

Write your name here

Surname

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.

Turn over ►

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**Question 3 continued**

DO NOT WRITE IN THIS AREA

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Area with horizontal dotted lines for writing.

**(Total for Question 3 is 6 marks)**





**Question 4 continued**

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Area with horizontal dotted lines for writing.

**(Total for Question 4 is 6 marks)**





**Question 5 continued**

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A large rectangular area with horizontal dotted lines for writing, spanning most of the page width and height.

**(Total for Question 5 is 7 marks)**





**Question 6 continued**

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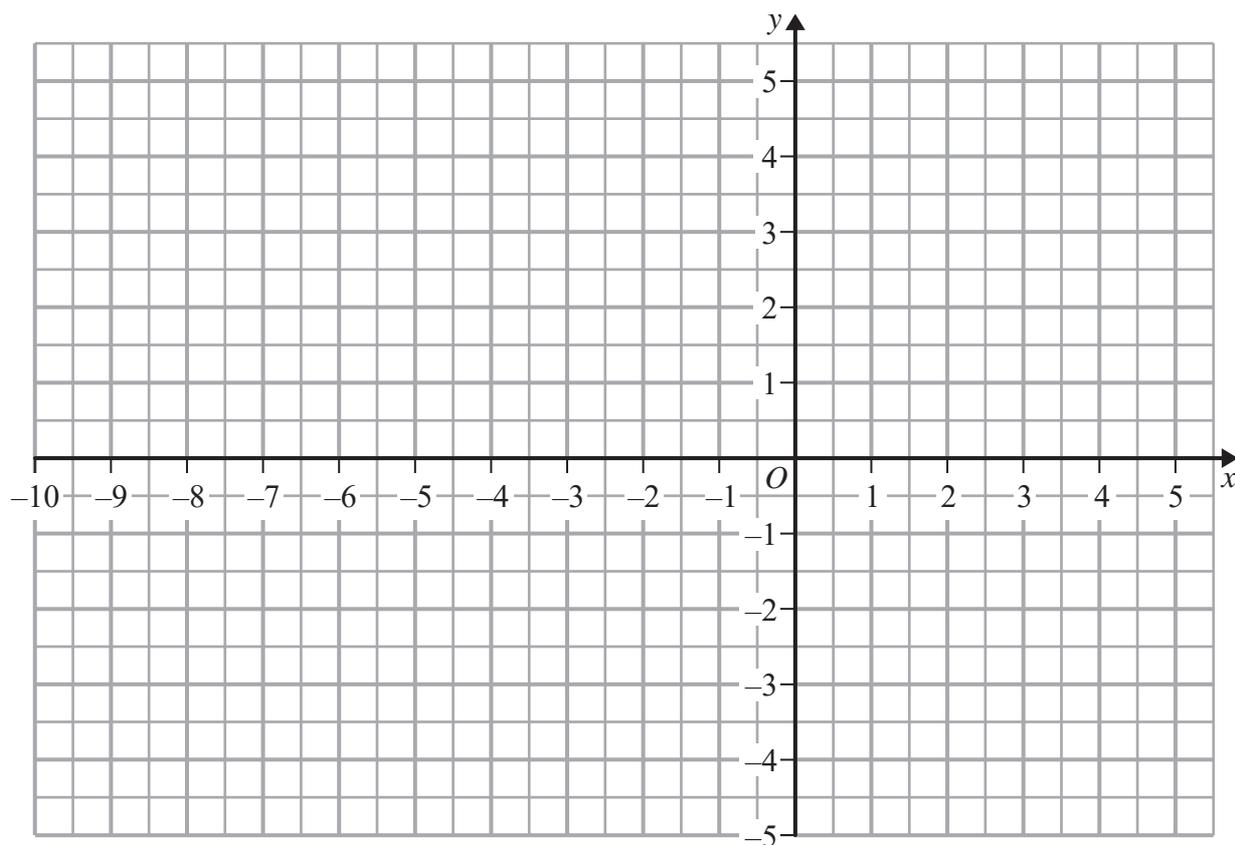
Area with horizontal dotted lines for writing.

