



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE MATHEMATICS

H

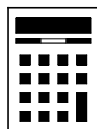
Higher Tier Paper 2 Calculator

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	



N 0 V 2 4 8 3 0 0 2 H 0 1

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

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]**



2

Here is a grouped frequency table.

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

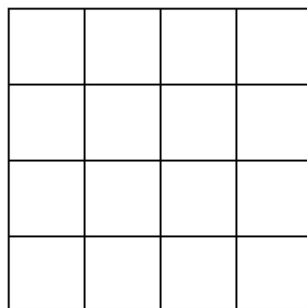
Work out an estimate of the mean value.

[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]**Turn over ►**

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 $\frac{1}{Y}$

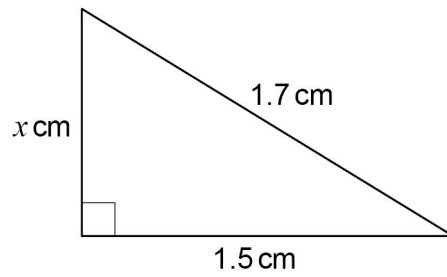
X is directly proportional to $2Y$

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



6

Here is a right-angled triangle.

Not drawn
accuratelyUse Pythagoras' theorem to show that $x = 0.8$ **[2 marks]**

Turn over for the next question

Turn over ►



- 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]



8

Some oil has

a mass of 537 g

a density of $895\,000\text{ g/m}^3$ $1\text{ m}^3 = 1000\text{ litres}$

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 $\leq$ length < _____ m**Turn over for the next question**

- 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 _____



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]

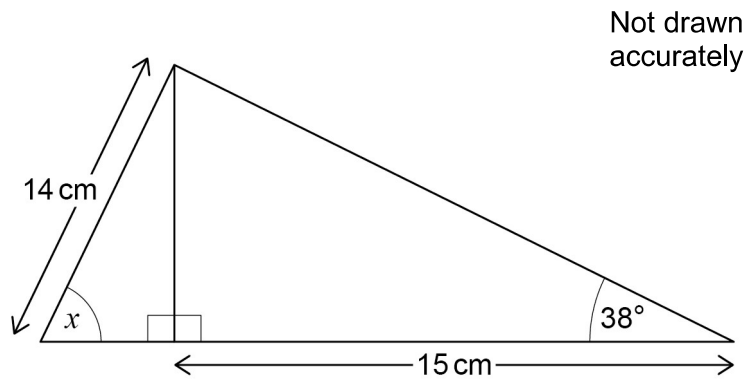
Answer _____

Turn over for the next question



13

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



Work out the size of angle x .

[4 marks]

$x =$ _____ $^\circ$



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

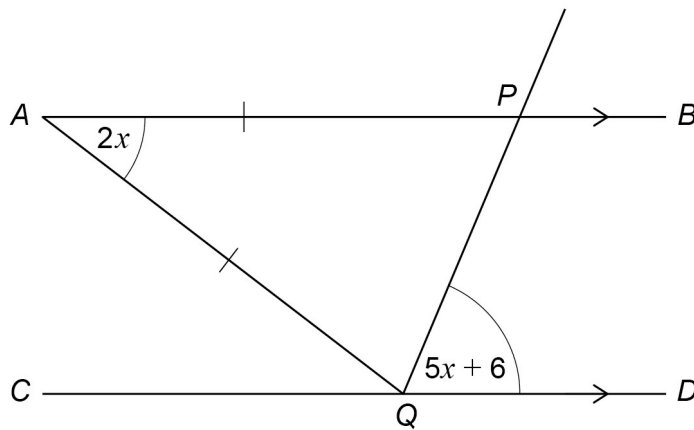
☐

Give a reason for your answer.

