AQA

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**

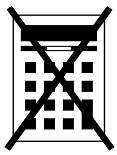
Higher Tier Paper 1 Non-Calculator

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.

**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 | |
| 24–25 | |
| 26 | |
| **TOTAL** | |

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

*Do not write outside the box*

**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]**

$\frac{7}{20}$ $\frac{2}{7}$ $\frac{20}{7}$ $\frac{7}{2}$

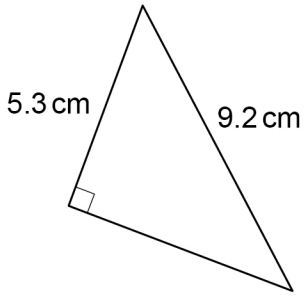
**3** Circle the calculation that increases 240 by 7.5%

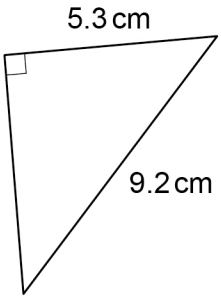
**[1 mark]**

240 × 1.0705 240 × 1.705 240 × 1.075 240 × 1.75

*Do not write outside the box*

**4**




Not drawn accurately

Circle the reason why the triangles are congruent.

**[1 mark]**

ASA RHS SAS SSS

**5** Work out 80 000 000 ÷ 200

Give your answer in standard form.

**[2 marks]**

Answer _____

**6**

*Do not write outside the box*

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

Give your answer as a whole number.

**[2 marks]**

Answer _____

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

Give your answer as a power of 2

**[2 marks]**

Answer _____

*Do not write outside the box*

**7** In a group of 98 students

25 study both Art and French

10 study Art but do not study French

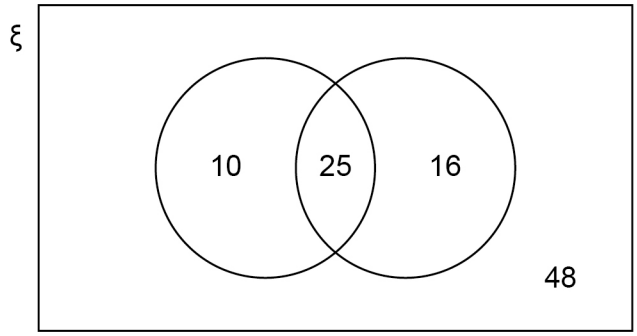
41 study French.

Joel draws this Venn diagram to represent the information.

