

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

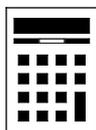
Shadow paper based on the November 2024 paper

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	
TOTAL	

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 _____ is the distance from the centre of a circle to its edge **[1 mark]**

1 (b) A _____ is part of a circle formed by two radii and an arc between them **[1 mark]**

1 (c) The _____ of a circle is the total distance around its edge **[1 mark]**

- 2 Here is a grouped frequency table.

Value, v	Frequency	Midpoint	
$0 \leq v < 10$	11	5	
$10 \leq v < 20$	17	15	
$20 \leq v < 30$	14	25	
$30 \leq v < 40$	18	35	
	Total = 60		

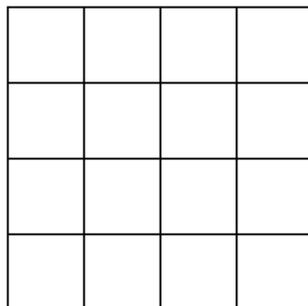
Work out an estimate of the mean value.

[3 marks]

Answer _____

- 3 In the grid below, shade **one quarter** of the squares
so that the grid has rotational symmetry of order 2 and **no** lines of symmetry.
Shade complete squares only.

[2 marks]



Turn over ►

4

A map has a scale of 1 : 6000

On the map, the distance from a supermarket to a train station is 8 cm

Is the **actual** distance from the supermarket to the train station **more** than 500 m?

Tick a box.

Yes

No

Show working to support your answer.

[3 marks]

5

A is inversely proportional to B .

Circle the correct statement.

[1 mark]

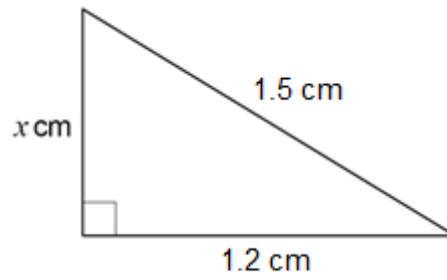
A increases as B increases

A stays the same when B doubles

A doubles when B doubles

A halves when B doubles

6 Here is a right-angled triangle.



Not drawn
accurately

Use Pythagoras' theorem to show that $x = 0.9$

[2 marks]

Turn over for the next question

- 7 Maya and Lewis each spin the same biased coin a number of times.
The table shows information about the results.

	Maya	Lewis
Number of spins	75	90
Relative frequency of Heads	0.44	0.4

- 7 (a) How many **more** Heads did Lewis spin than Maya?

[2 marks]

Answer _____

- 7 (b) Maya says,

“My estimate of the probability of the coin landing on Heads must be the best,
because 0.44 is greater than 0.4”

Is she correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

- 8** Some oil has
a mass of 672 g
a density of $960\,000\text{ g/m}^3$
 $1\text{ m}^3 = 1000\text{ litres}$

Work out the volume of the oil.
Give your answer in litres.

[2 marks]

Answer _____ litres

- 9** The temperature of a room is 17° to the nearest degree.
Complete the error interval for temperature of the room.

[2 marks]

Answer _____ $^\circ \leq$ temperature $<$ _____ $^\circ$

Turn over for the next question

- 10** 429 000 tickets were sold for a concert this year.
This is 30% **more** than last year.
How many were sold **last year**?

[3 marks]

Answer _____

- 11** Here are three terms.

$$2x$$

$$3x^2$$

$$y^2$$

Bella 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 instruments are played.

violins flutes cellos saxophones

- The total number of instruments is 72
- Half of the instruments are violins.
- flutes : cellos : saxophones = 2 : 3 : 1

How many **flutes** are there?

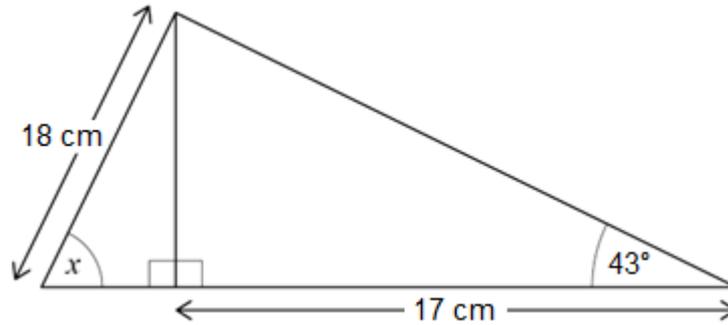
[4 marks]

Answer _____

Turn over for the next question

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

Not drawn
accurately



Work out the size of angle x .

