



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

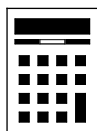
Higher Tier Paper 2 Calculator

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	
<b>TOTAL</b>	



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8300/2H

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]**


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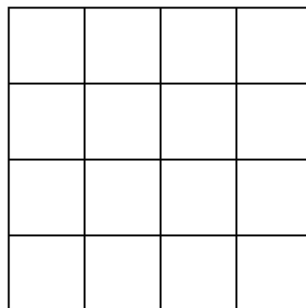


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Answer \_\_\_\_\_

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]

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5

$X$  is inversely proportional to  $Y$ .

Circle the correct statement.

[1 mark]

$X$  is directly proportional to  $Y$

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

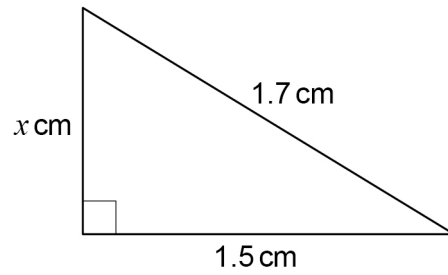
$X$  is directly proportional to  $2Y$

$X$  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]**

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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]**

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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]**

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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]**


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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]

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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]

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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]**

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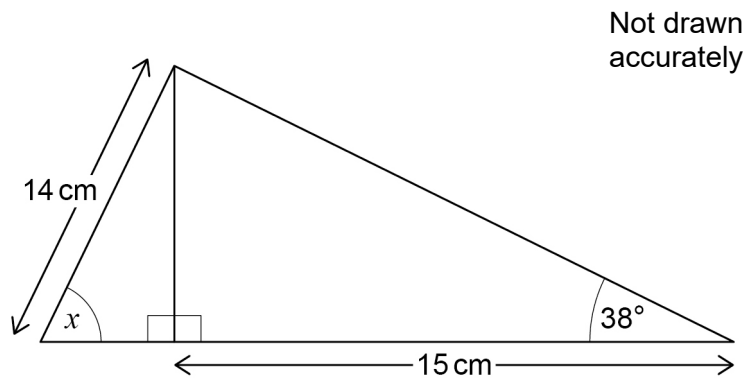
Answer \_\_\_\_\_

**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]

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$x =$  \_\_\_\_\_  $^\circ$



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]**


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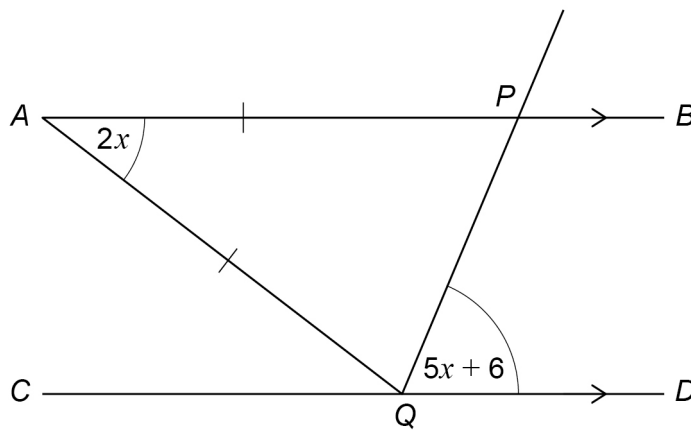
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**Turn over for the next question**

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]**


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 $x =$  \_\_\_\_\_ °

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

**[4 marks]**

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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]**

