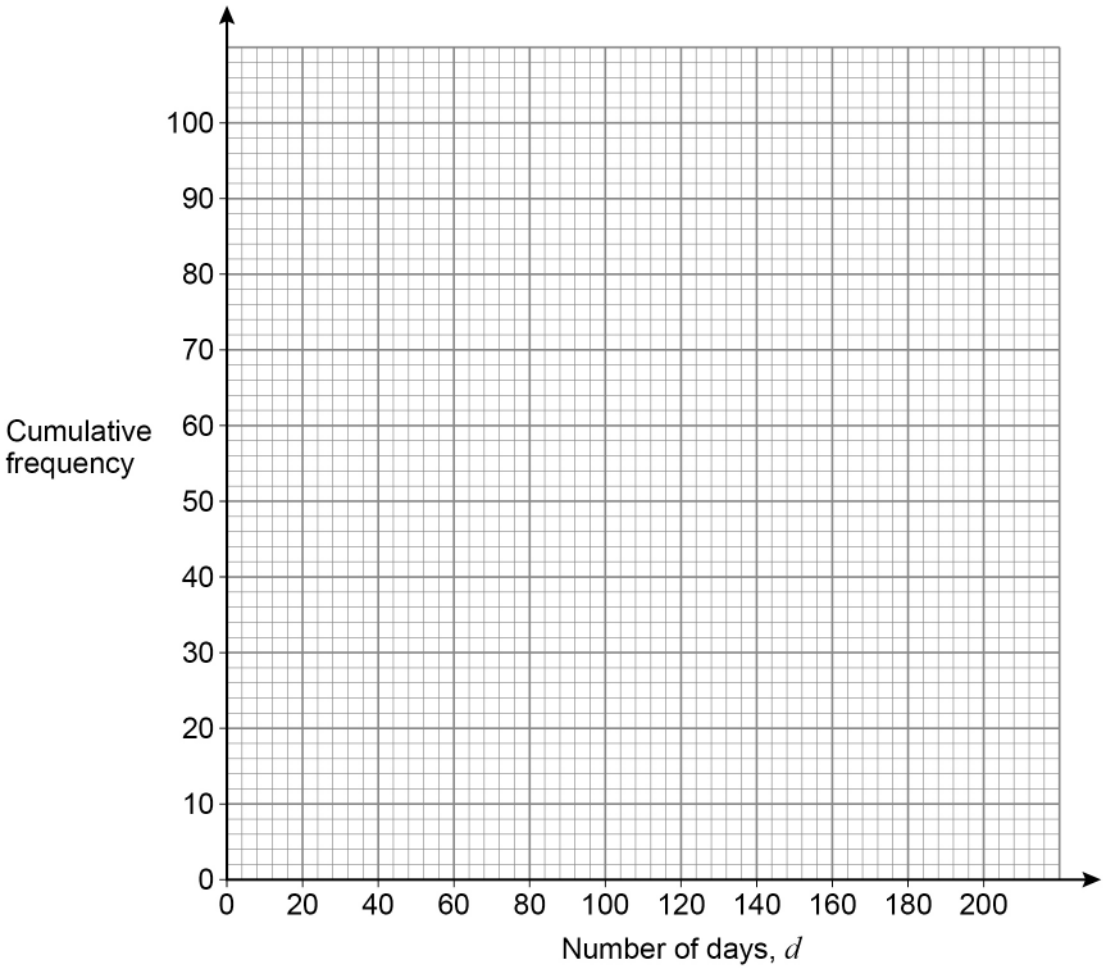
The number of days each battery lasted was recorded.

18 (a) The frequency table represents the results for **type P**.

Number of days, d	**Frequency**	
$0 \leqslant d < 40$	2	
$40 \leqslant d < 80$	9	
$80 \leqslant d < 120$	26	
$120 \leqslant d < 160$	45	
$160 \leqslant d < 200$	18	

On the grid, draw a cumulative frequency diagram to represent the data.

[3 marks]



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18 (b) For **type Q**,

the median was 126 days

the interquartile range was 57 days.

Compare the number of days that types P and Q lasted.

Make **one** statement about the average and **one** statement about the spread.

Use statistical measures to support your statements.