ξ = 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**

**6**

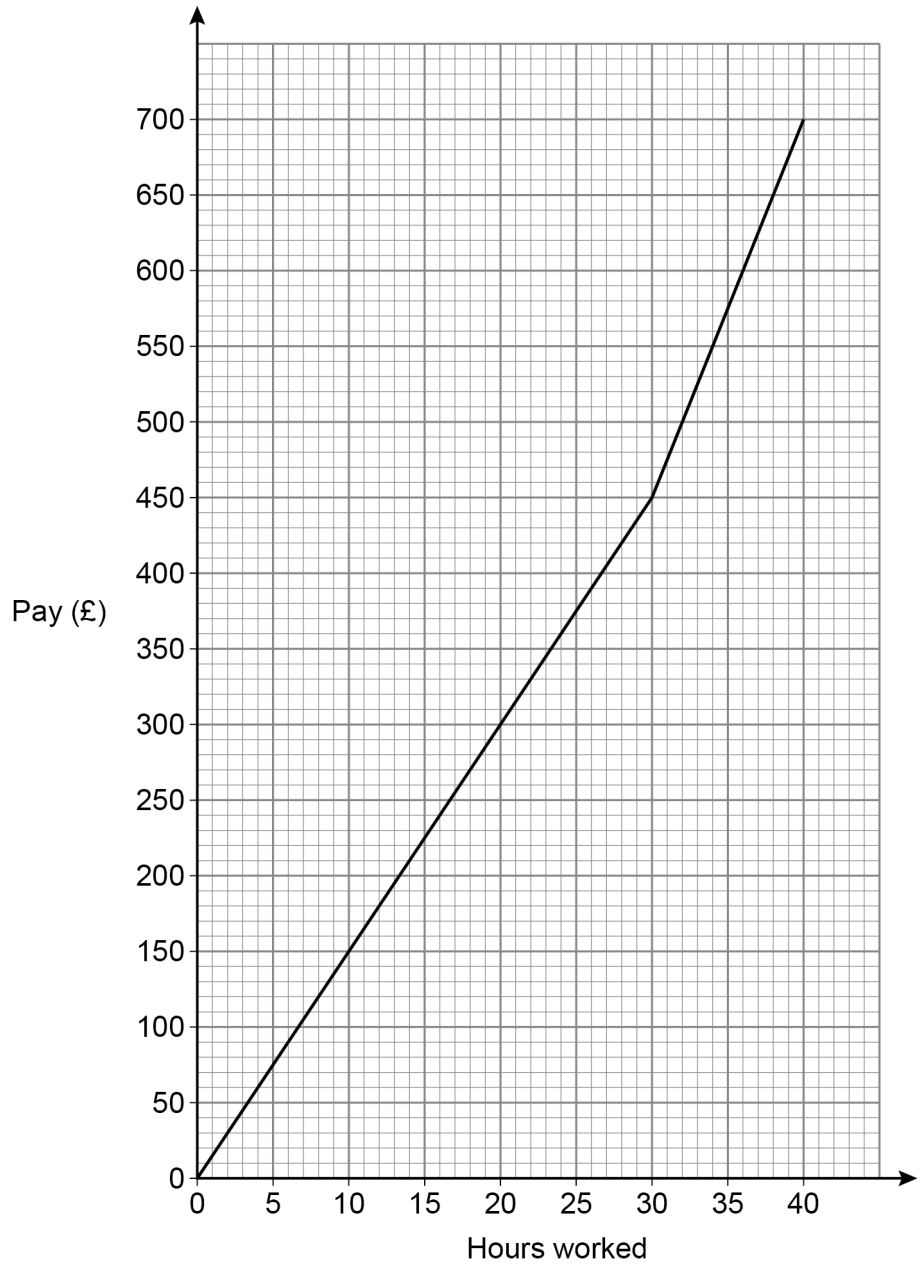
*Do not write outside the box*

**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.



*Do not write outside the box*

Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

**[3 marks]**

Answer _____ : _____

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

**[1 mark]**

$$\frac{\square}{\square} \times \frac{\square}{\square} = \frac{3}{10}$$

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

**[1 mark]**

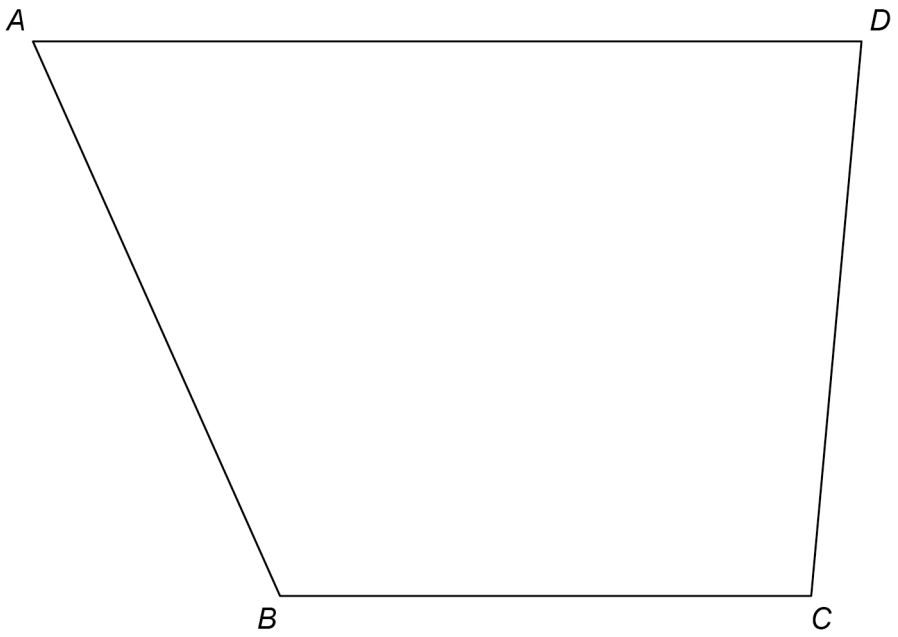
$$\square \times \square = 0.06$$

**5**

*Do not write outside the box*

**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.

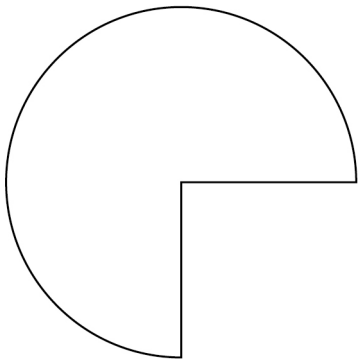
**[3 marks]**

*Do not write outside the box*

**11** Here are two shapes, P and Q.

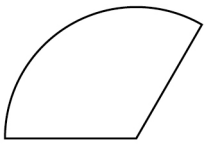
**P**

$\frac{3}{4}$ 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]**

Answer _____

7

*Do not write outside the box*

**12** In a game, two bags, A and B, contain cards.

Each card is marked Yes or No.