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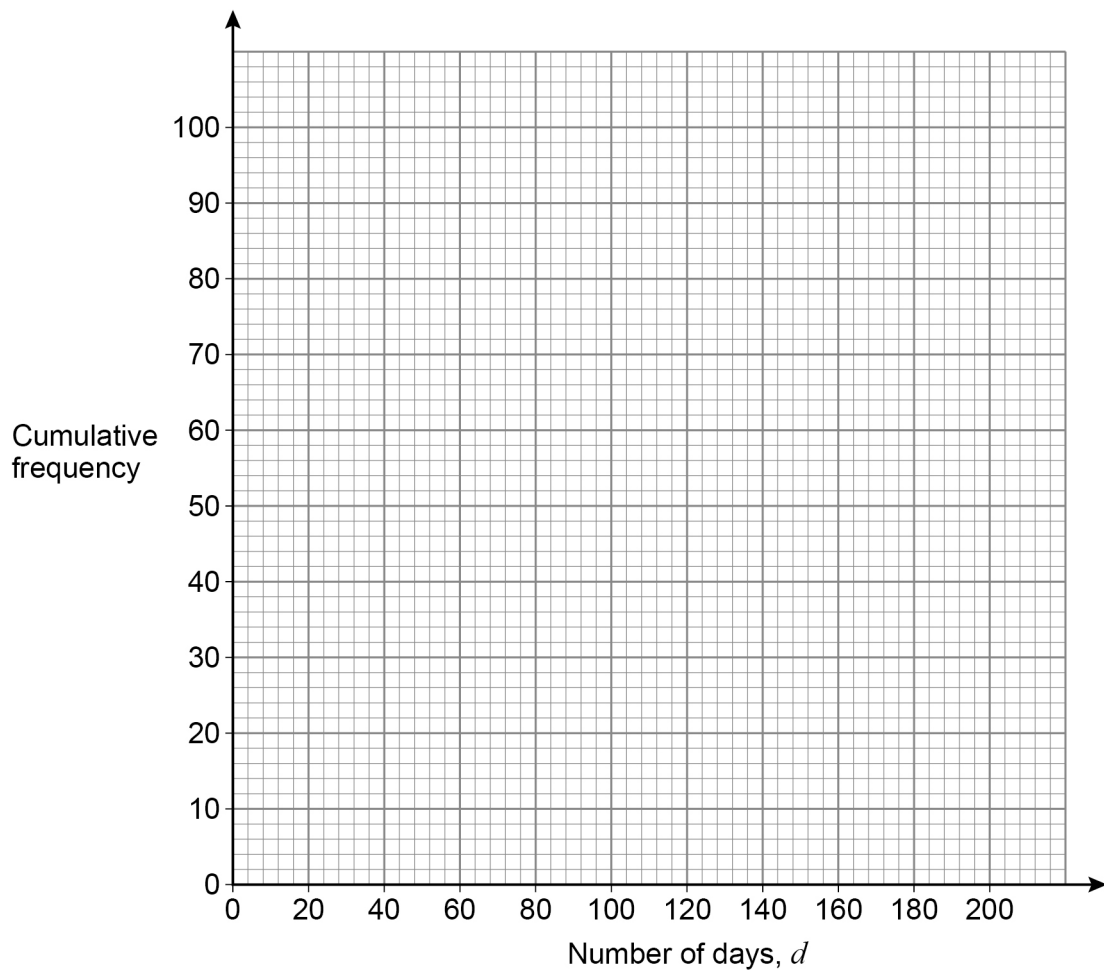
- 18** Two types of battery, P and Q, were tested.  
100 of each type were put into clocks.  
The number of days each battery lasted was recorded.

**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 \_\_\_\_\_

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Spread \_\_\_\_\_

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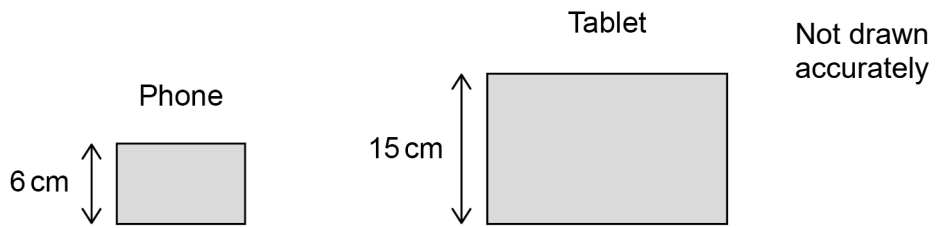
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**Turn over for the next question**



19

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



The area of the **tablet** screen is  $420 \text{ cm}^2$

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

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

**[5 marks]**

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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]**


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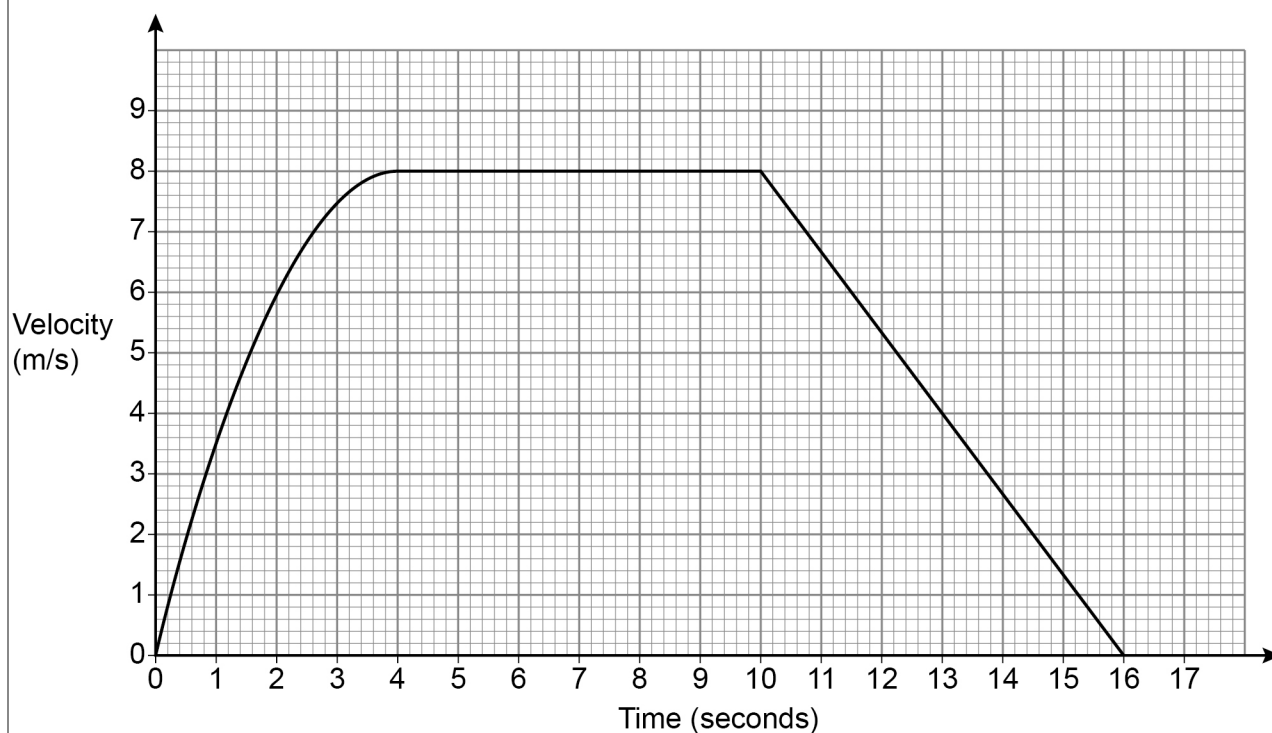
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$$u_1 = \underline{\hspace{2cm}} \quad u_3 = \underline{\hspace{2cm}}$$

