

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# GCSE MATHEMATICS

# H

Higher Tier

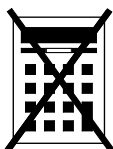
Paper 1 Non-Calculator

Time allowed: 1 hour 30 minutes

## Materials

For this paper you must have:

- mathematical instruments
- the Formulae Sheet (enclosed).



You must **not** use a calculator.

## 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.

| 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              |      |
| 24–25              |      |
| 26                 |      |
| <b>TOTAL</b>       |      |

## Advice

In all calculations, show clearly how you work out your answer.



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

**1** Which of these is the equation of a straight line?

Circle your answer.

[1 mark]

$$y = 6x^2$$

$$y = x - 6$$

$$y = x^2 + 6$$

$$y = \frac{6}{x}$$

**2** What is 0.28 as a fraction of 0.8 ?

Circle your answer.

[1 mark]

$$\frac{7}{20}$$

$$\frac{2}{7}$$

$$\frac{20}{7}$$

$$\frac{7}{2}$$

**3** Circle the calculation that increases 240 by 7.5%

[1 mark]

$$240 \times 1.0705$$

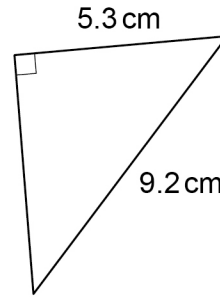
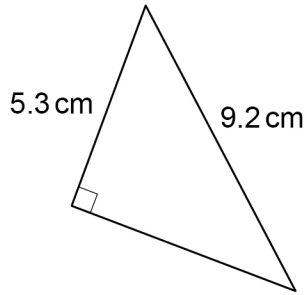
$$240 \times 1.705$$

$$240 \times 1.075$$

$$240 \times 1.75$$



4

Not drawn  
accurately

Circle the reason why the triangles are congruent.

[1 mark]

ASA

RHS

SAS

SSS

5

Work out  $80\,000\,000 \div 200$ 

Give your answer in standard form.

[2 marks]

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Answer \_\_\_\_\_



6 (a) Work out  $\frac{3^{12}}{3^7}$

Give your answer as a whole number.

[2 marks]

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Answer \_\_\_\_\_

6 (b) Simplify  $8 \times 2^6 \times 2^4$

Give your answer as a power of 2

[2 marks]

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Answer \_\_\_\_\_



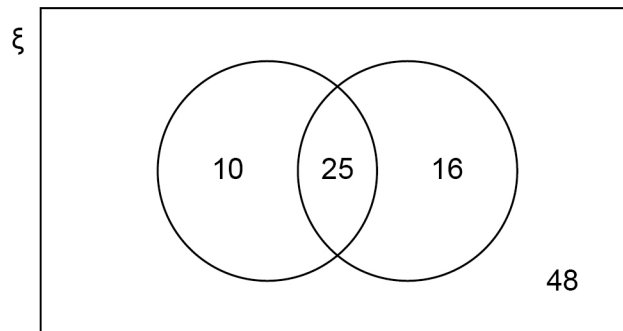
- 7 In a group of 98 students  
 25 study both Art and French  
 10 study Art but do not study French  
 41 study French.

Joel draws this Venn diagram to represent the information.

$\xi$  = the group of 98 students

A = the students who study Art

F = the students who study French



Make **two** criticisms of his diagram.

[2 marks]

