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Other names

Pearson Edexcel
International GCSE

Centre Number

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Candidate Number

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Mathematics B

Paper 2



Thursday 8 June 2017 – Morning
Time: 2 hours 30 minutes

Paper Reference

4MB0/02

You must have: Ruler graduated in centimetres and millimetres, protractor, 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.

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Question 3 continued

Ruled area for writing answers, consisting of multiple horizontal dotted lines.

(Total for Question 3 is 6 marks)



4 Given that $x > 0$ and $y > 0$ and that

$$\begin{pmatrix} x & y \\ y & z \end{pmatrix} \begin{pmatrix} \frac{1}{x} & x \\ y & x \end{pmatrix} = \begin{pmatrix} 17 & 9 + 4x \\ \frac{y}{x} - 20 & -3 \end{pmatrix}$$

find the value of x , the value of y and the value of z .

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Question 4 continued

Area with horizontal dotted lines for writing.

(Total for Question 4 is 6 marks)



5 A farmer has c cows and h hens.

The number of cows is 3 times the number of hens.

(a) Write down an equation in c and h to represent this information.

(1)

Each cow has 4 legs and each hen has 2 legs.

The cows and the hens have a total number of 700 legs.

(b) Write down another equation in c and h to represent this information.

(1)

(c) Hence find the value of c and the value of h .

(3)

The farmer sells $\frac{2}{3}$ of his cows and all of his hens.

He sells each cow for £400 and each hen for £8

(d) Calculate how much money the farmer received by selling these cows and hens.

(2)

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Question 5 continued

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Area with horizontal dotted lines for writing.

(Total for Question 5 is 7 marks)



6 The two functions, f and g , are defined as

$$f: x \mapsto 2x - 3$$

$$g: x \mapsto 2 - \frac{1}{x} \quad \text{where } x \neq 0$$

(a) Express the composite function fg in the form $fg: x \mapsto \dots$, simplifying your answer. (2)

The function h is defined as

$$h: x \mapsto \frac{3x}{1 - 2x} \quad \text{where } x \neq \frac{1}{2}$$

(b) (i) Express the inverse function h^{-1} in the form $h^{-1}: x \mapsto \dots$

(ii) Write down the value of x that must be excluded from any domain of h^{-1} (3)

(c) Find the value of x for which $fg(x) = 2h^{-1}(x)$ (3)

