

Please check the examination details below before entering your candidate information

Candidate surname	Other names
Centre Number	Candidate Number
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Pearson Edexcel International GCSE

Tuesday 6 June 2023

Afternoon (Time: 2 hours 30 minutes)	Paper reference	4MB1/02R
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Mathematics B

PAPER 2R

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

P72919A

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Question 1 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 1 continued

Handwriting practice area consisting of 20 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

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DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 1 continued

Handwriting practice area consisting of 25 horizontal dotted lines for writing.

(Total for Question 1 is 8 marks)



Question 2 continued

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Handwriting practice area consisting of 28 horizontal dotted lines.

(Total for Question 2 is 4 marks)



3

(a) Solve $4x - 3 \leq 11$ (2)

(b) Solve $\frac{y + 8}{2} \geq 3$ (2)

(c) On the grid opposite, by drawing suitable straight lines and using shading, show the region **R** that satisfies the inequalities

$$4x - 3 \leq 11$$

$$\frac{y + 8}{2} \geq 3$$

$$y \leq 2x + 1$$

Label the region **R** (4)

Grid area with horizontal dotted lines for drawing and shading the region R.

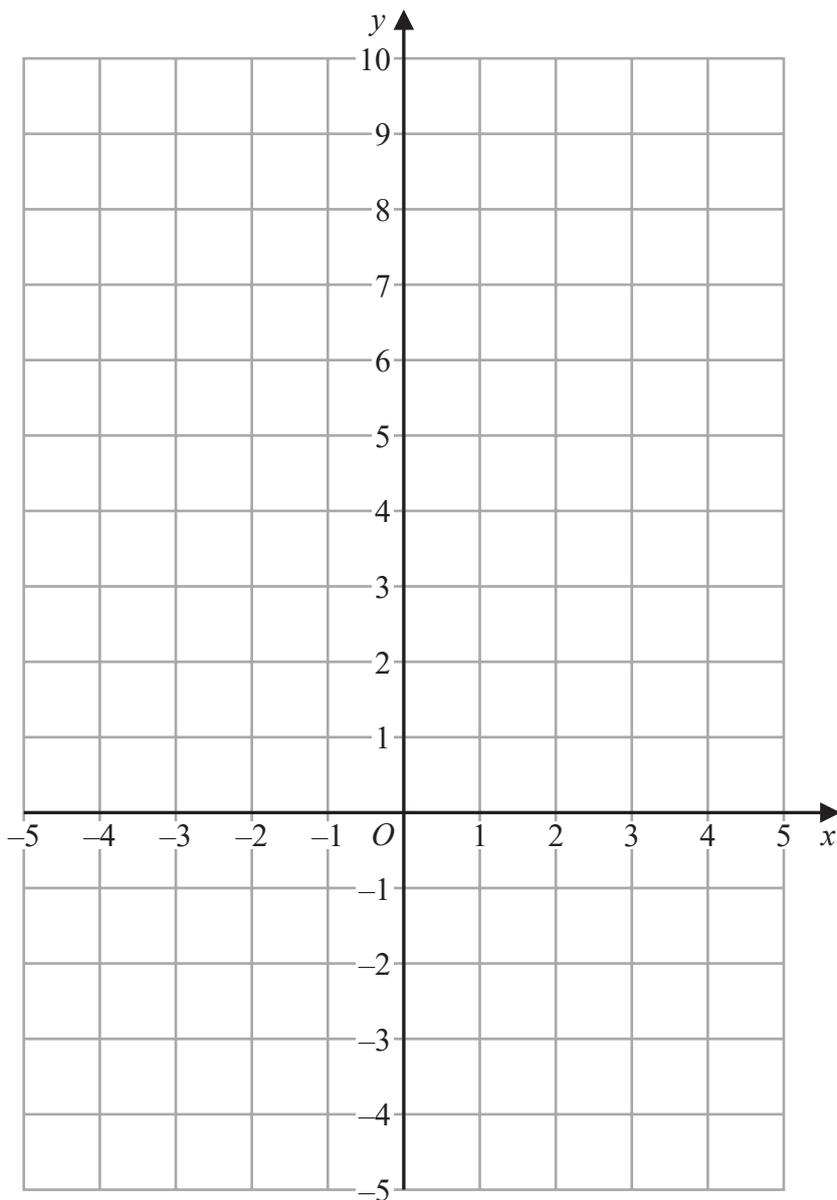
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Question 3 continued