Criticism 1 \_\_\_\_\_

\_\_\_\_\_

Criticism 2 \_\_\_\_\_

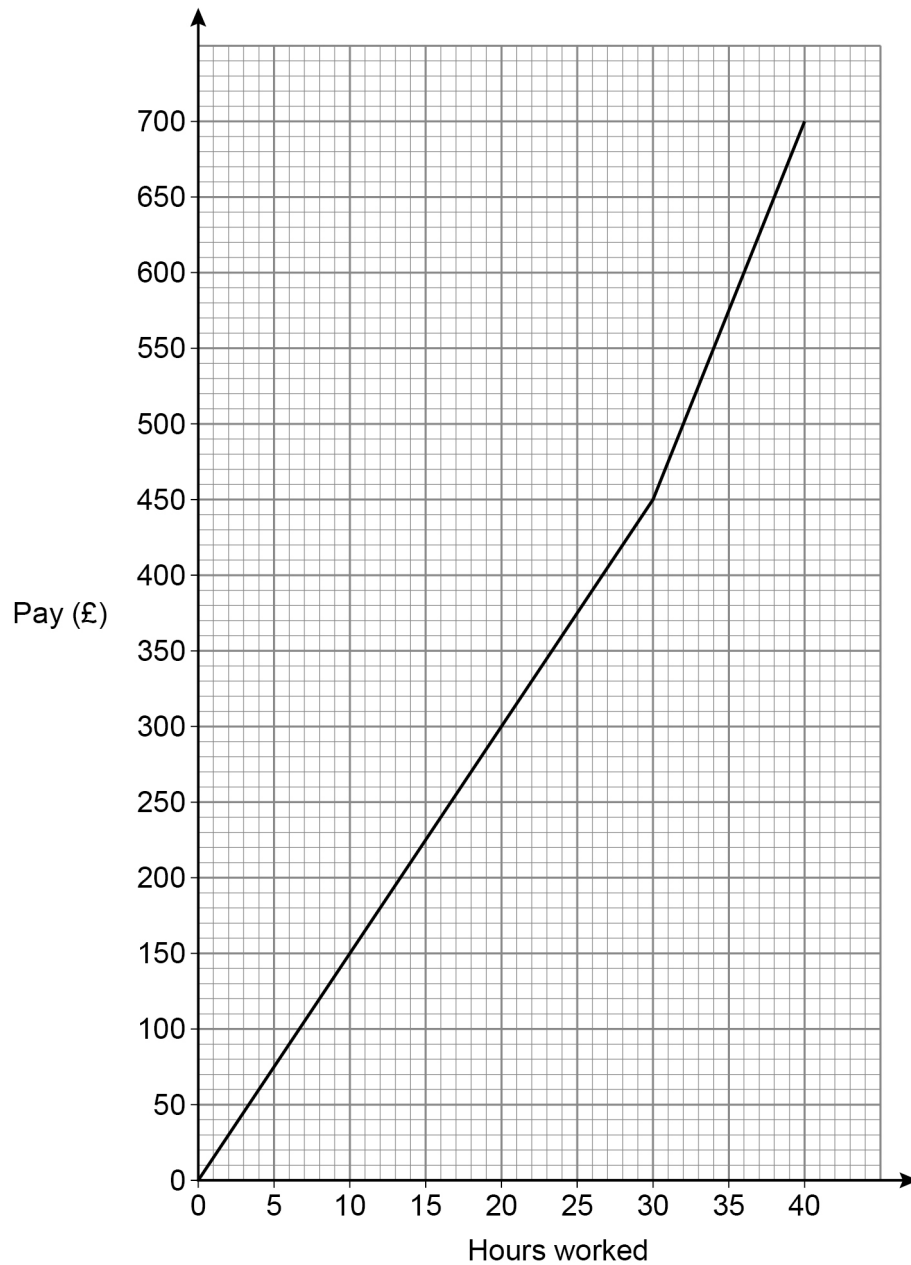
\_\_\_\_\_

Turn over for the next question



- 8 In a week, Samir is paid  
a basic hourly rate for the first 30 hours worked  
an overtime hourly rate for any extra hours worked.

The graph shows his pay for working up to 40 hours in a week.



Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

[3 marks]

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

9 (a) In each box, write a fraction **less** than 1 to make a correct calculation.

[1 mark]

$$\boxed{\frac{\quad}{\quad}} \times \boxed{\frac{\quad}{\quad}} = \frac{3}{10}$$

9 (b) In each box, write a decimal **less** than 1 to make a correct calculation.

[1 mark]