The table shows the number of each type of card in the bags.

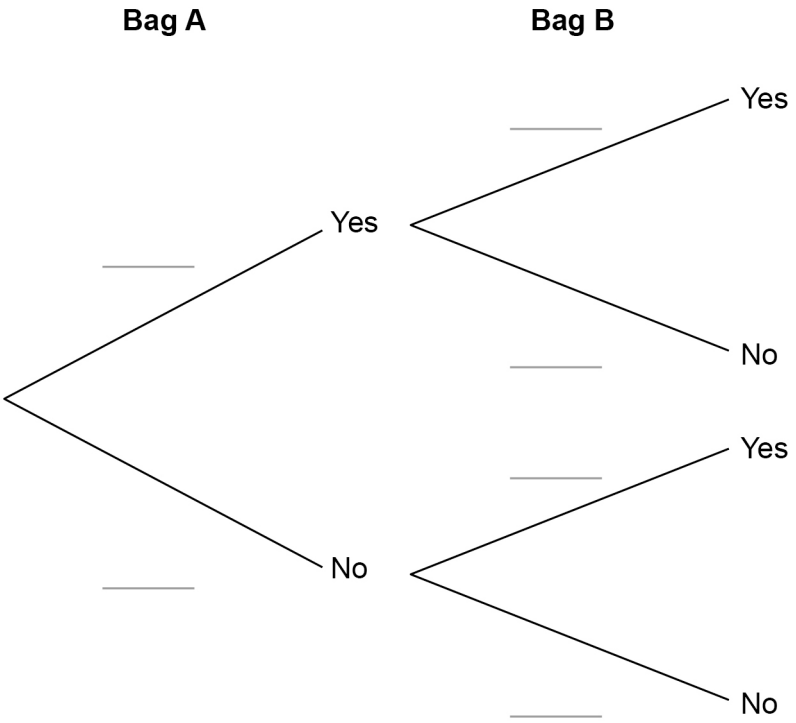
| | **Yes** | **No** |
|---|---|---|
| **Bag A** | 3 | 2 |
| **Bag B** | 1 | 9 |

In the game, a player picks one card at random from each bag.

The cards are then put back into the bags.

**12 (a)** Complete the tree diagram.

**[2 marks]**



*Do not write outside the box*

**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]**

Answer _____

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

**[2 marks]**

$w =$ _____

**7**

**Turn over ►**

*Do not write outside the box*

**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]**

Answer _____

**15** The cross section of a prism has $n$ sides.

Circle the expression for the number of faces of the prism.

**[1 mark]**

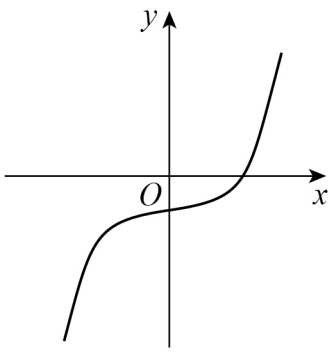
$n$ $\quad$ $2n$ $\quad$ $3n$ $\quad$ $n + 2$

*Do not write outside the box*

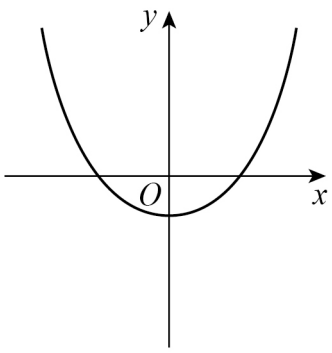
**16** Circle the letter of the possible sketch graph of $y = x^3 - 4$

