

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel
International GCSE**

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Mathematics B

Paper 2R



Thursday 9 June 2016 – Morning
Time: 2 hours 30 minutes

Paper Reference
4MB0/02R

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 1 continued

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Area with horizontal dotted lines for writing.

(Total for Question 1 is 6 marks)



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Question 2 continued

Figure 2, below, shows the funnel placed on a sheet of metal.

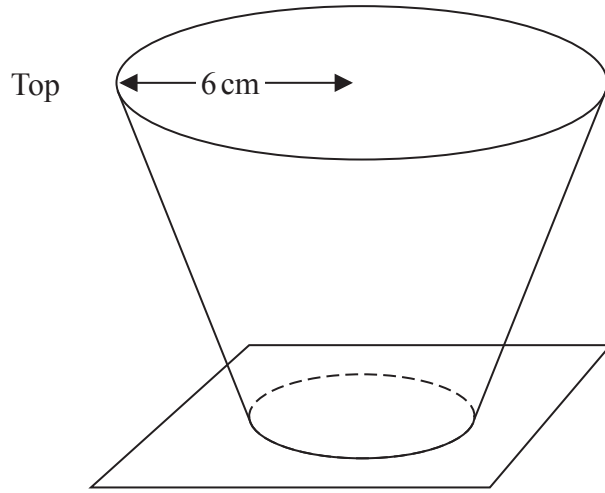


Diagram NOT accurately drawn

Figure 2

The funnel is completely filled with water and no water escapes from the bottom of the funnel.

The sheet of metal is suddenly removed.

Given that water flows out of the funnel at a constant rate of $54 \text{ cm}^3/\text{s}$

(c) calculate the time, to the nearest second, to completely empty the funnel of water.

(2)

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Question 2 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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Question 2 continued

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(Total for Question 2 is 6 marks)



Question 3 continued

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(Total for Question 3 is 7 marks)



Question 4 continued

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(Total for Question 4 is 7 marks)



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Question 5 continued

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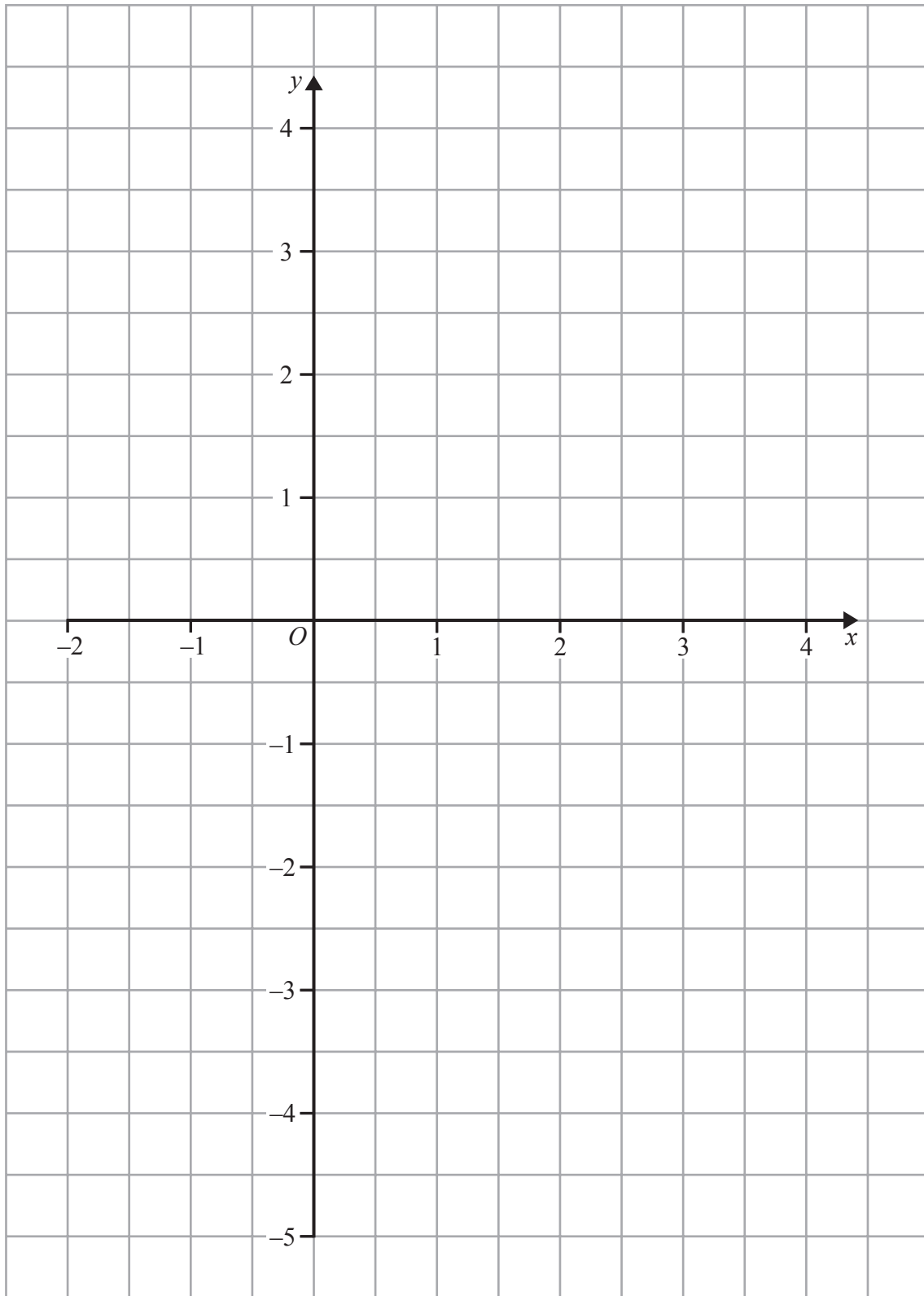
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(Total for Question 5 is 9 marks)