$$\boxed{\quad} \times \boxed{\quad} = 0.06$$

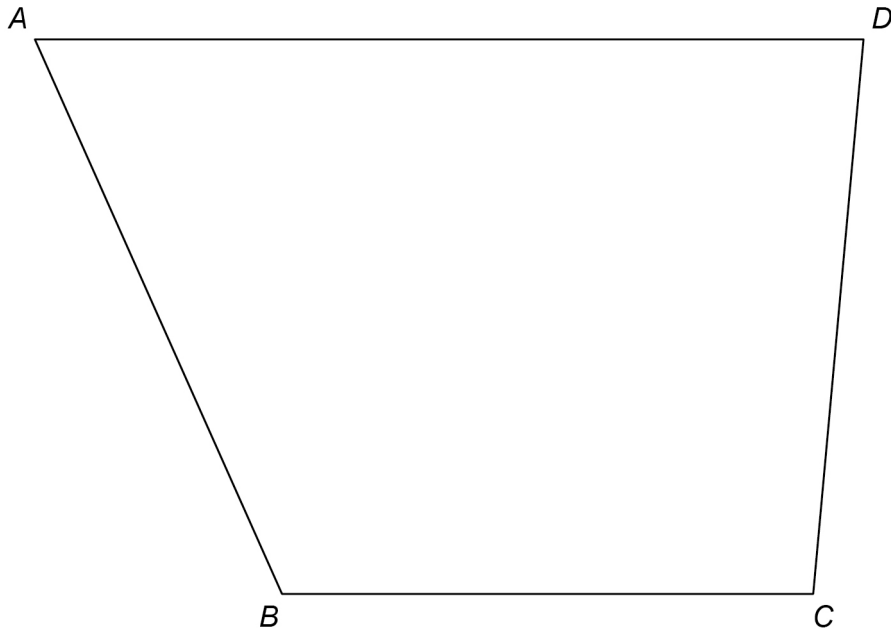
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Turn over ►



10 Use a ruler and compasses in this question.

$ABCD$  represents a garden.



A tree is to be planted in the garden.

The tree will be in the region that is closer to  $AB$  than to  $BC$ .

Label the region,  $R$ , where the tree could be planted.

Show all your construction lines.

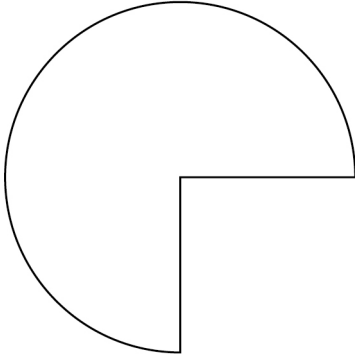
**[3 marks]**



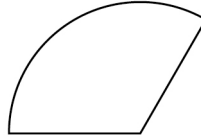


11 Here are two shapes, P and Q.

**P**  
 $\frac{3}{4}$  of a circle, radius 20 cm



**Q**  
 $\frac{1}{3}$  of a circle, radius 15 cm



Not drawn  
accurately

How many times bigger is the area of P than the area of Q?  
You **must** show your working.

[4 marks]

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Answer \_\_\_\_\_





- 12 (b)** To win a prize, a player must pick two cards marked Yes.  
450 people each play the game once.

How many people are expected to win a prize?

**[3 marks]**

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Answer \_\_\_\_\_

- 13** Solve  $\frac{2w}{15} = \frac{4}{5}$

**[2 marks]**

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$w =$  \_\_\_\_\_

7

Turn over ►



- 14** 15 workers can complete a job in 8 days.  
How many **more** workers are needed to complete the job in 6 days?  
Assume that all of the workers work at the same rate.

**[3 marks]**

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Answer \_\_\_\_\_

- 15** The cross section of a prism has  $n$  sides.  
Circle the expression for the number of faces of the prism.

**[1 mark]**

$n$

$2n$

$3n$

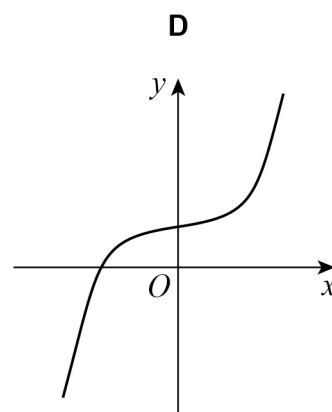
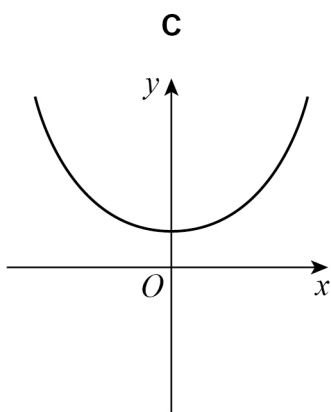
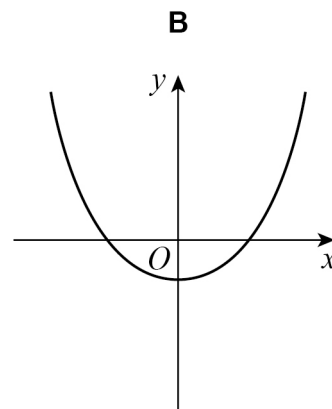
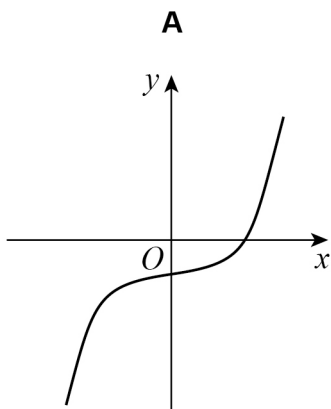
$n + 2$