**(Total for Question 6 is 8 marks)**





Question 7 continued



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

Question 7 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

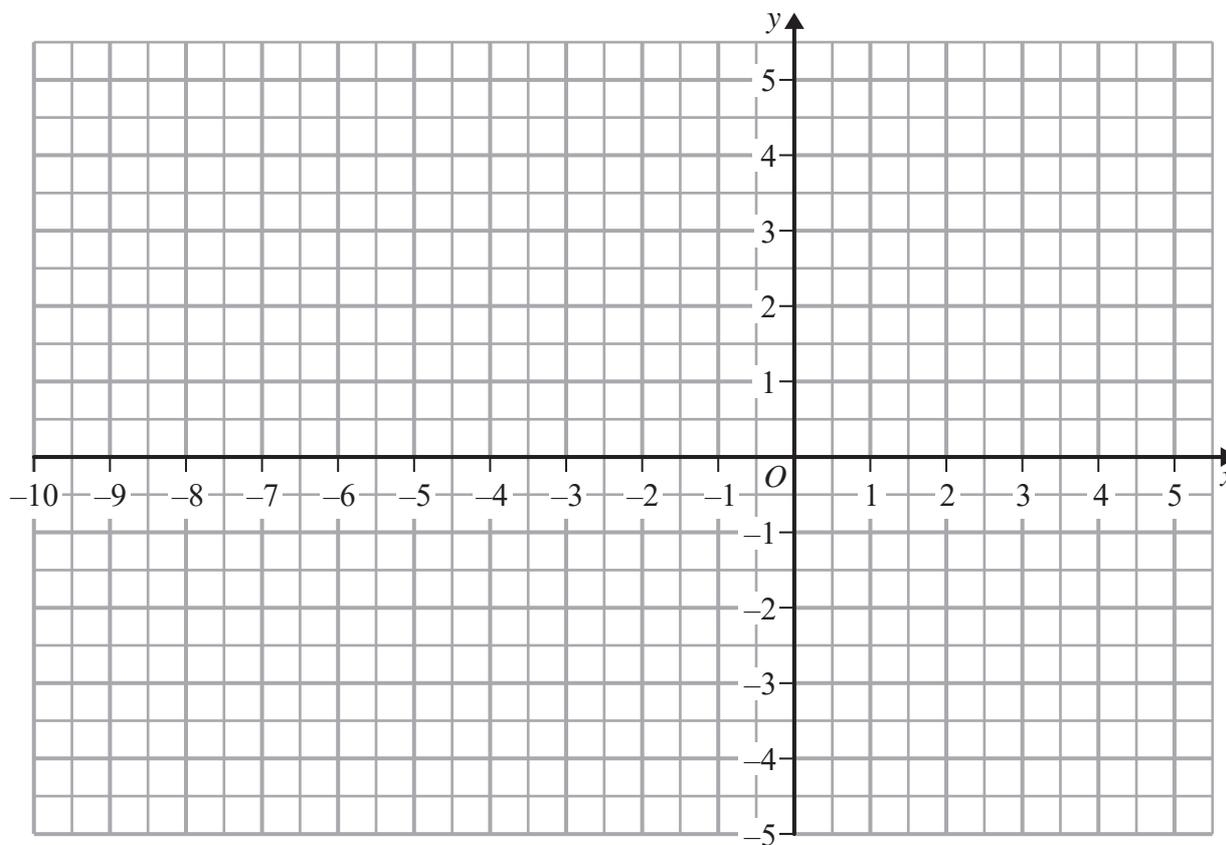
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Question 7 continued

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



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(Total for Question 7 is 10 marks)

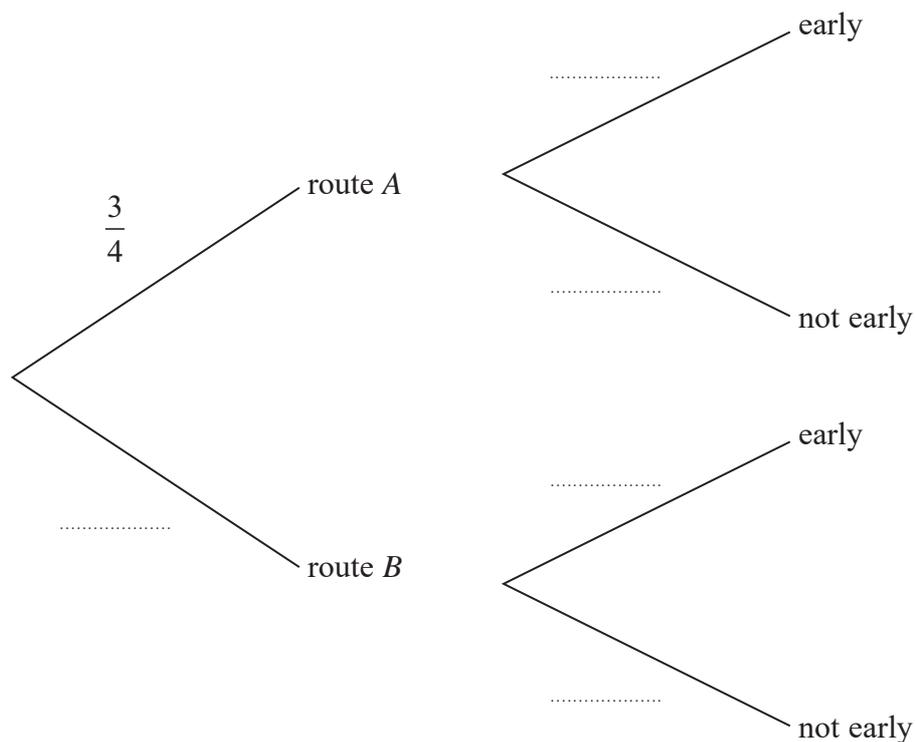
8 When James travels to work, he can take two routes, route *A* and route *B*.