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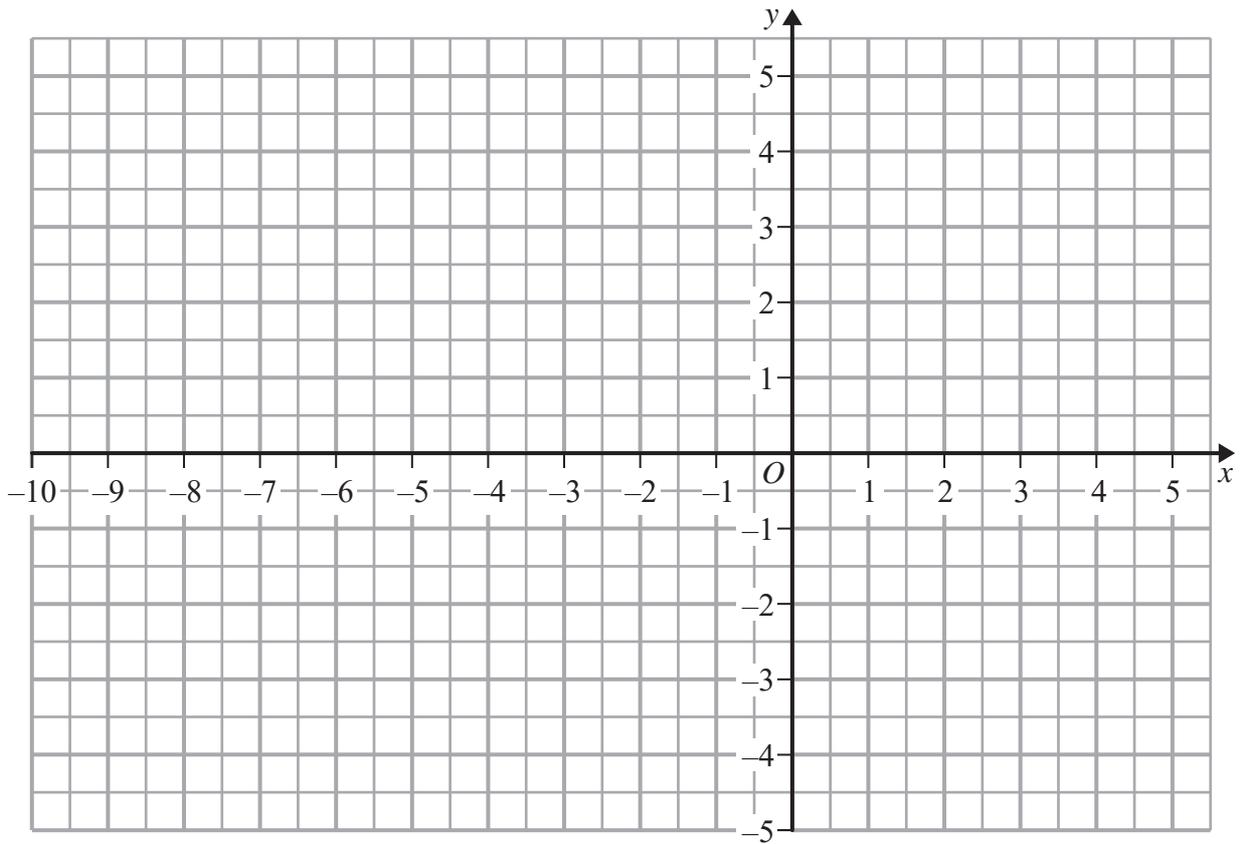
Question 6 continued

Area with horizontal dotted lines for writing answers.

(Total for Question 6 is 8 marks)



Question 7 continued