[4 marks]

$x =$ _____ $^\circ$

14 Here is a sign in a shop.

SALE
30% OFF ALL STOCK
TODAY ONLY 10% OFF THE REDUCED PRICE
THAT MEANS YOU SAVE 40%

Is the sign correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

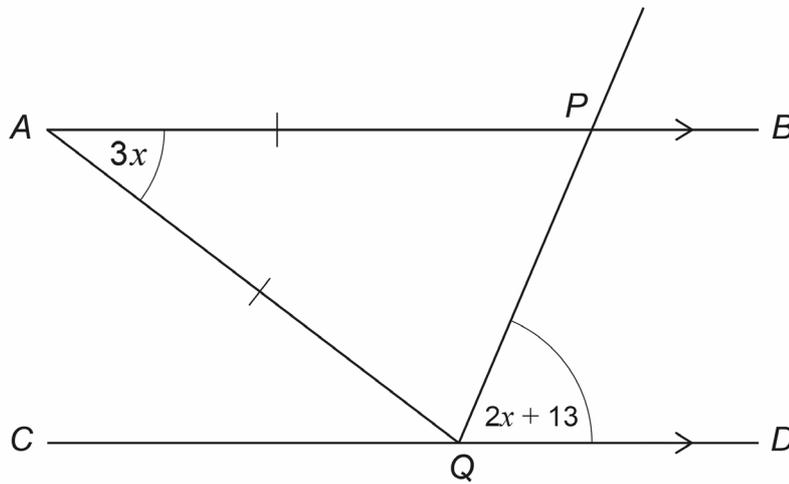
Turn over for the next question

5

Turn over ►

- 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]

$$x = \underline{\hspace{2cm}}^{\circ}$$

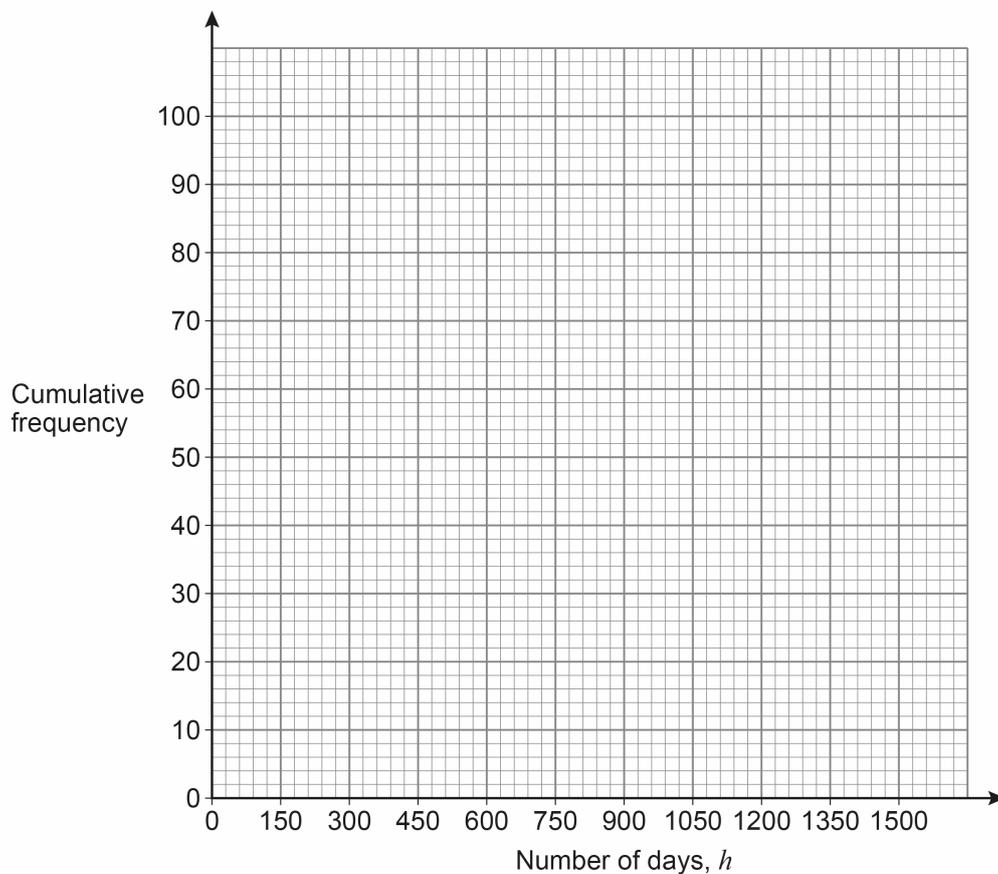
- 18** Two types of LED light bulbs, X and Y, were tested.
100 of each type were switched on continuously.
The number of hours each bulb lasted before failing was recorded.