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Turn over for a spare grid if you need to redraw your inequalities.



Question 3 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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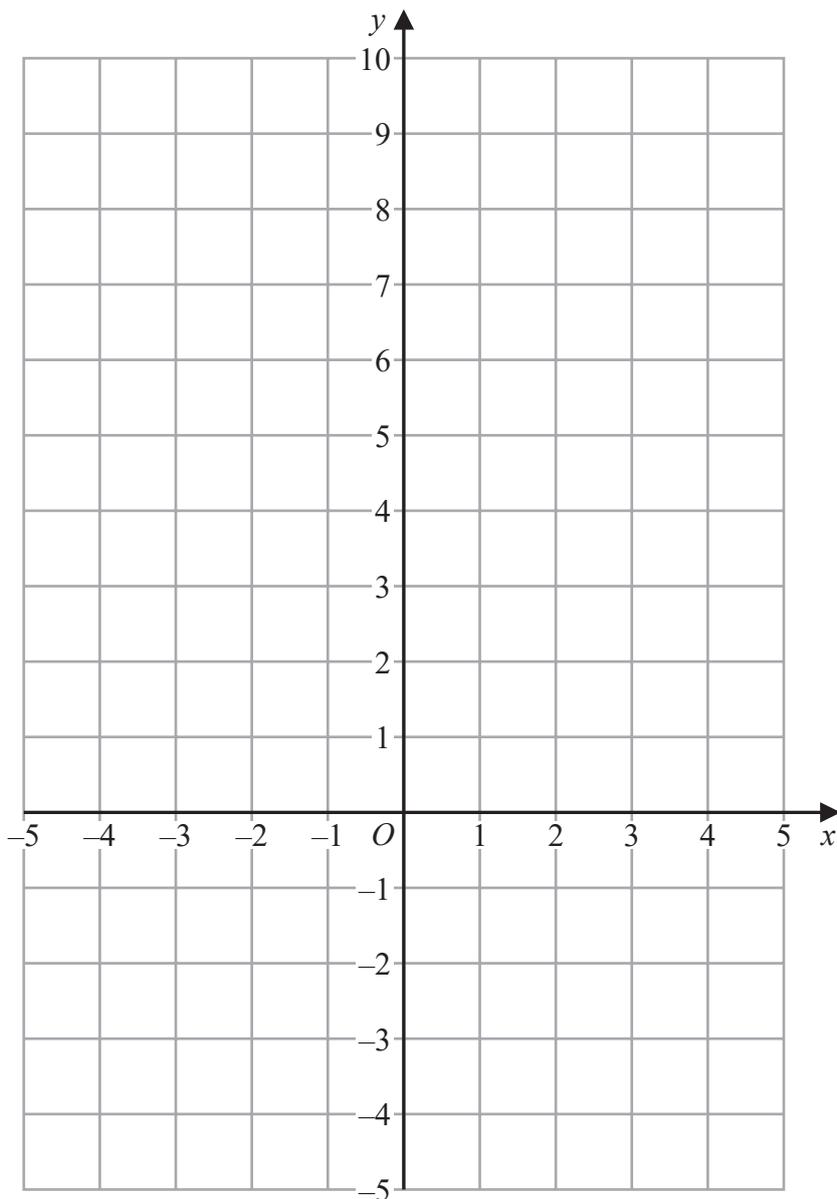
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Question 3 continued

Only use this grid if you need to redraw your inequalities.