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Question 7 continued

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

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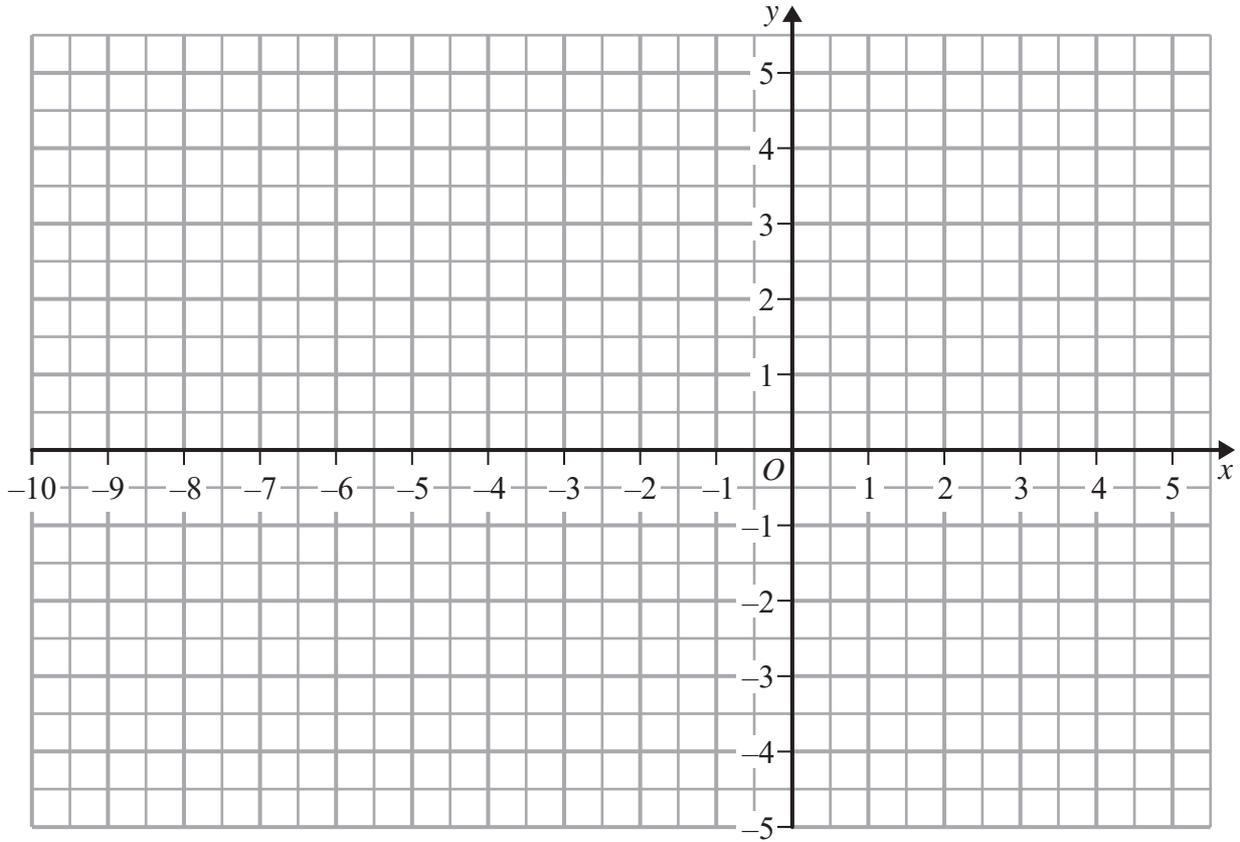
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Question 7 continued