[1 mark]

Turn over for the next question

15

 AB and CD are straight, parallel lines. P is a point on AB . Q is a point on CD . $AP = AQ$ Not drawn
accuratelyWork out the value of x .**[4 marks]**

 $x =$ _____ °

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]



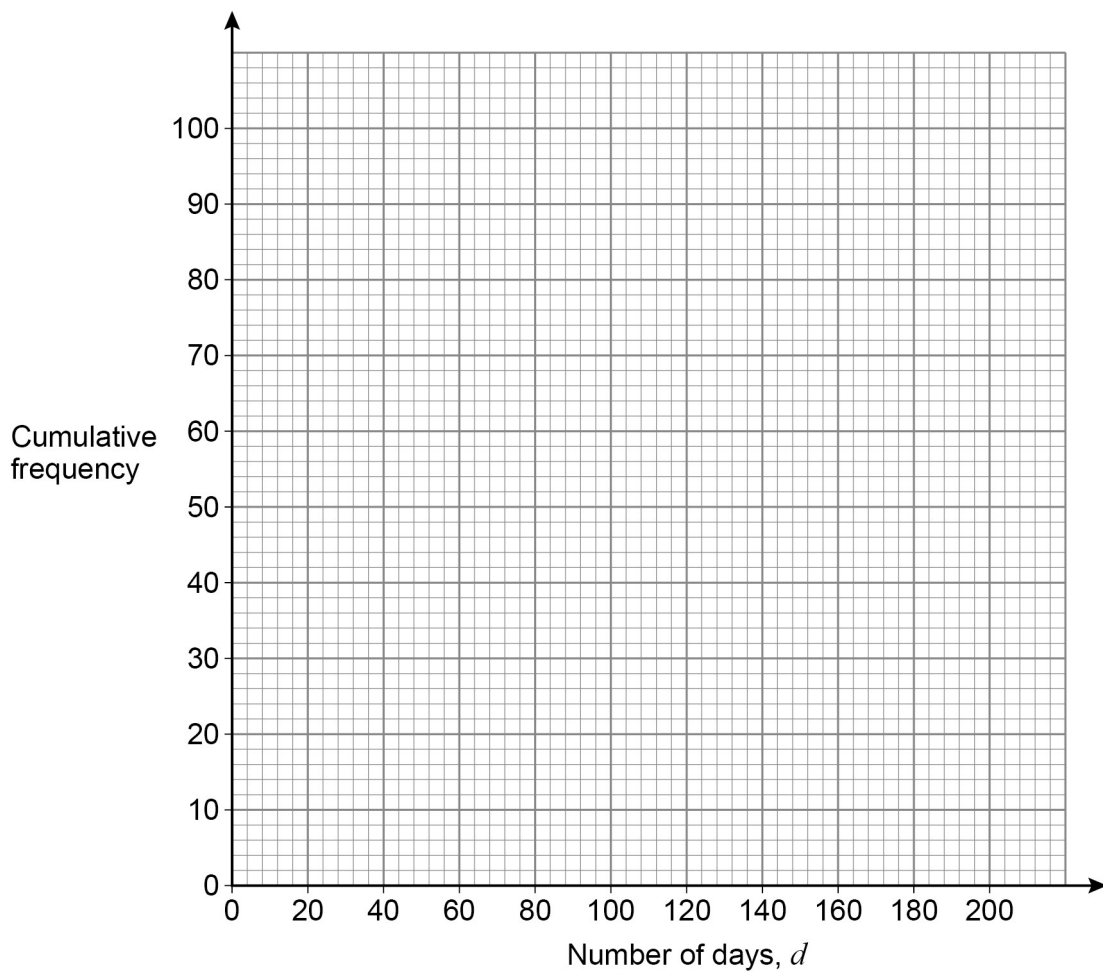
- 18** Two types of battery, P and Q, were tested.
100 of each type were put into clocks.
The number of days each battery lasted was recorded.