Question 6 continued



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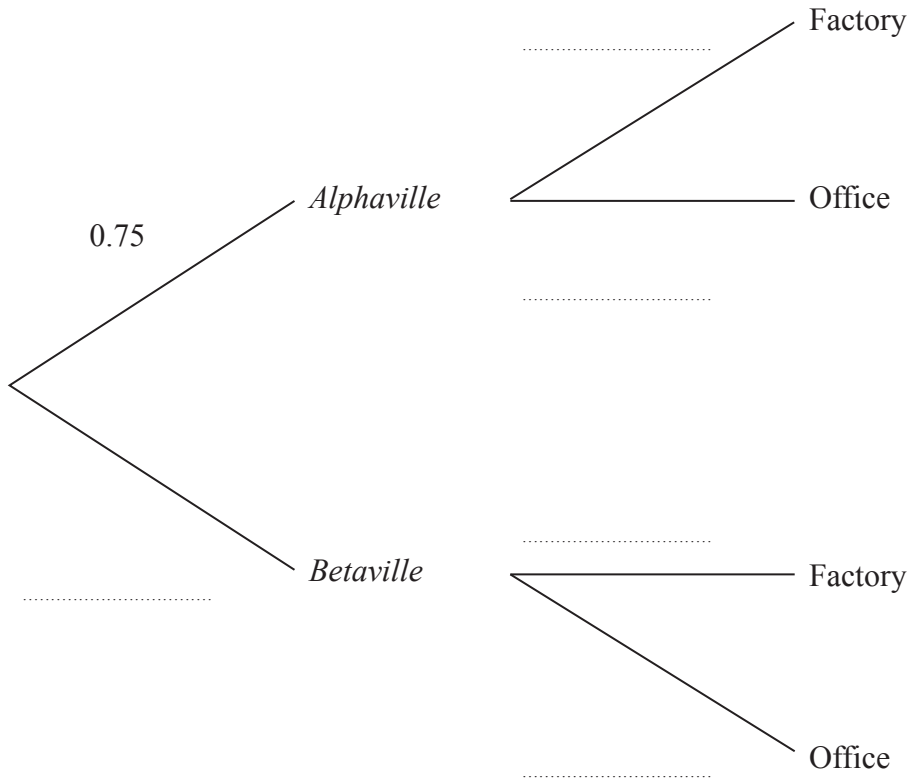
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(Total for Question 6 is 10 marks)



Question 7 continued



(3)

An adult on the island is to be chosen at random.

(b) Find the probability that this adult

- (i) works in an office in *Betaville*,
- (ii) works in an office.

(5)

Given that the adult chosen works in an office,

(c) find the probability that this adult works in *Betaville*.

(3)

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8 Make x the subject of $t = a(b + dx)$

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Handwriting practice area consisting of 28 horizontal dotted lines.