16

Circle the letter of the possible sketch graph of  $y = x^3 - 4$ 

[1 mark]

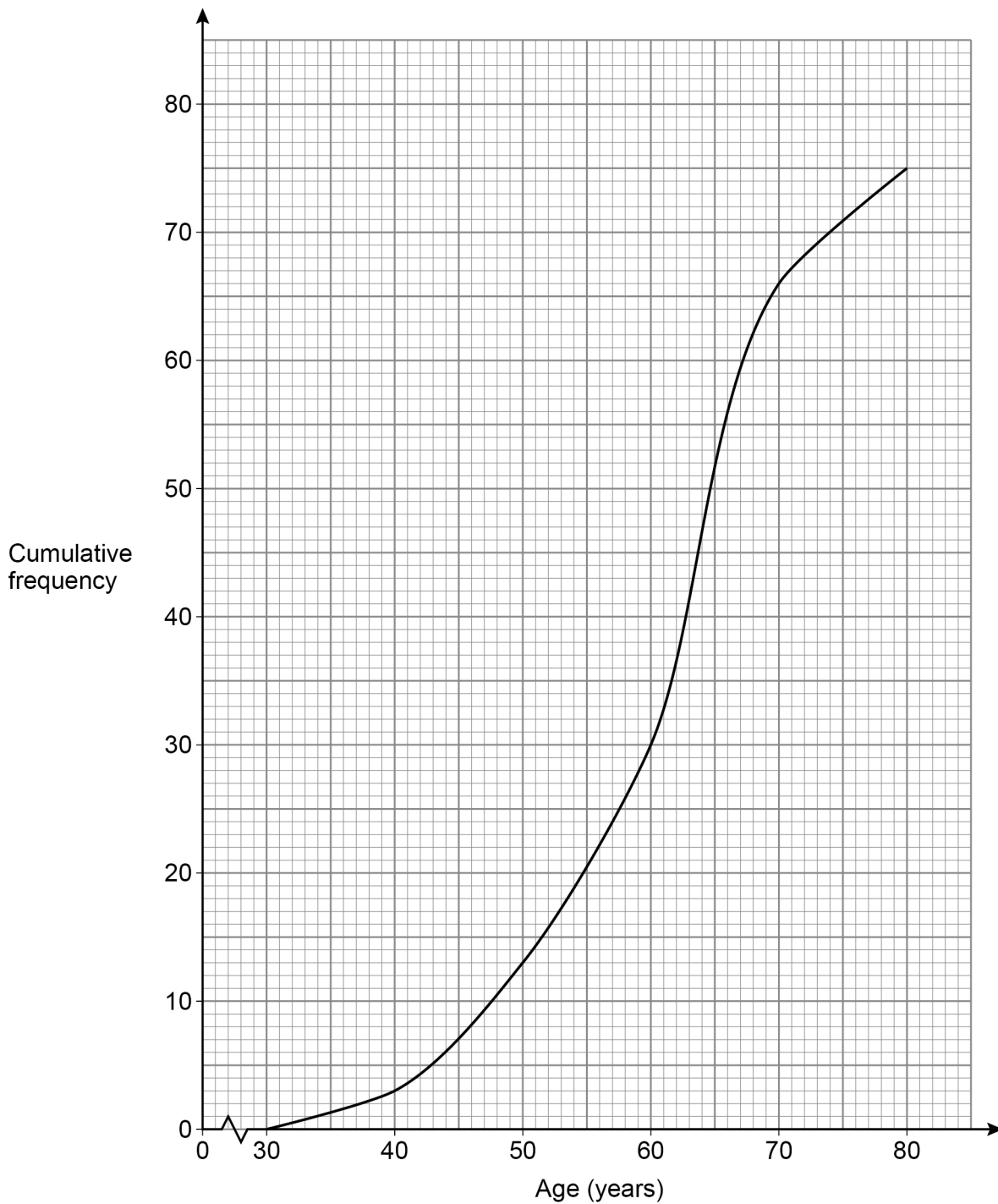


Turn over for the next question

Turn over ►



- 17 75 people attend a clinic.  
Their ages are recorded and a cumulative frequency diagram is drawn.