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.



(3)

(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)

**Question 8 continued**

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Area with horizontal dotted lines for writing.



**Question 8 continued**

Handwriting practice area consisting of 25 horizontal dotted lines.

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**Question 8 continued**

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**(Total for Question 8 is 12 marks)**



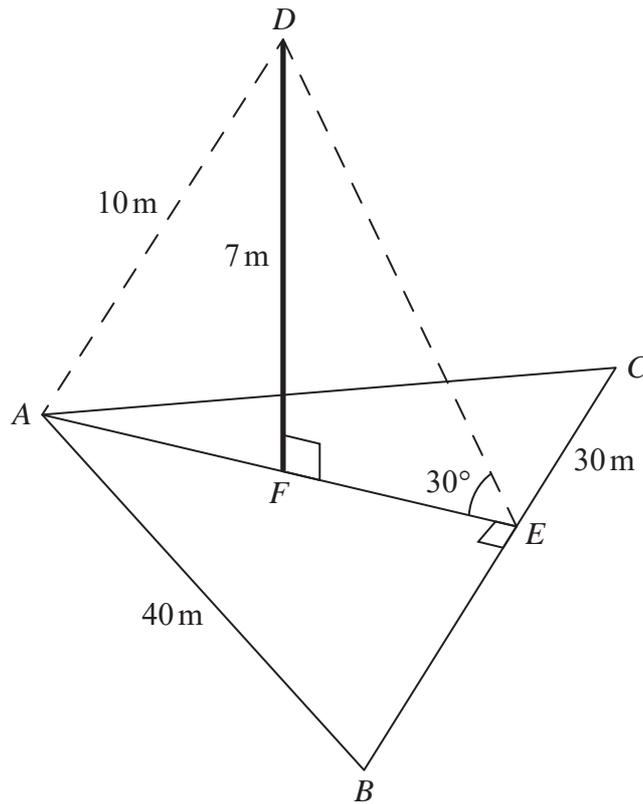


Diagram **NOT**  
accurately drawn

**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

Area with horizontal dotted lines for writing.

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**Question 9 continued**

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**(Total for Question 9 is 13 marks)**



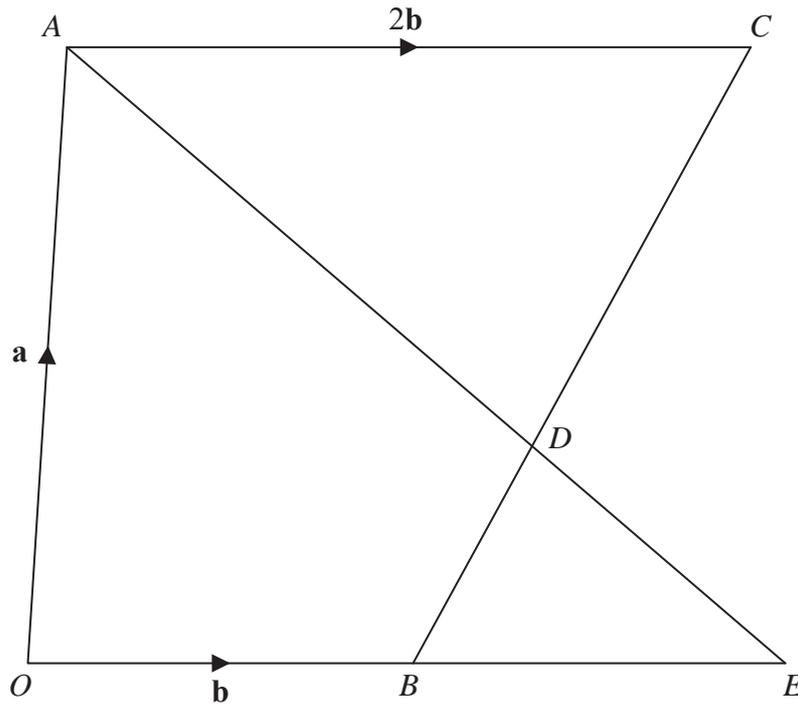


Diagram NOT accurately drawn

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  $\lambda$  is a constant,

(c) find the value of  $\lambda$  and the value of  $n$ .