(Total for Question 8 is 3 marks)



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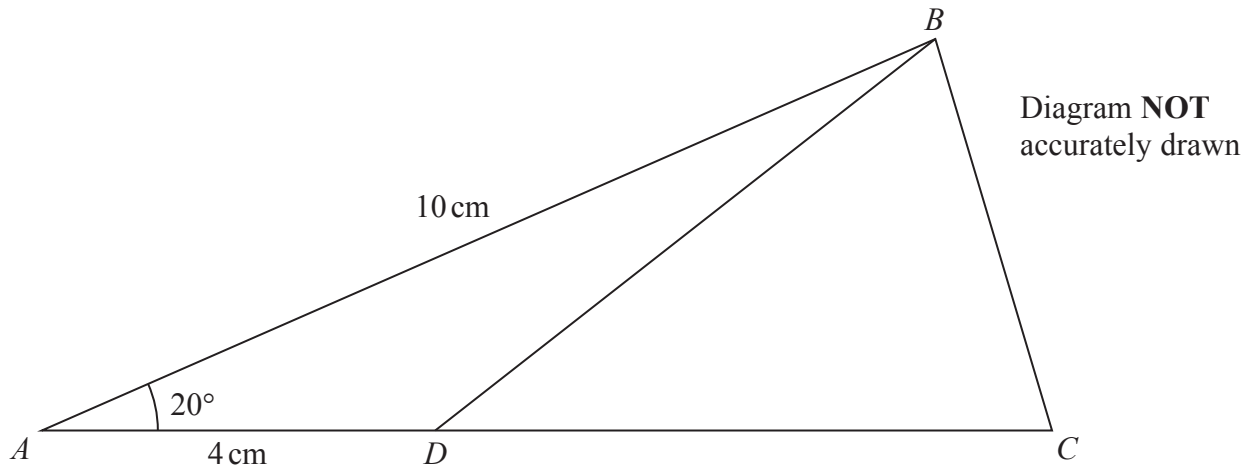


Figure 3

Figure 3 shows $\triangle ABC$ in which $AB = 10$ cm and $\angle BAC = 20^\circ$

The point D lies on the line AC so that $AD = 4$ cm and $\angle BDA$ is obtuse.

Calculate, to 3 significant figures,

(a) the length, in cm, of BD , (3)

(b) the size, in degrees, of $\angle BDC$. (4)

Given that the area of $\triangle ABC$ is 18 cm²

(c) calculate the length, in cm to 3 significant figures, of CD . (3)

$$\left[\begin{array}{l} \text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \\ \text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A \\ \text{Area of triangle} = \frac{1}{2}bc \sin A \end{array} \right]$$



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

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(Total for Question 9 is 10 marks)



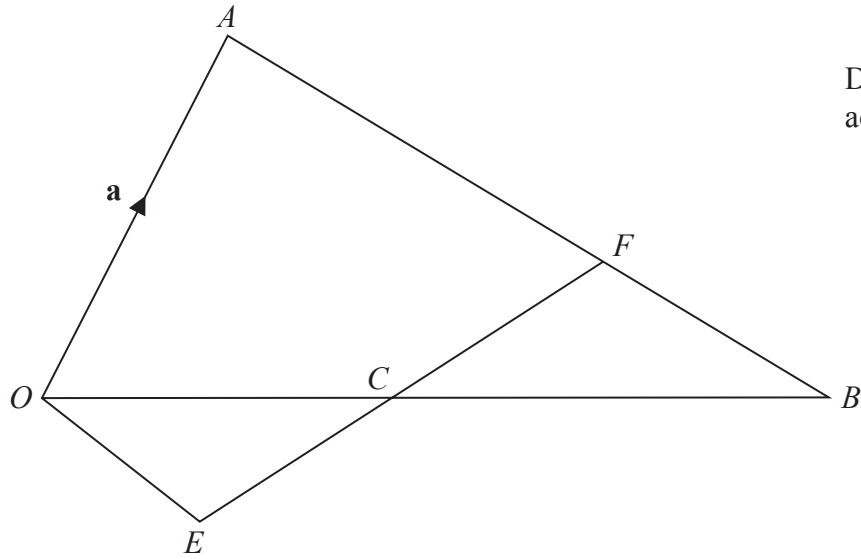


Diagram NOT accurately drawn

Figure 4

In Figure 4, OAB is a triangle.
 The point C is the midpoint of OB .
 The point F is on AB such that $AF:FB = 2:1$

Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = 2\mathbf{b}$

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

- (i) \vec{AB} (ii) \vec{BC} (iii) \vec{AF} (iv) \vec{FC} (5)

The point E is such that FCE is a straight line so that $\vec{FE} = \lambda\vec{FC}$, where λ is a scalar.

(b) Write down an expression in terms of \mathbf{a} , \mathbf{b} and λ for \vec{FE} . (1)

(c) Find and simplify an expression in terms of \mathbf{a} , \mathbf{b} and λ for \vec{OE} . (2)

The point E is such that $\vec{OE} = \mu\vec{AB}$, where μ is a scalar.