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

Number of hours, h	Frequency	
$0 \leq h < 300$	3	
$300 \leq h < 600$	12	
$600 \leq h < 900$	31	
$900 \leq h < 1200$	38	
$1200 \leq h < 1500$	16	

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

[3 marks]



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

the median was 910 hours

the interquartile range was 460 hours.

Compare the number of hours that types X and Y 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

20 Here is a formula for an iterative process.

$$u_{n+1} = \frac{40}{u_n} + 5$$

$$u_2 = 10$$

Work out the values of u_1 and u_3

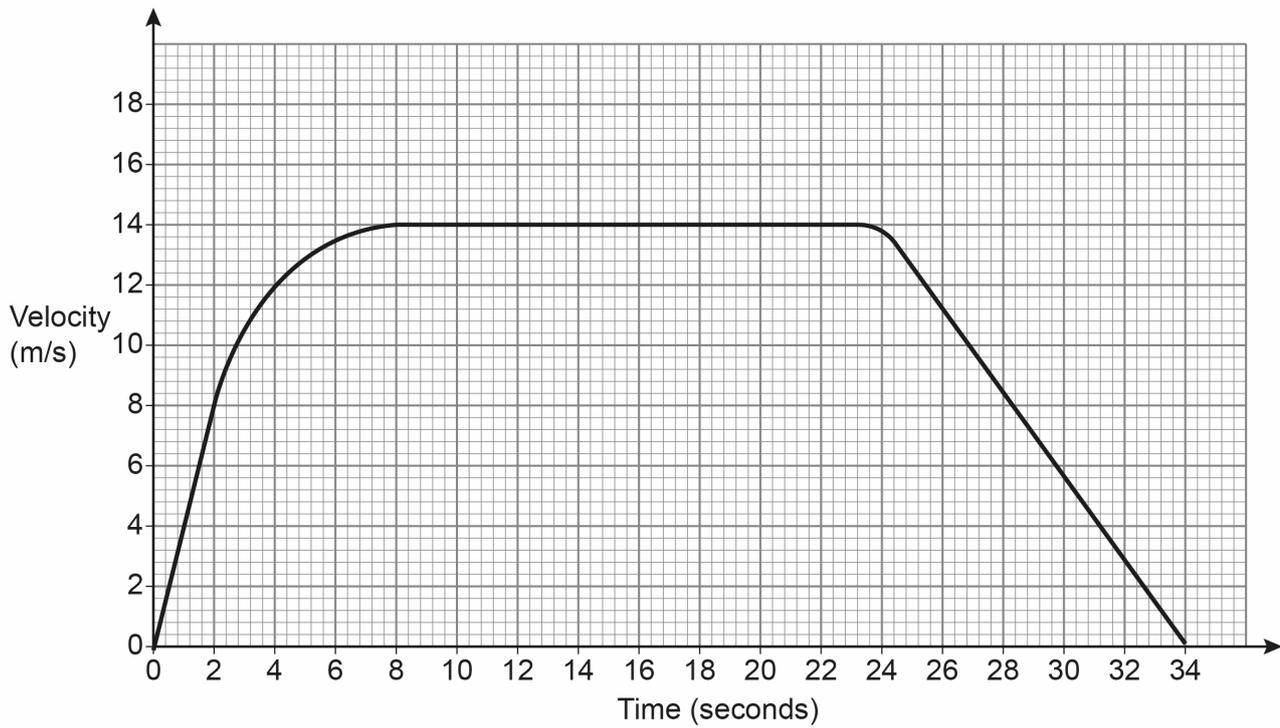
[3 marks]

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

Turn over for the next question

Turn over ►

- 21 The graph represents the velocity of a car travelling along a straight road.



- 21 (a) Work out an estimate for the acceleration of the car, 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 car.

[3 marks]

Answer _____ m

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

Tick a box.