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

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

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

[3 marks]



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 _____

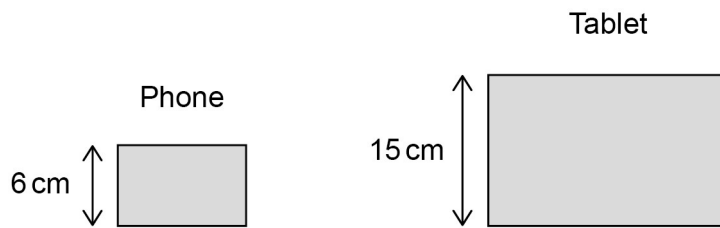
Spread _____

Turn over for the next question

Turn over ►



Not drawn accurately



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

[5 marks]

Answer £



20

Here is a formula for an iterative process.

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

$$u_2 = 8$$

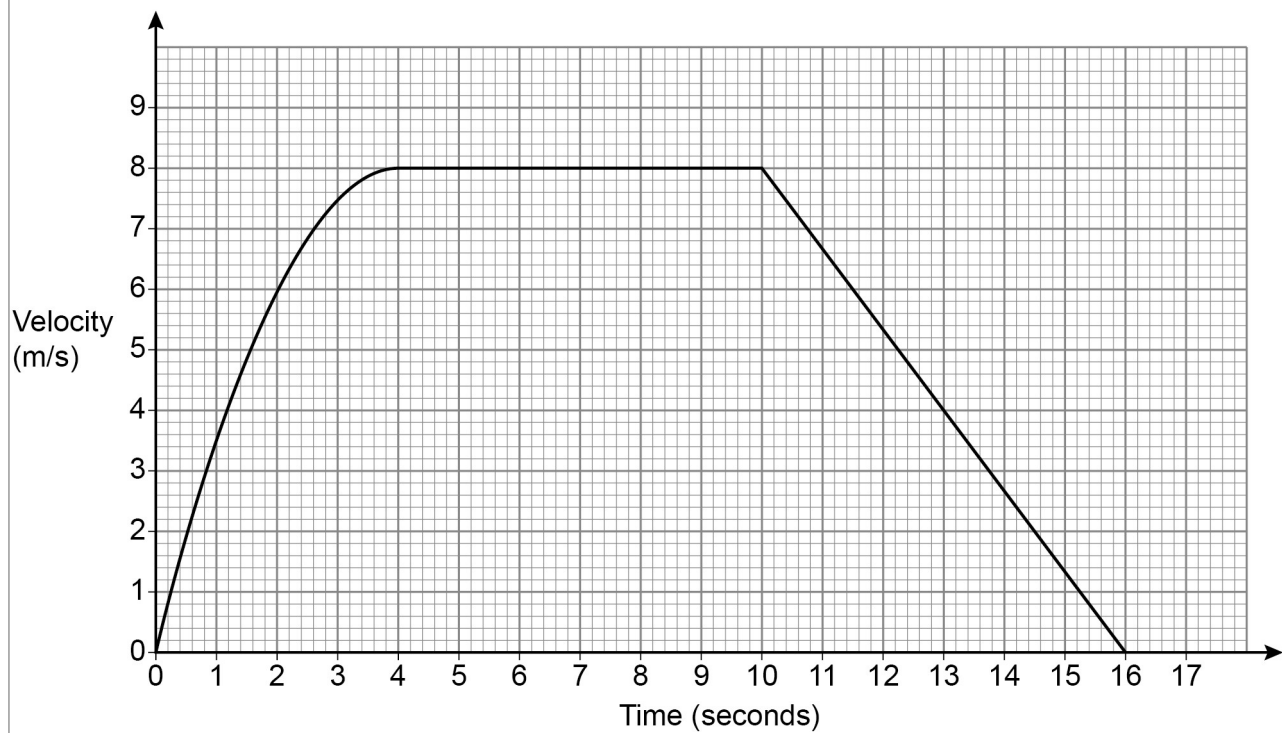
Work out the values of u_1 and u_3 **[3 marks]**