**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  $\text{m/s}^2$ , after 2 seconds.  
You **must** show your working.

[2 marks]

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Answer \_\_\_\_\_  $\text{m/s}^2$



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

**[3 marks]**

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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]**

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**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]**

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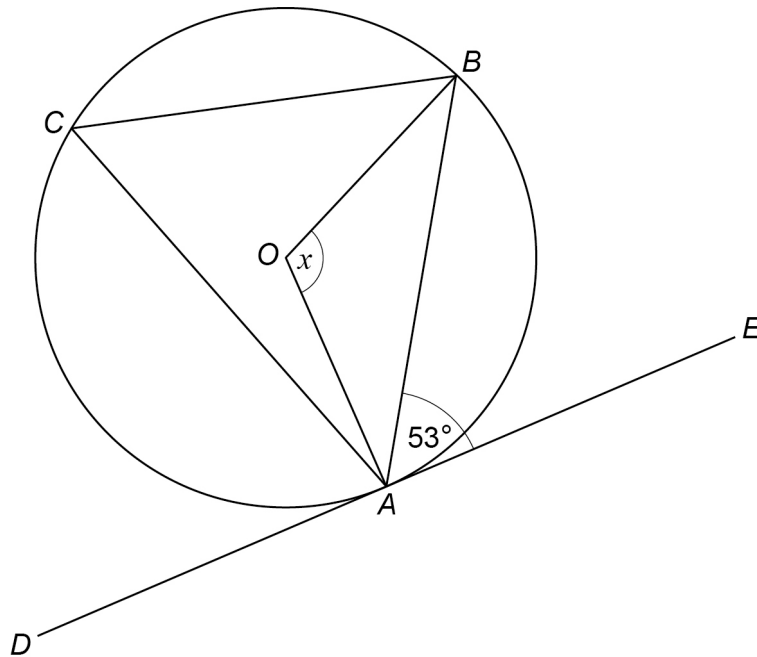
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23 (a)

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]

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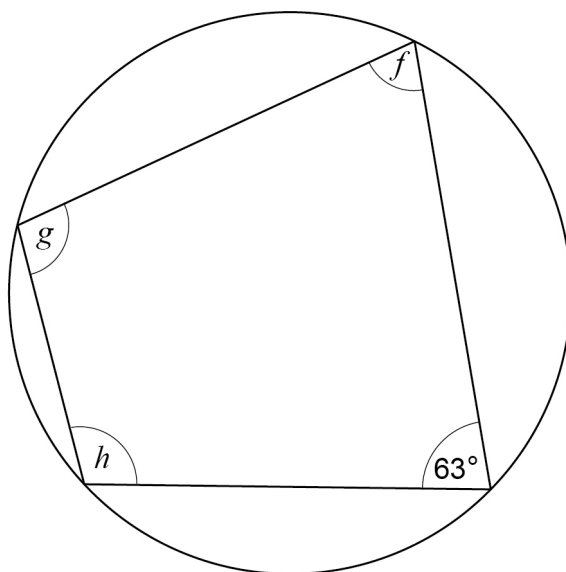
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$x =$  \_\_\_\_\_<sup>o</sup>

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]**

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Answer \_\_\_\_\_ : \_\_\_\_\_



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24

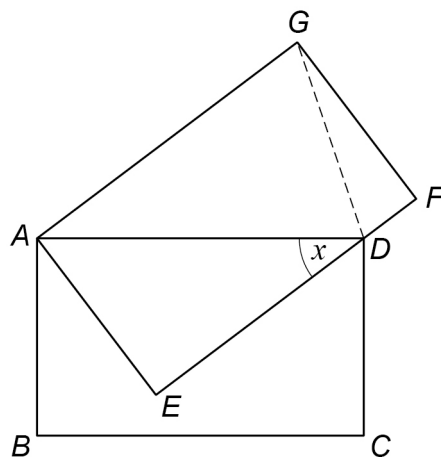
In the diagram,

$ABCD$  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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2 8



2 4 B G 8 3 0 0 / 2 H

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