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(Total for Question 7 is 10 marks)

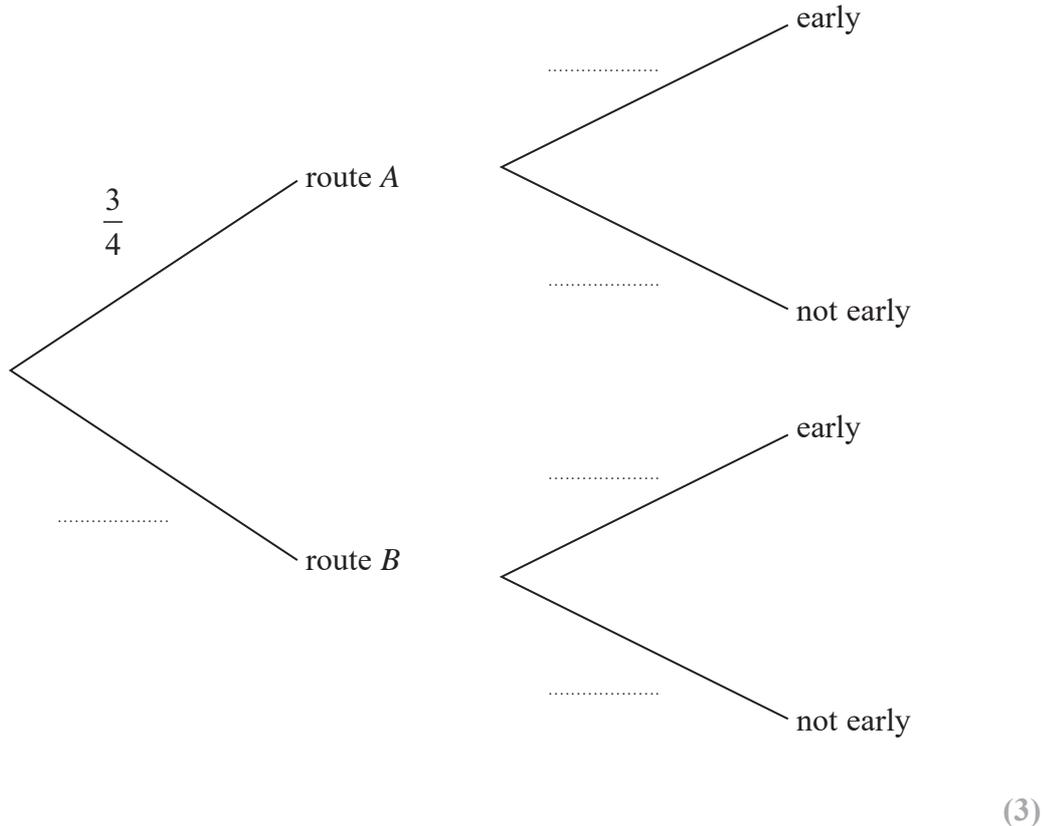


- 8 When James travels to work, he can take two routes, route *A* and route *B*.

The probability that on any work day he takes route *A* is $\frac{3}{4}$

When James takes route *A*, the probability of his arriving early at work is x .
When James takes route *B*, the probability of his arriving early at work is kx ,
where k is a constant.

- (a) Complete the probability tree diagram to show this information.



- (b) Write down an expression in terms of x for the probability that James takes route *A* to work and arrives early. (1)

The probability that James takes route *A* to work and arrives early is $\frac{1}{8}$

- (c) Find the value of x . (2)

The probability that James takes route *B* to work and does **not** arrive early is $\frac{1}{10}$

- (d) Find the value of k . (3)

- (e) Calculate the probability that on any day James goes to work, he does **not** arrive early. (3)

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Question 8 continued

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Question 8 continued

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

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Question 8 continued

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(Total for Question 8 is 12 marks)



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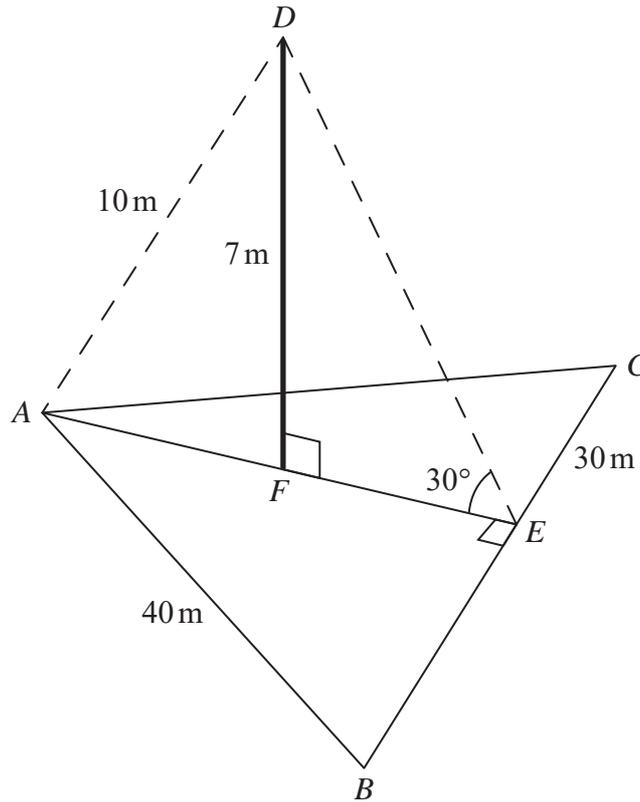
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accurately drawn

Figure 1

Figure 1 shows a horizontal triangular field ABC in which $AB = 40$ metres.

The point E lies on BC so that AE is perpendicular to BC and $EC = 30$ metres.
The point F on AE is the bottom of a vertical flagpole, FD , of height 7 metres.
In $\triangle ADE$, $AD = 10$ metres and $\angle AED = 30^\circ$

(a) Calculate the length, in metres to 3 significant figures, of

- (i) FE ,
- (ii) AE ,
- (iii) EB .

(7)

The point X lies on AB so that CFX is a straight line.

(b) Calculate the length, in metres to 3 significant figures, of CX .

(6)

$$\left[\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \right]$$



Question 9 continued

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Question 9 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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Question 9 continued

Area with horizontal dotted lines for writing answers.