Overestimate

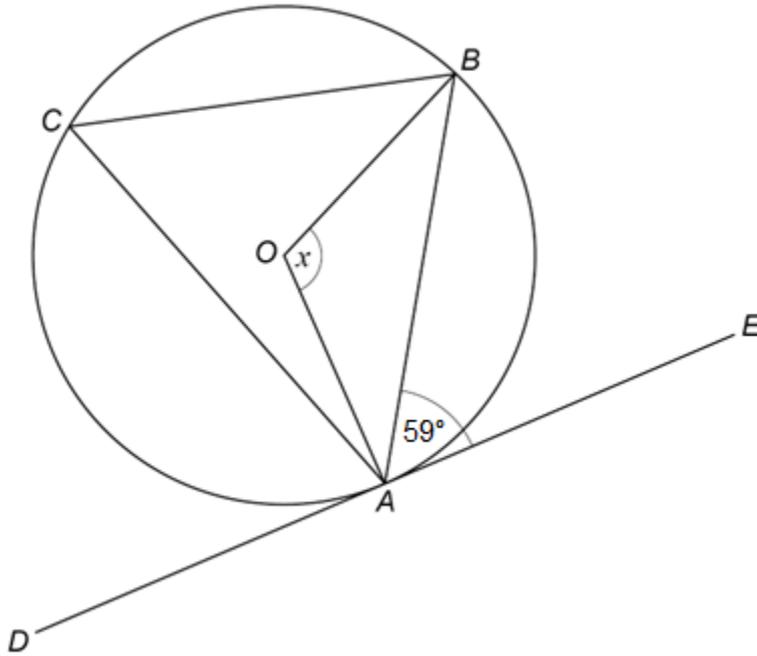
Underestimate

Give a reason for your answer.

[1 mark]

Turn over for the next question

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 .

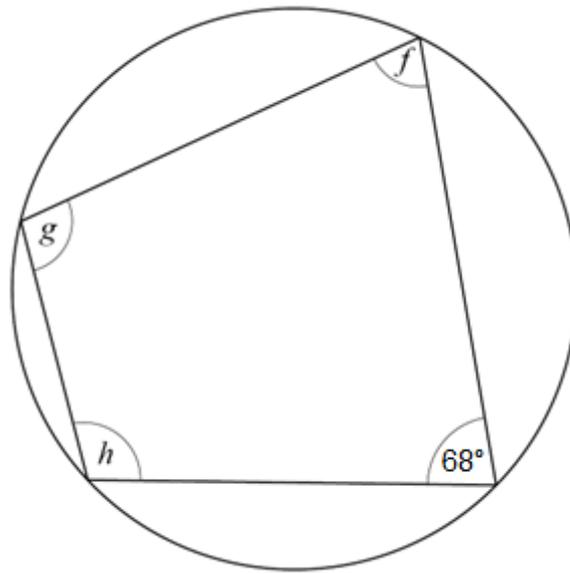
[2 marks]

$$x = \underline{\hspace{10em}}^\circ$$

Turn over for the next question

Turn over ►

23 (b) Here is a cyclic quadrilateral.



Not drawn
accurately

$$f : g = 4 : 7$$

Work out $f : h$

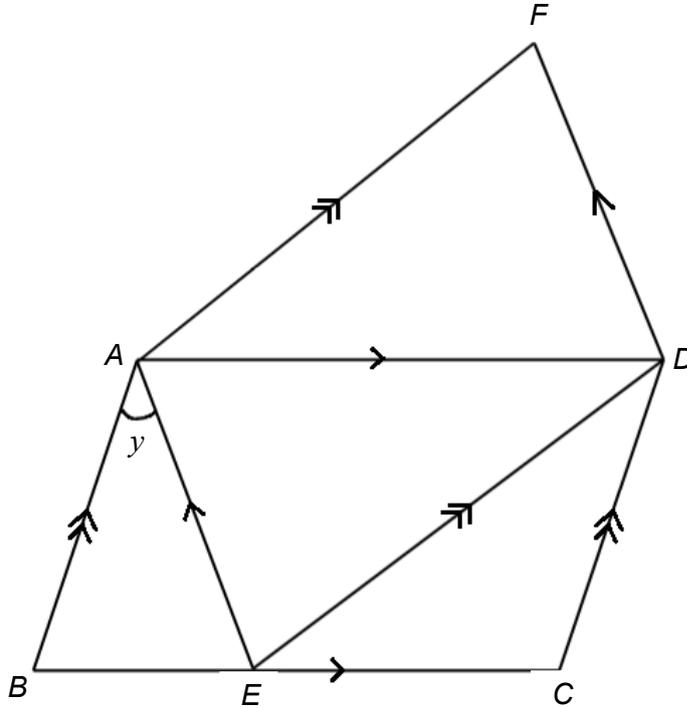
Give your answer in its simplest form.

[4 marks]

Answer _____ : _____

24

In the diagram,

 $ABCD$ and $AEDF$ are congruent parallelograms E lies on BC angle $BAE = y$ Not drawn
accuratelyProve that AE bisects angle BED .

[4 marks]

END OF QUESTIONS

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