(d) Find the value of λ and the value of μ . (6)

(e) State what can be deduced about triangles OCE and CFB . (1)

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Question 10 continued

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Question 10 continued

Handwriting practice area consisting of 20 horizontal dotted lines.

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Question 10 continued

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(Total for Question 10 is 15 marks)



P 4 6 2 2 5 A 0 2 7 3 2

11 The equation of a curve is given by $y = -2x^3 + 3x^2 + 2x$

(a) Complete the table of values for $y = -2x^3 + 3x^2 + 2x$

Give your values of y to two decimal places where necessary.

x	-1	-0.5	-0.25	0	0.25	0.5	0.75	1	1.25	1.5	2
y	3	0		0	0.66	1.5	2.34	3		3	0

(2)

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

(3)

(c) Using your curve, write down the values, to one decimal place, of the x coordinates of the stationary points on $y = -2x^3 + 3x^2 + 2x$

(2)

(d) Use your curve to estimate the range of values for x , to one decimal place, for which

$$-2x^3 + 3x^2 + 2x - 1 > 0$$

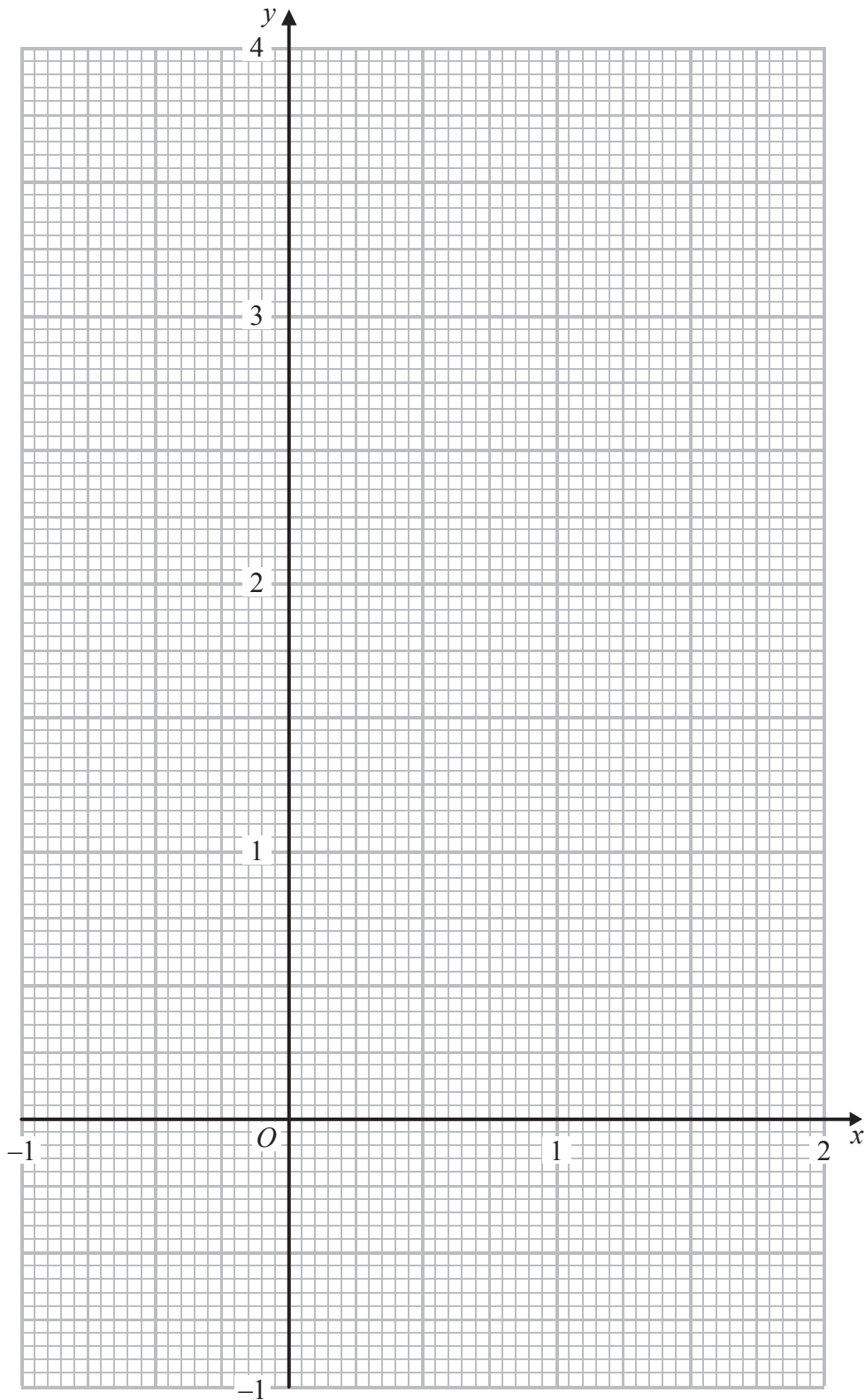
(3)

(e) By drawing a suitable straight line on the grid, find estimates, to one decimal place, of the 3 values of x which satisfy $-2x^3 + 3x^2 + \frac{3}{2}x - 2 = 0$

(6)



Question 11 continued



Use the grid on page 31 if you need to redraw your graph.