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(Total for Question 3 is 8 marks)



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DO NOT WRITE IN THIS AREA

Question 4 continued

Area with horizontal dotted lines for writing.

(Total for Question 4 is 7 marks)



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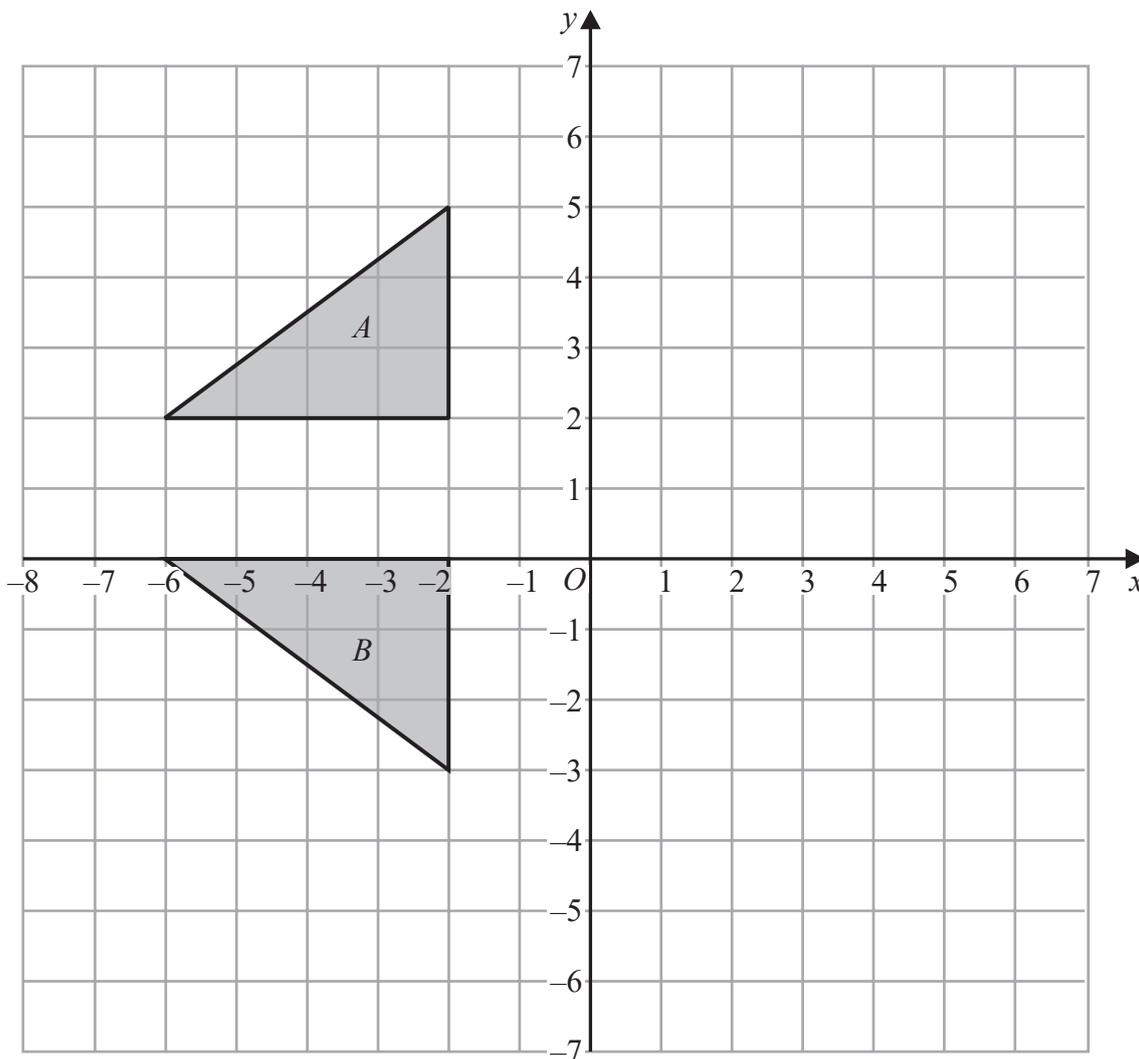
Question 5 continued

Area with horizontal dotted lines for writing answers.