(Total for Question 9 is 13 marks)



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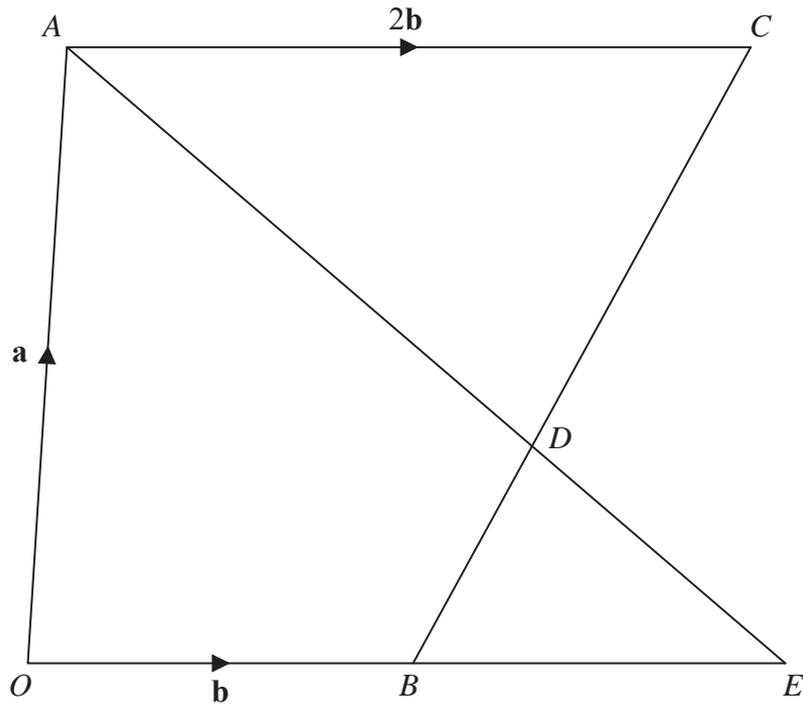
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Figure 2

In Figure 2, $OACB$ is a quadrilateral such that $\vec{OA} = \mathbf{a}$, $\vec{OB} = \mathbf{b}$ and $\vec{AC} = 2\mathbf{b}$.
 D is the point on BC such that $BD:BC = 1:3$.

(a) Express in terms of \mathbf{a} and \mathbf{b} , simplifying your answers where possible,

(i) \vec{OC} , (ii) \vec{BC} , (iii) \vec{AD} .

(5)

E is the point such that OBE and ADE are straight lines.
 Given that $OB:OE = 1:n$, where n is a constant,

(b) find an expression, in terms of \mathbf{a} , \mathbf{b} and n , for \vec{AE} .

(1)

Given also that $\vec{AD} = \lambda \vec{AE}$, where λ is a constant,

(c) find the value of λ and the value of n .

(5)

(d) Explain why $OACE$ is a parallelogram.

(1)

The area of triangle ACD is 30 cm^2

(e) Calculate the area, in cm^2 , of triangle BDE .

(2)

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Question 10 continued

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Question 10 continued

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Question 10 continued

Area with horizontal dotted lines for writing answers.

(Total for Question 10 is 14 marks)



11 The equation of a curve is given by

$$y = -\frac{8}{3}x^3 + 7x^2 - 4$$

(a) Complete the table for y , giving your values of y to 2 decimal places.

x	-1	-0.75	-0.5	0	0.5	1	1.5	2	2.5
y	5.67	1.06		-4	-2.58	0.33		2.67	-1.92

(2)

(b) On the grid, plot the points from your completed table and join them to form a smooth curve.