[4 marks]

Average

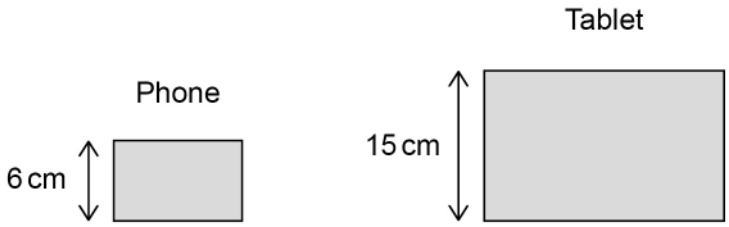
Spread

Turn over for the next question

7

Do not write outside the box

19 A phone screen is **similar** to a tablet screen.



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The area of the **tablet** screen is 420 cm^2

A screen costs £7000 per **square metre**.

Work out the cost of a screen for the **phone**.

[5 marks]

Answer £ _____

Do not write outside the box

20 Here is a formula for an iterative process.

$$u_{n+1} = \frac{24}{u_n} + 4$$

$u_2 = 8$

Work out the values of u_1 and u_3

[3 marks]

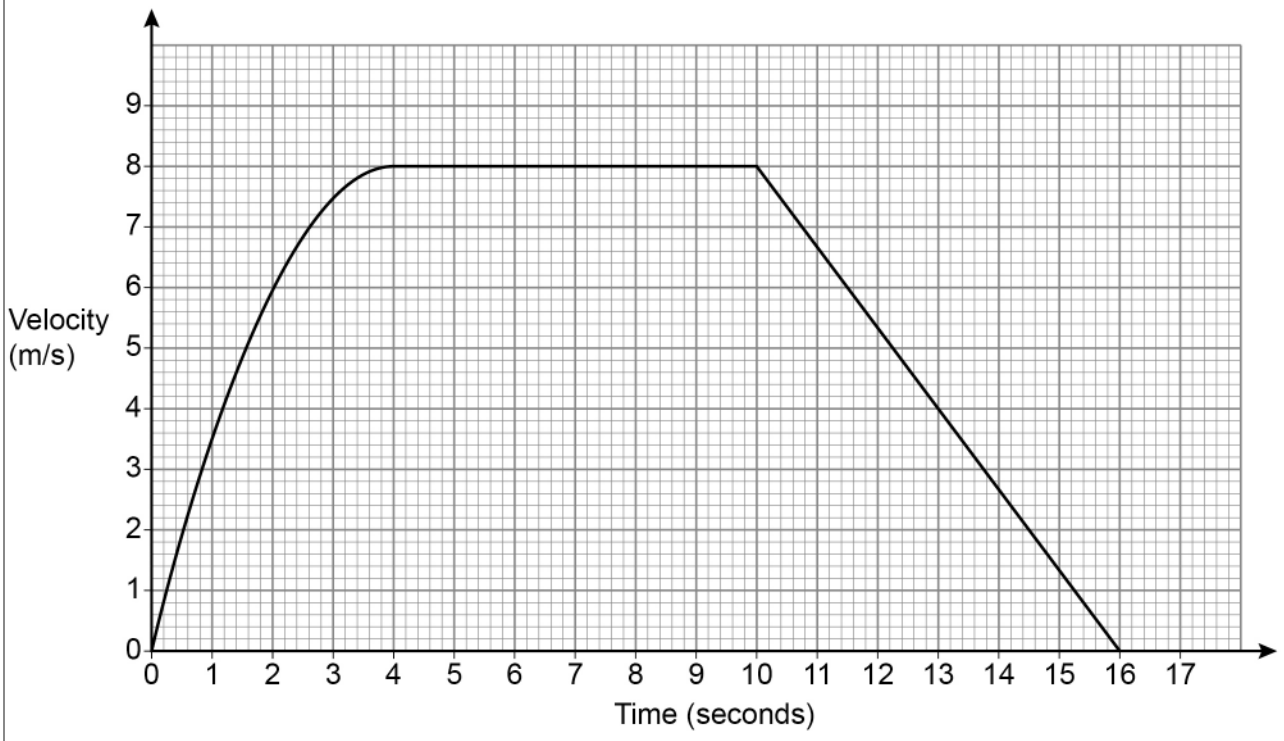
$u_1 =$ _____ $u_3 =$ _____

Turn over for the next question

8

Do not write outside the box

21 The graph represents the velocity of a ball as it rolls along the ground.



21 (a) Work out an estimate for the acceleration of the ball, in m/s^2, after 2 seconds.

You **must** show your working.

[2 marks]

Answer _____ m/s^2

Do not write outside the box

21 (b) Work out an estimate for the total distance covered by the ball.

[3 marks]

Answer _____ m

21 (c) Is your estimate from part (b) an overestimate or underestimate?