(Total for Question 5 is 7 marks)



Question 6 continued



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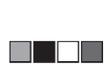
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Turn over for a spare grid if you need to redraw your triangles.



Question 6 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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DO NOT WRITE IN THIS AREA

Question 7 continued

Area with horizontal dotted lines for writing.

(Total for Question 7 is 7 marks)



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Question 8 continued

A large rectangular area with horizontal dotted lines for writing.

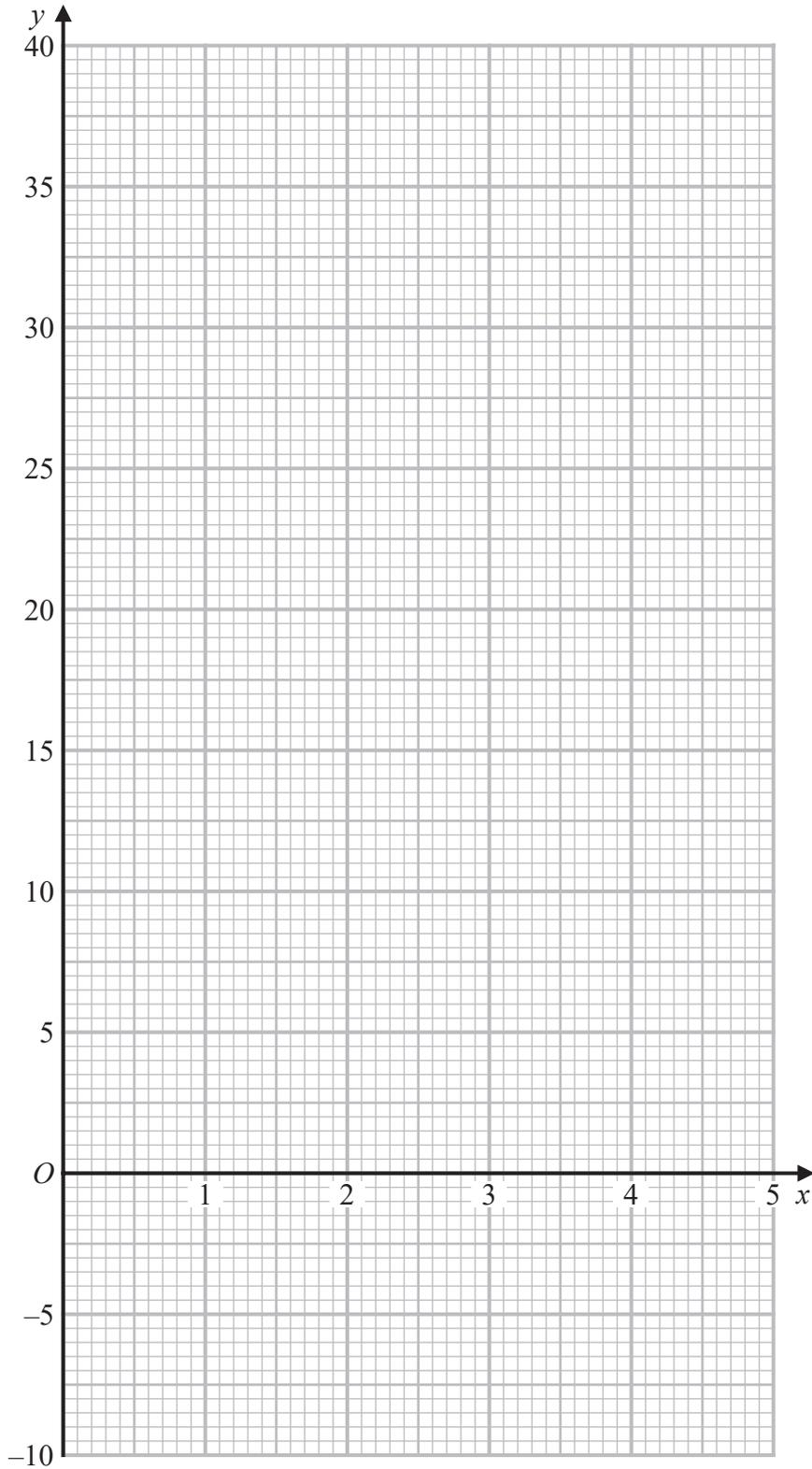


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Question 9 continued



Turn over for a spare grid if you need to redraw your curve.



Question 9 continued

Handwriting practice area consisting of 20 horizontal dotted lines.

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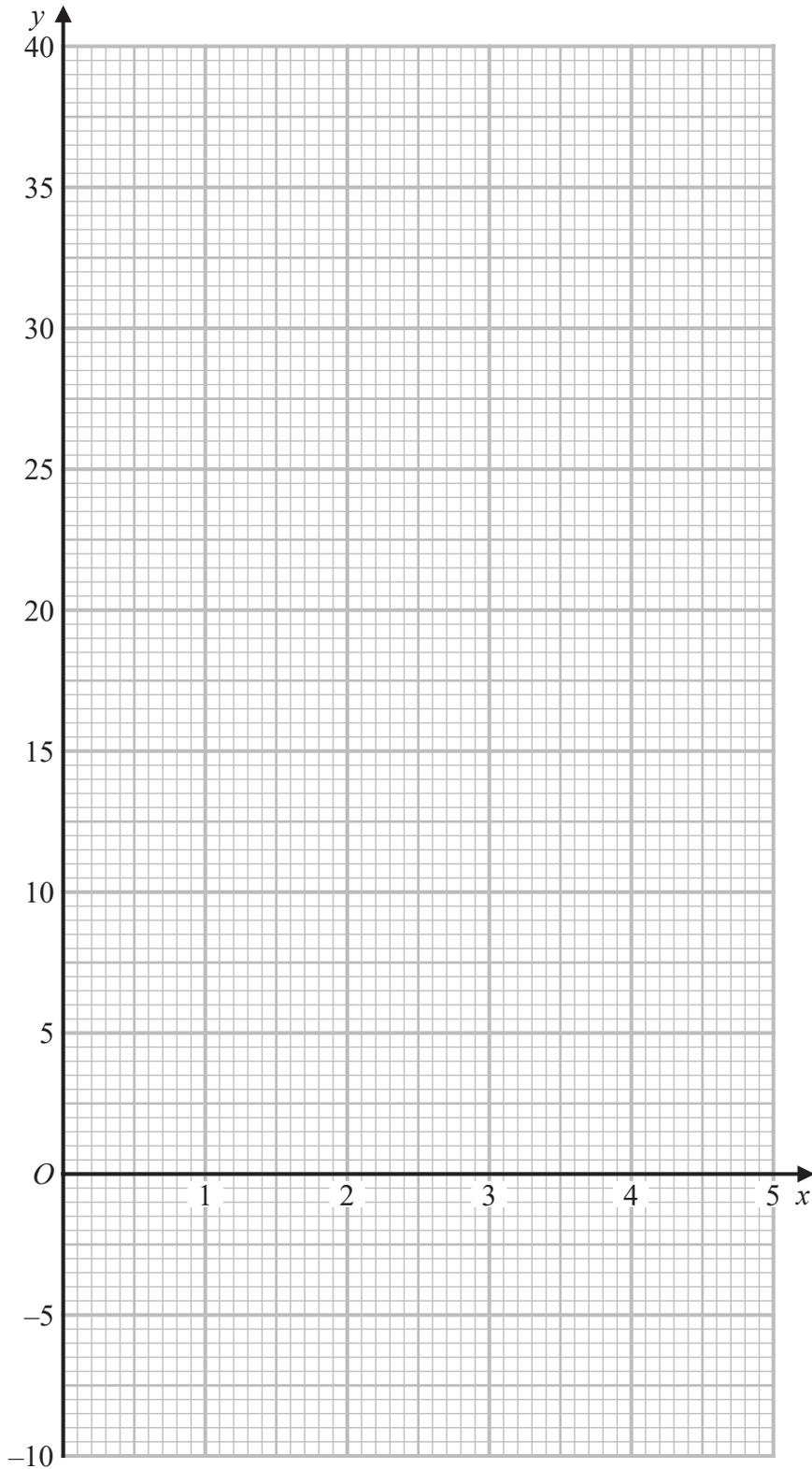
DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