A nurse makes a statement about the **ages** of the people at the clinic.

He says,

“More than twice as many people are in their 60s as in their 50s.”

Is he correct?

Tick a box.

Yes

No

Show working to support your answer.

**[3 marks]**

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**Turn over for the next question**

**3**

**Turn over ►**



18

$$12x^3 + 7x^2 + 3x - 10 \equiv 2(ax^3 + x^2 + 2x - 5) + x(bx + c)$$

Work out the values of  $a$ ,  $b$  and  $c$ .

**[3 marks]**

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$$a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}} \quad c = \underline{\hspace{2cm}}$$





19 The first three terms of a sequence are  $x$   $y$   $xy$

The sequence is continued by multiplying the previous two terms.

19 (a) Circle the 5th term of the sequence.

[1 mark]

$x^3y^3$

$x^5y^5$

$x^3y^4$

$x^2y^3$

19 (b) The 8th term of the sequence is  $x^8y^{13}$

The value of this term is negative.

What does this mean about the values of  $x$  and  $y$ ?

Tick **one** box for each row.

[2 marks]

|     | Must be positive | Must be negative | Could be either |
|-----|------------------|------------------|-----------------|
| $x$ |                  |                  |                 |
| $y$ |                  |                  |                 |

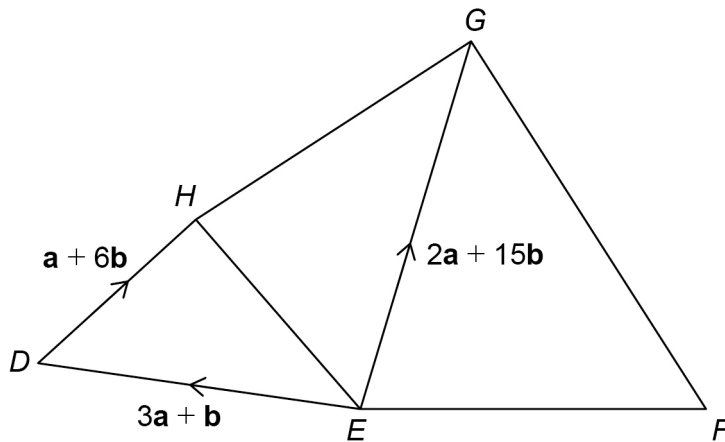
Turn over for the next question





21 Five points are connected by vectors.

Not drawn  
accurately



$$\overrightarrow{FG} = 2\overrightarrow{EH}$$

Work out  $\overrightarrow{FE}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

[4 marks]