Tick a box.

Overestimate ☐ Underestimate ☐

Give a reason for your answer.

[1 mark]

Turn over for the next question

6

Do not write outside the box

22 The nth term of a sequence is $n^2 - 30n + 236$

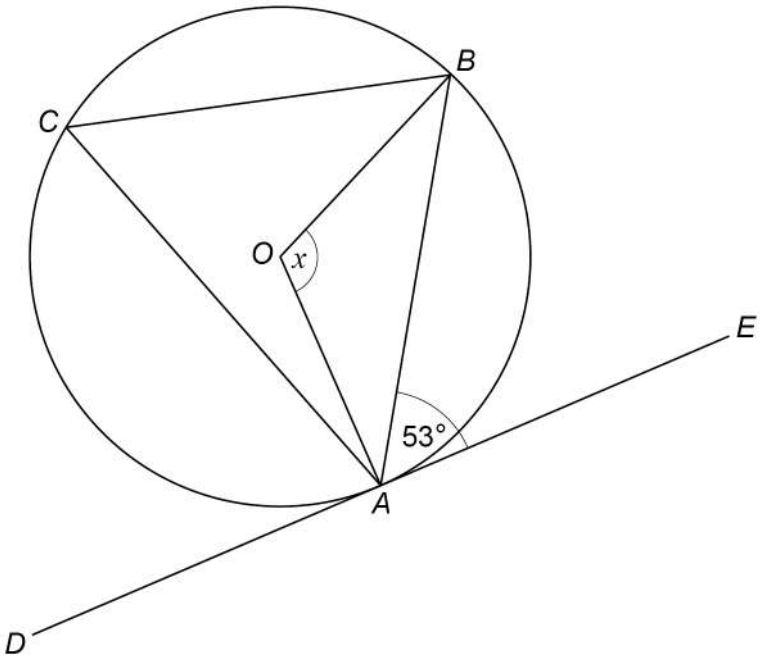
By completing the square,

show that all the terms of the sequence have two or more digits.

[3 marks]

Do not write outside the box

23 (a)



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Line *DAE* is a tangent at *A* to the circle with centre *O*.

Work out the size of angle x.

[2 marks]

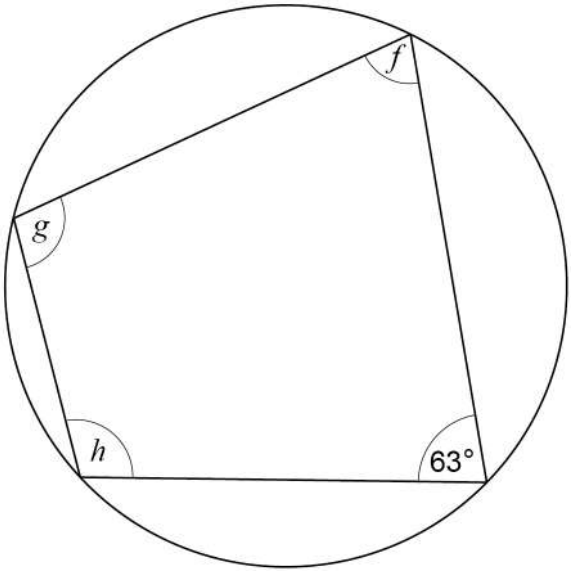
$x =$ _____ °

Turn over for the next question

5

Do not write outside the box

23 (b) Here is a cyclic quadrilateral.



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$f : g = 2 : 3$

Work out $f : h$

Give your answer in its simplest form.

[4 marks]

Answer _____ : _____

Do not write outside the box

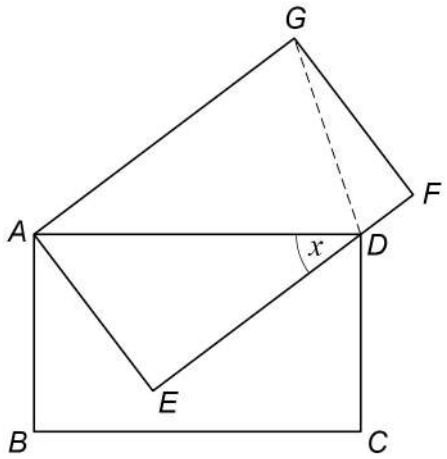
24 In the diagram,

ABCD and *AEFG* are congruent rectangles

D lies on *EF*

angle *ADE* = x

Not drawn accurately



Prove that *GD* bisects angle *ADF*.

[4 marks]

END OF QUESTIONS

8