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Question 11 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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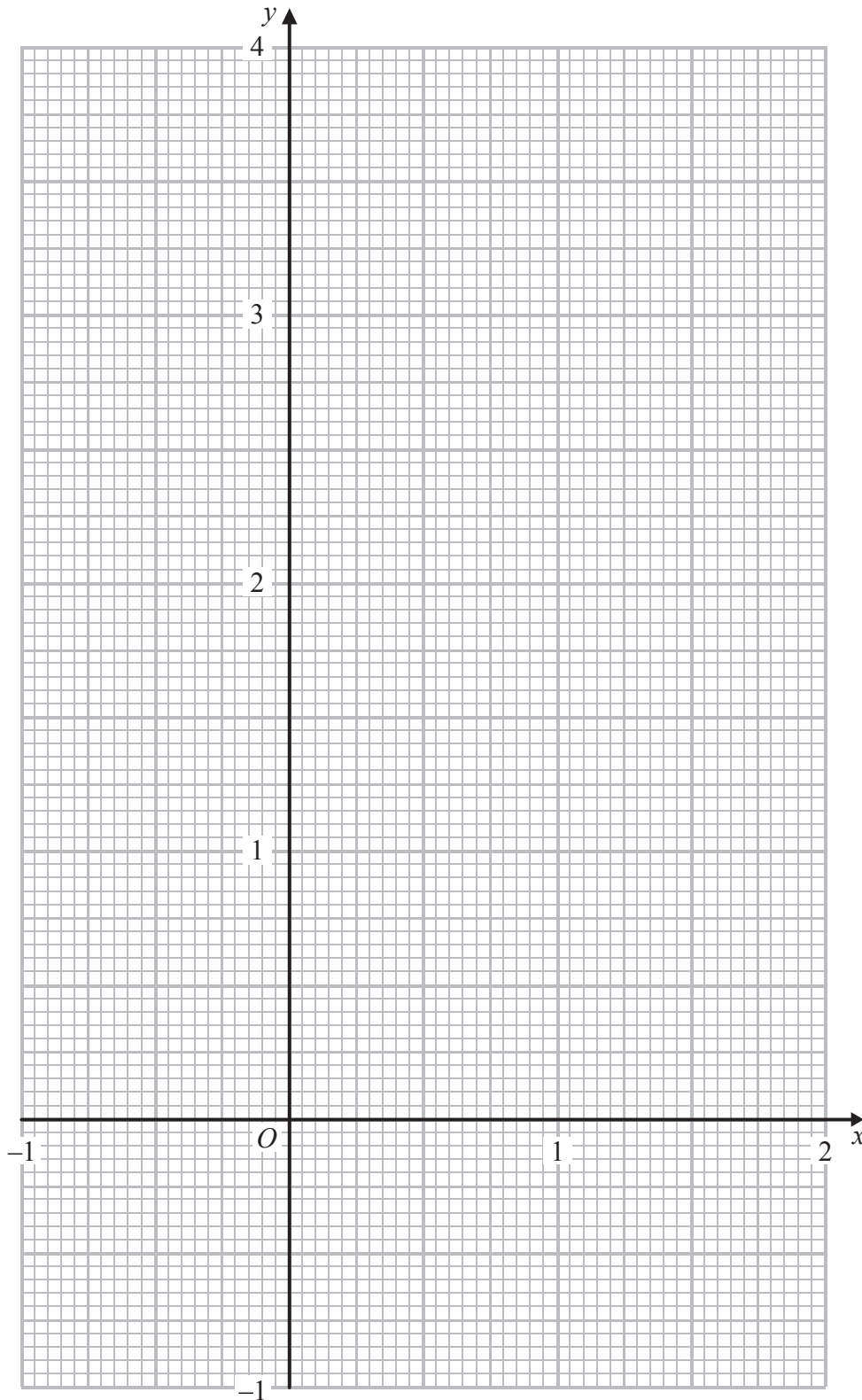
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Question 11 continued

Use this grid if you need to redraw your graph.



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Question 11 continued

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(Total for Question 11 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS

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