**[1 mark]**

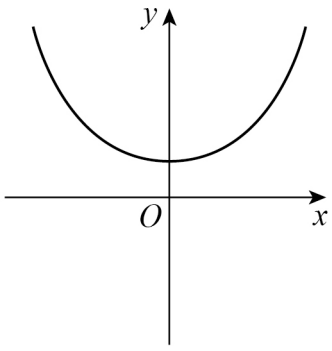
**A**



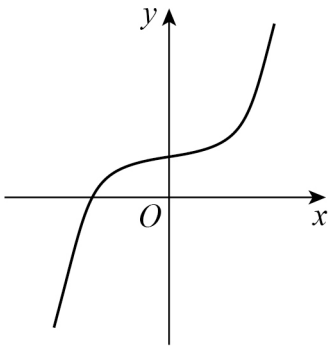

**B**




**C**




**D**



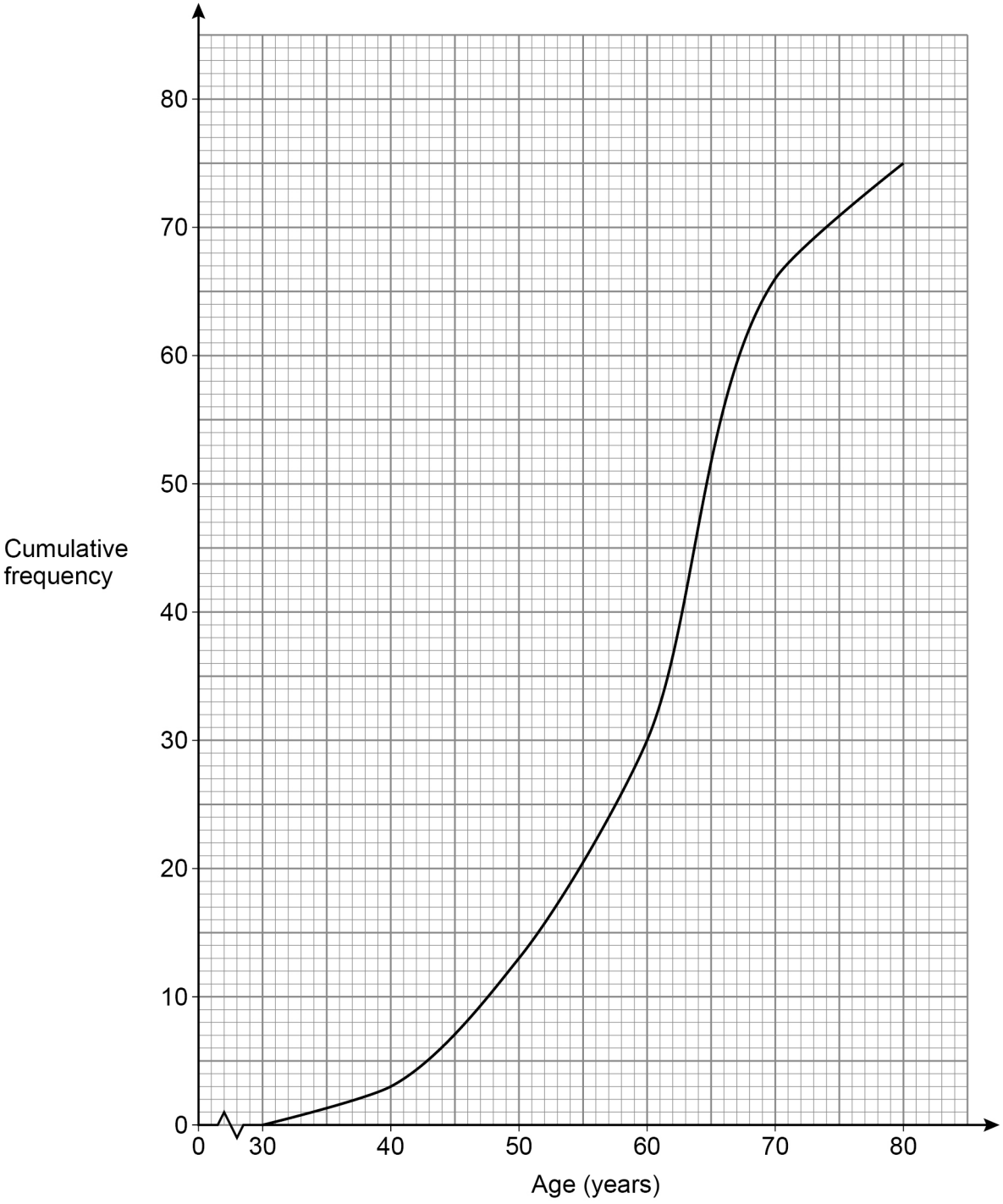

**Turn over for the next question**

5

*Do not write outside the box*

**17** 75 people attend a clinic.

Their ages are recorded and a cumulative frequency diagram is drawn.