(5)

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

(1)

The area of triangle  $ACD$  is  $30 \text{ cm}^2$

(e) Calculate the area, in  $\text{cm}^2$ , of triangle  $BDE$ .

(2)

**Question 10 continued**

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Area with horizontal dotted lines for writing.

**Question 10 continued**

Area with horizontal dotted lines for writing.

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**Question 10 continued**

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Area with horizontal dotted lines for writing.

**(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)

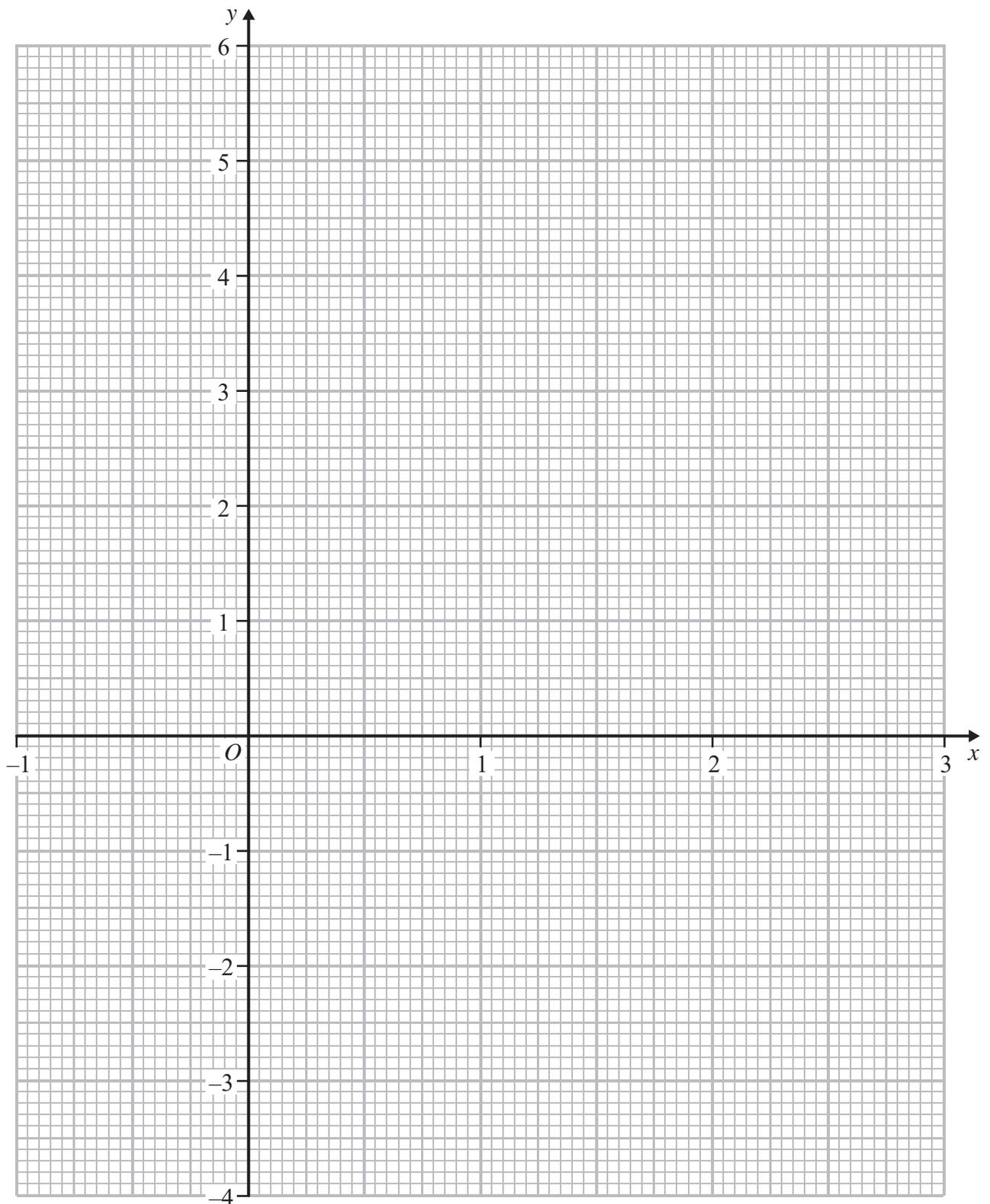
(d) By drawing and labelling a straight line on the grid, find estimates for

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

(6)



Question 11 continued



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



**Question 11 continued**

Handwriting practice area consisting of 25 horizontal dotted lines.