(3)

(c) **By drawing a suitable straight line on the grid**, find an estimate, to one significant figure, of the gradient of the curve at the point where $x = 2$

(3)

(d) By drawing and labelling a straight line on the grid, find estimates for

the solutions of $\frac{8}{3}x^3 + \frac{5}{3}x + \frac{7}{2} = 7x^2$

(6)

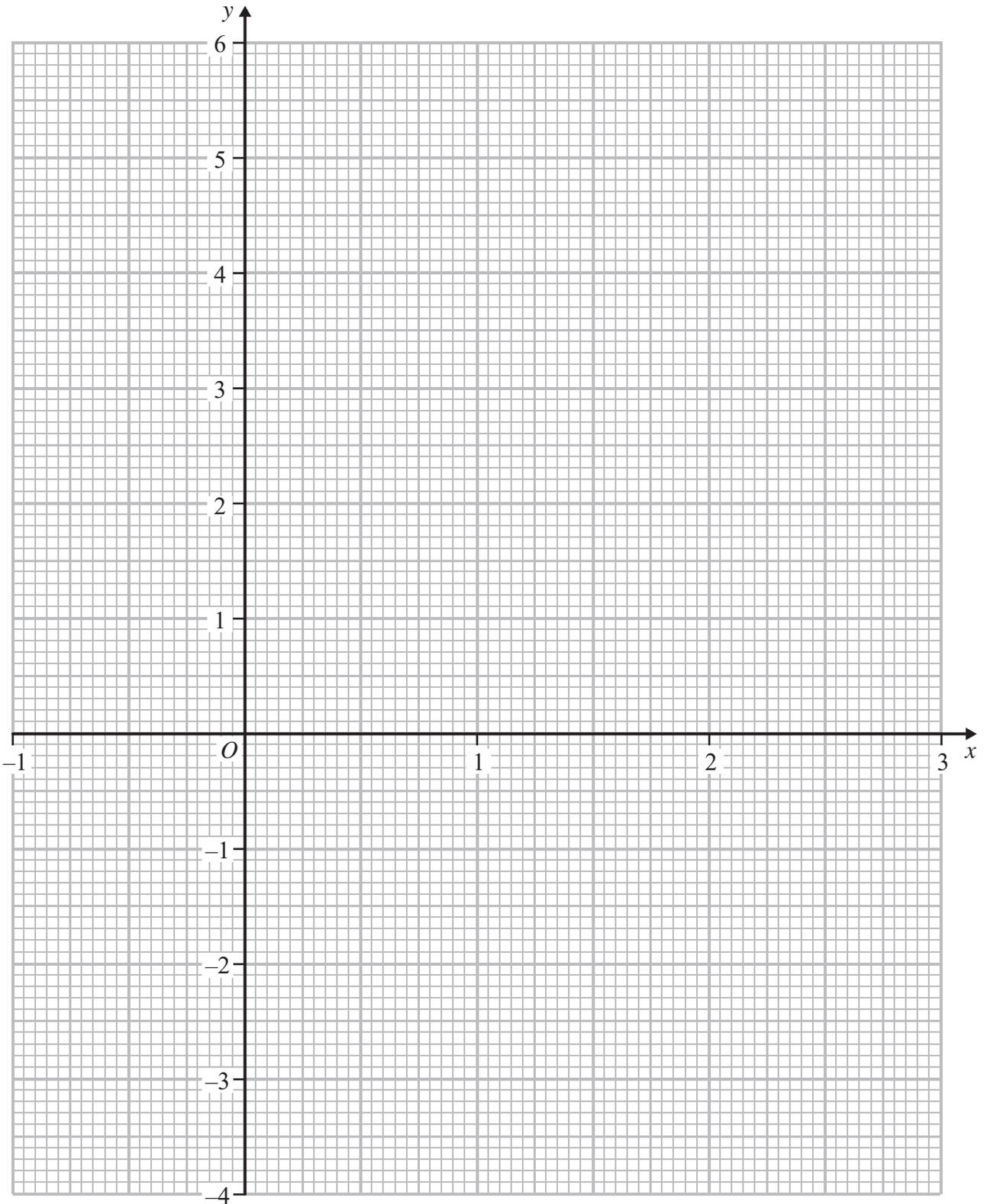
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Question 11 continued