*Do not write outside the box*

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]**

**Turn over for the next question**

3

*Do not write outside the box*

**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]**

$a =$ _____ $b =$ _____ $c =$ _____

*Do not write outside the box*

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

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**

**6**

*Do not write outside the box*

**20** Rearrange $y = \dfrac{5x + 9}{x}$ to make $x$ the subject.

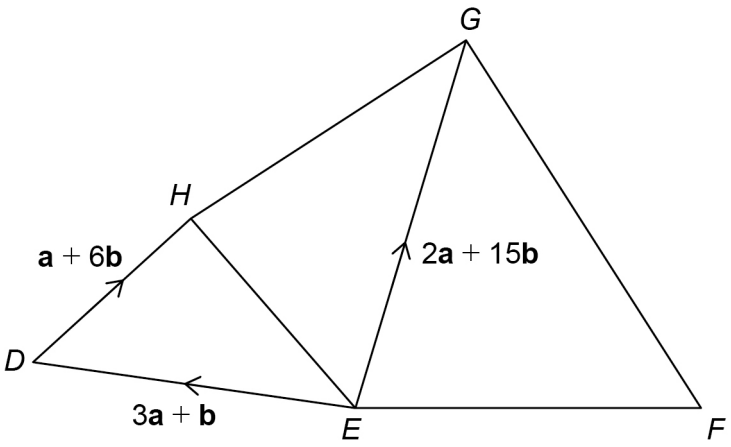
**[4 marks]**

Answer _____

*Do not write outside the box*

**21** Five points are connected by vectors.

Not drawn accurately




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

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

**[4 marks]**

Answer _____

8

*Do not write outside the box*

**22** Work out $0.6\dot{8} - 0.4\dot{5}$

Give your answer as a fraction in its simplest form.

**[5 marks]**

Answer _____

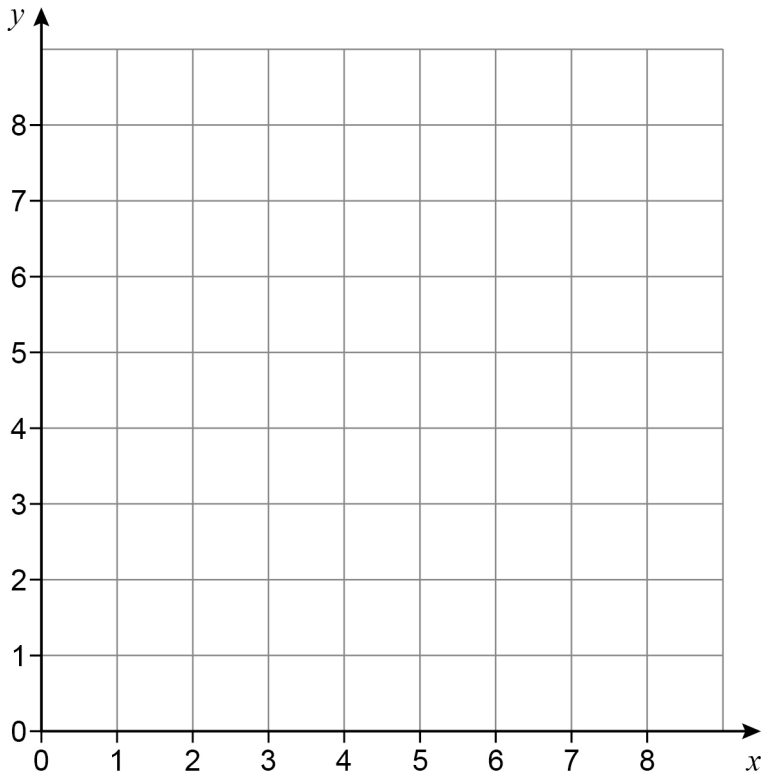
*Do not write outside the box*

**23** On the grid, identify the region represented by

$x > 3$ and $y > 1$ and $x + y \leqslant 7$

Label the region R.