$$u_1 = \underline{\hspace{2cm}} \quad u_3 = \underline{\hspace{2cm}}$$

Turn over for the next question**Turn over ►**

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



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



22

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

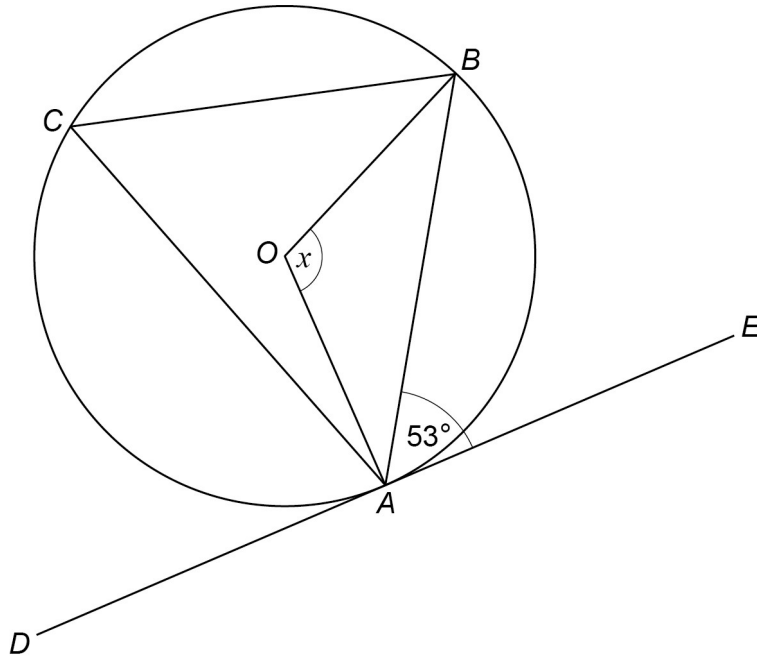
By completing the square,

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

[3 marks]



23 (a)

Not drawn
accurately

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

Work out the size of angle x .

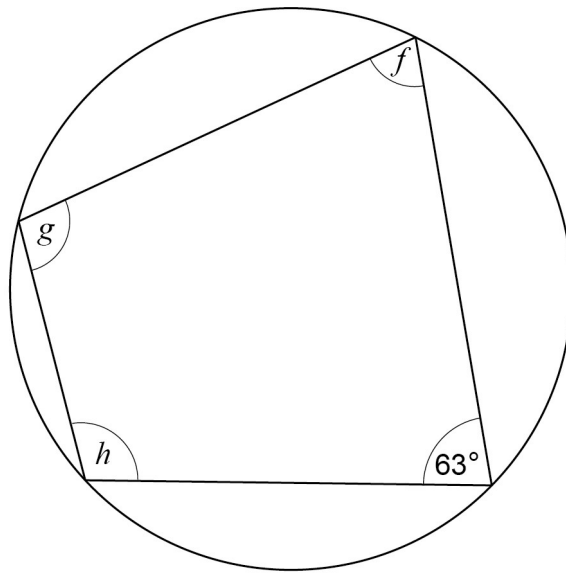
[2 marks]

$x =$ _____ $^{\circ}$

Turn over for the next question



23 (b) Here is a cyclic quadrilateral.



Not drawn
accurately

$$f : g = 2 : 3$$

Work out $f : h$

Give your answer in its simplest form.

[4 marks]

Answer _____ :



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outside the
box

24

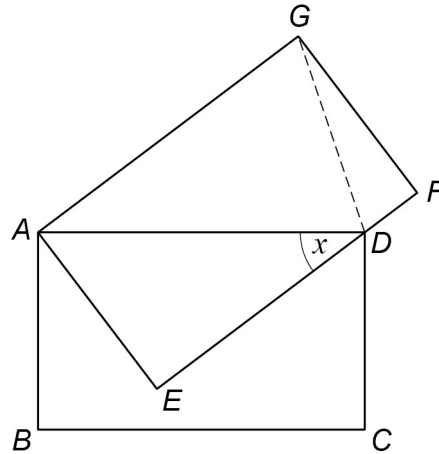
In the diagram,

$ABCD$ 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



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