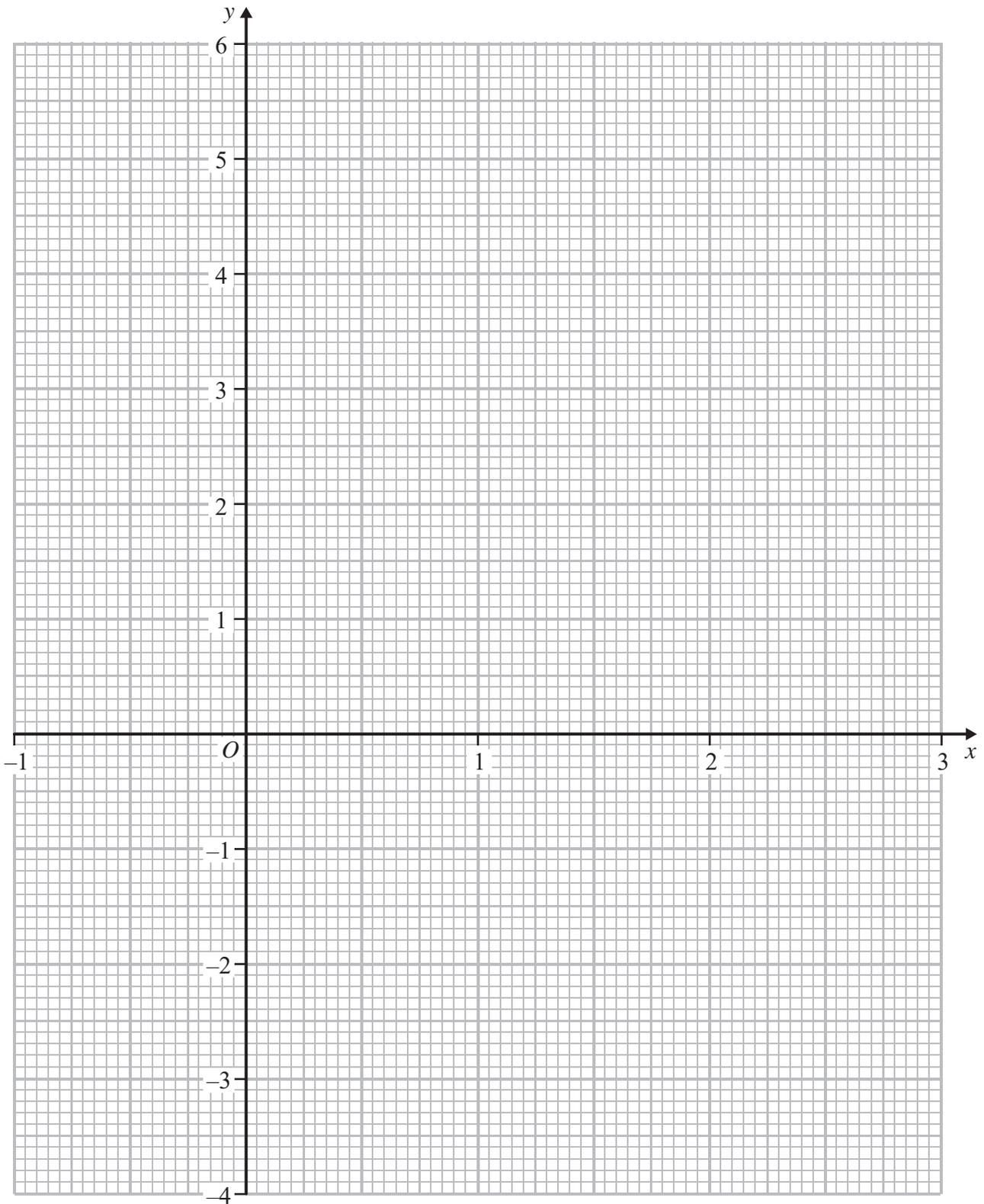
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Question 11 continued

Only use this grid if you need to redraw your graph



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