**[3 marks]**




**Turn over for the next question**

8

*Do not write outside the box*

**24 (a)** Simplify fully $\frac{6}{a} - \frac{11}{4a}$

**[2 marks]**

Answer _____

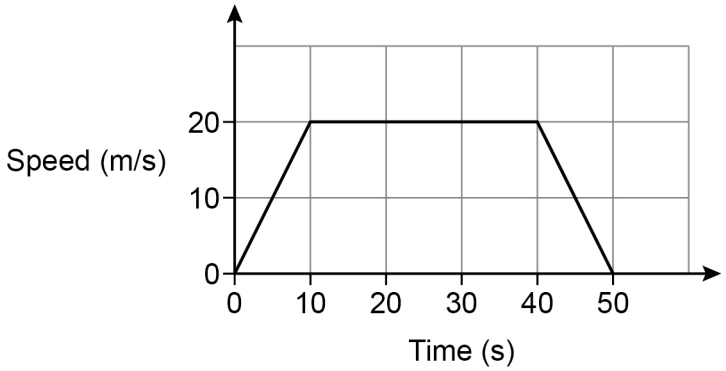
**24 (b)** Simplify fully $(y^2 - 3y) \times \frac{y^2 + 10y + 21}{y^2 - 9}$

**[4 marks]**

Answer _____

*Do not write outside the box*

**25** Here is the speed-time graph for a 50-second journey.




**25 (a)** Circle the acceleration, in $m/s^2$, halfway through the journey.

**[1 mark]**

0 2 20 25

**25 (b)** Work out the total distance travelled.

**[2 marks]**

Answer _____ m

9

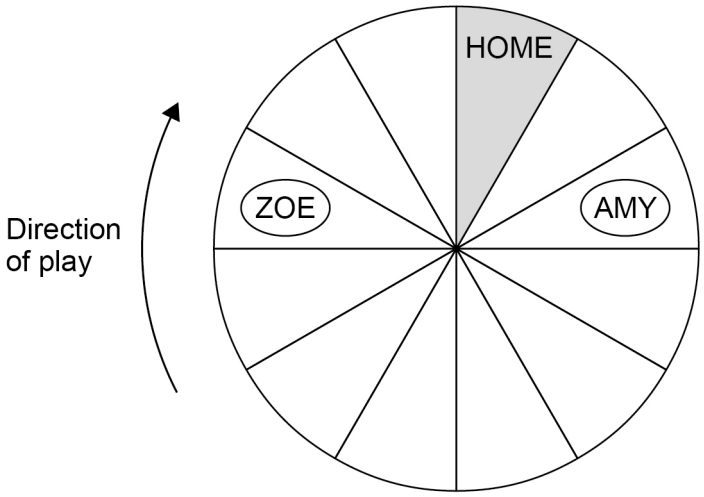
**Turn over ►**

*Do not write outside the box*

**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.



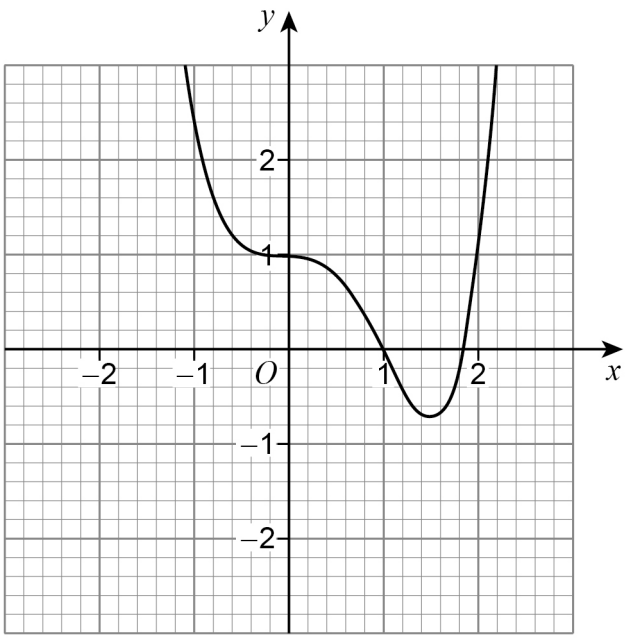

Work out the probability that Zoe wins within her next two turns.

**[4 marks]**

Answer _____

*Do not write outside the box*

**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**

6

*Do not write outside the box*

**28** Work out the value of $(\cos 30° \times \sin 45° \times \tan 60°)^2$

**[4 marks]**

Answer _____

**END OF QUESTIONS**

4

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**ANSWER IN THE SPACES PROVIDED**

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| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
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**ANSWER IN THE SPACES PROVIDED**

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