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Question 11 continued

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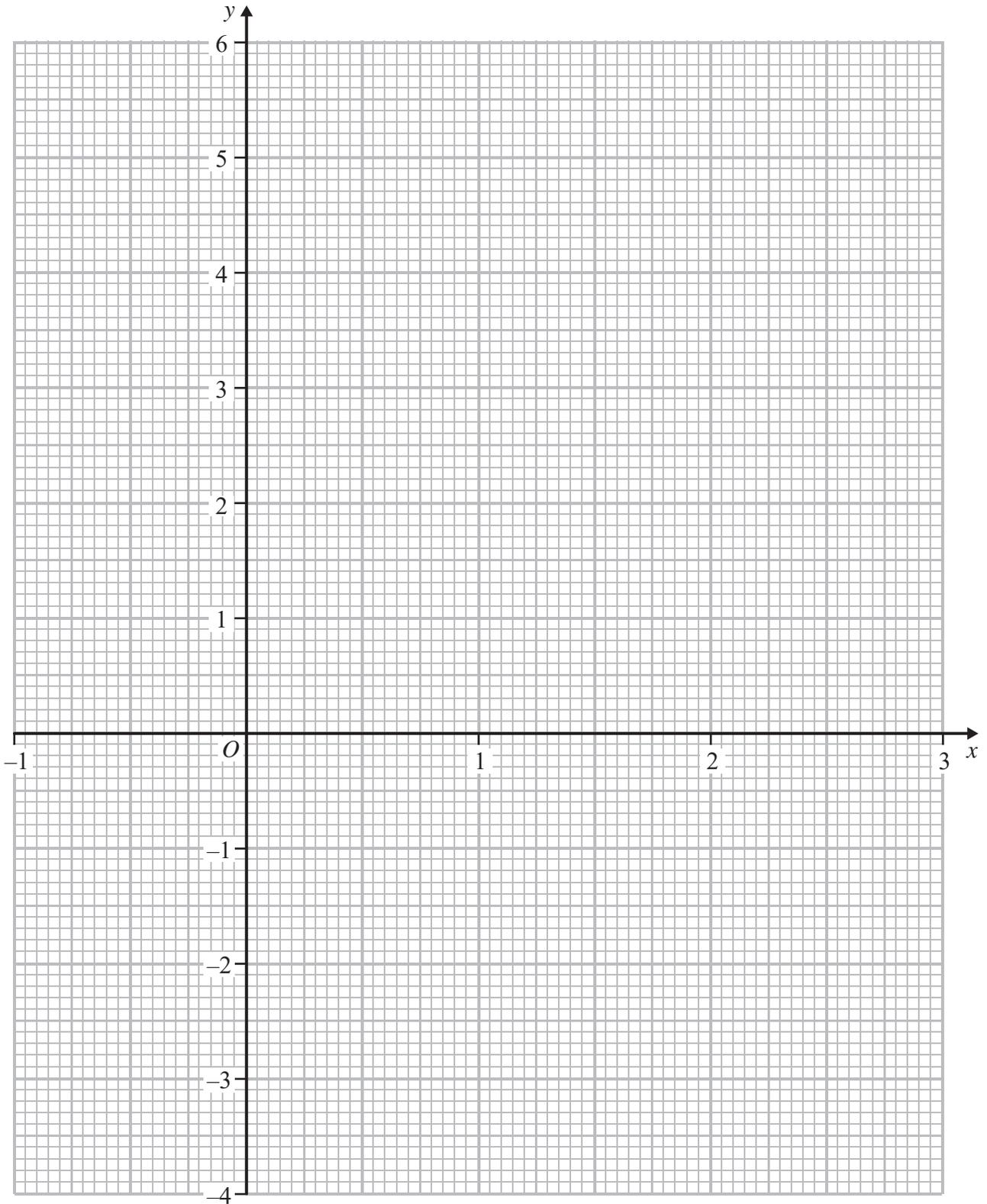
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Question 11 continued

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