Question 9 continued

Only use this grid if you need to redraw your curve.



(Total for Question 9 is 15 marks)



10 Hugo is learning a new game. Each time he plays the game the possible outcomes are that he may win, draw or lose.

The first time Hugo plays the game the probability that

$$\text{he wins is } \frac{1}{4}$$

$$\text{he draws is } \frac{1}{12}$$

(a) Show that the probability that Hugo loses the first game is $\frac{2}{3}$ (1)

The second time Hugo plays the game the probability that

$$\text{he wins is } \frac{3}{5}$$

$$\text{he draws is } \frac{1}{10}$$

$$\text{he loses is } \frac{3}{10}$$

(b) Use the information to complete the tree diagram opposite. (2)

Hugo plays the game twice.

(c) Find the probability that he draws both of his games. (2)

Hugo scores points each time he plays.

He scores 3 points if he wins, 2 points if he draws and 1 point if he loses.

After 2 games Hugo has 3 points.

(d) Find the probability that Hugo lost the first game. (5)

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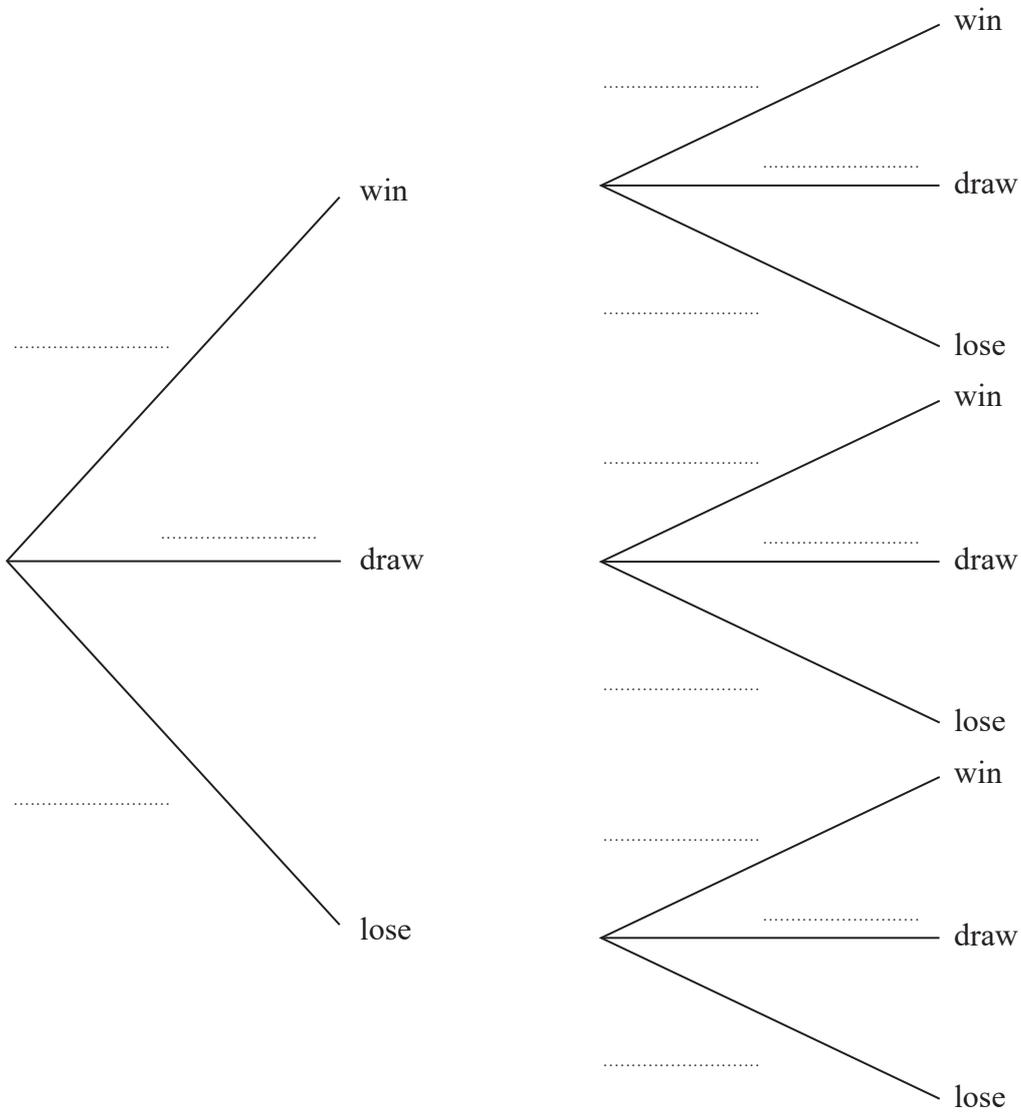