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Answer \_\_\_\_\_



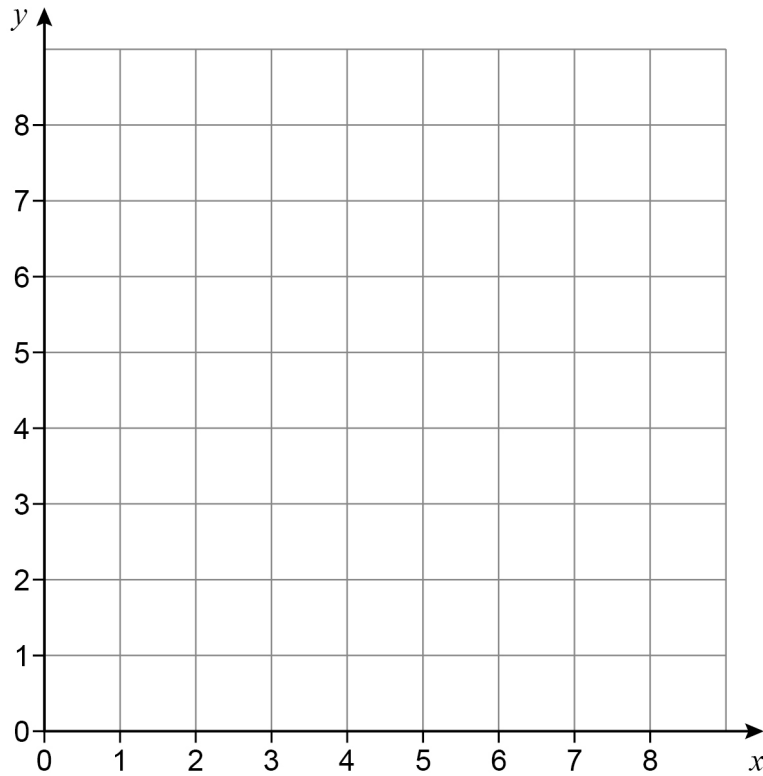


23 On the grid, identify the region represented by

$$x > 3 \quad \text{and} \quad y > 1 \quad \text{and} \quad x + y \leq 7$$

Label the region R.

[3 marks]



Turn over for the next question

Turn over ►





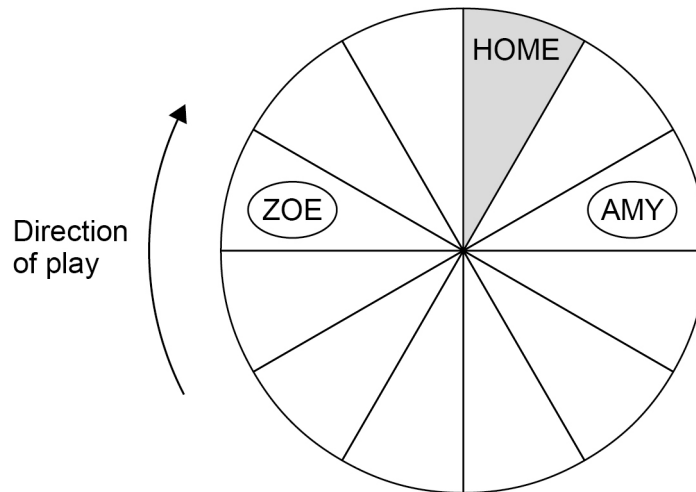


26

Zoe and Amy are playing a board game.

- They each have one disc and take turns to roll a fair, ordinary dice.
- The player moves their disc **clockwise** the number of spaces shown on the dice.
- The winner is the first player whose disc is on HOME at the end of a turn.

Here is the board after Amy's turn.



Work out the probability that Zoe wins within her next two turns.

**[4 marks]**

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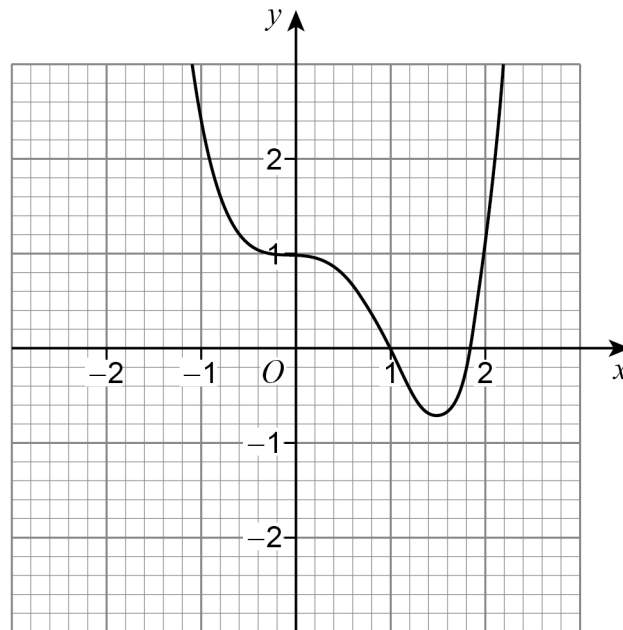
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Answer \_\_\_\_\_





27

The grid shows the graph of  $y = f(x)$ On the grid, draw the graph of  $y = -f(x)$ **[2 marks]****Turn over for the next question****Turn over ►**

28 Work out the value of  $(\cos 30^\circ \times \sin 45^\circ \times \tan 60^\circ)^2$  [4 marks]

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Answer \_\_\_\_\_

**END OF QUESTIONS**

4



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3 2



2 2 6 G 8 3 0 0 / 1 H

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