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Question 10 continued

First game

Second game



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Turn over for a spare copy of the tree diagram.



Question 10 continued

Handwriting practice area consisting of 25 horizontal dotted lines for writing.

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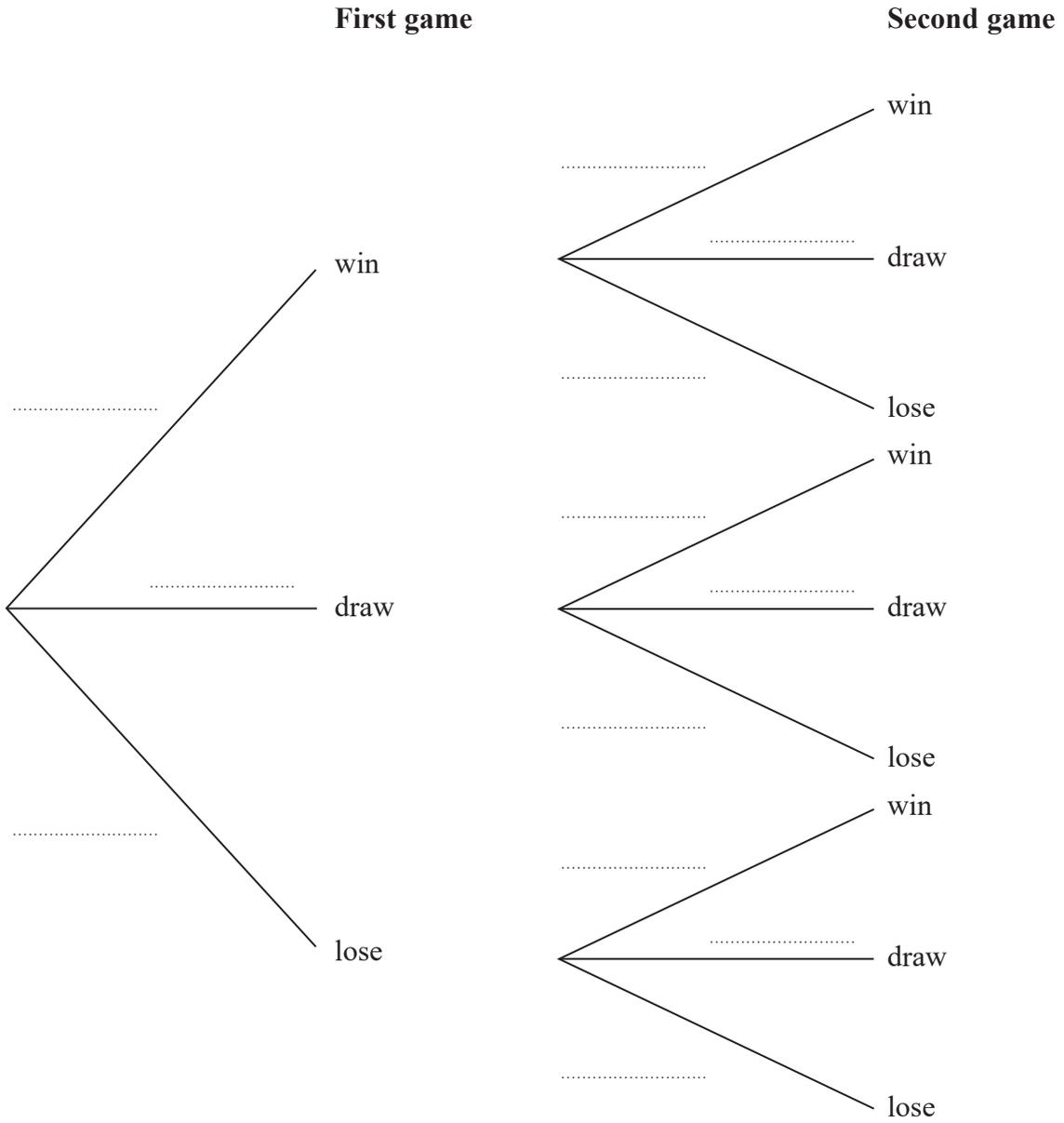
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Question 10 continued

Only use this diagram if you need to redraw your tree diagram.



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(Total for Question 10 is 10 marks)



11

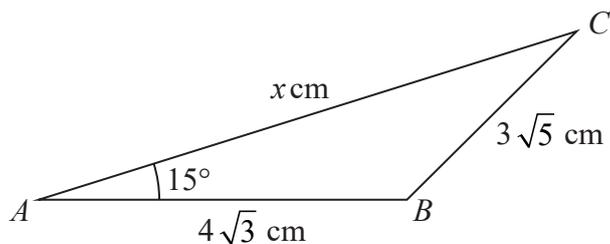


Diagram NOT accurately drawn

Figure 3

Figure 3 shows triangle ABC

$$AB = 4\sqrt{3} \text{ cm} \quad BC = 3\sqrt{5} \text{ cm} \quad AC = x \text{ cm} \quad \angle BAC = 15^\circ$$

Given that the exact value of $\cos 15^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}$

(a) show that x is a solution of the equation

$$x^2 - (6\sqrt{2} + 2\sqrt{6})x + 3 = 0 \tag{3}$$

(b) Write the equation given in part (a) in the form $(x - k)^2 = 21 + 12\sqrt{3}$ where k is a constant that should be stated as a simplified surd. (2)

(c) Show that $(3 + 2\sqrt{3})^2 = 21 + 12\sqrt{3}$ (2)

Given that $\angle ABC$ is obtuse

(d) use parts (b) and (c) to find the exact value of x
 Give your answer in the form $a + b\sqrt{2} + c\sqrt{3} + \sqrt{d}$ where a, b, c and d are integers. (3)

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[Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$]

DO NOT WRITE IN THIS AREA



Question 11 continued

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 11 continued

Handwriting practice area consisting of 25 horizontal dotted lines for writing.

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DO NOT WRITE IN THIS AREA



Question 11 continued

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Handwriting practice area consisting of 25 horizontal dotted lines.



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