9 (a) Complete the table of values for

$$y = \frac{x^3 + 4}{5 - x}$$

giving your answers to 2 decimal places.

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y	-0.57	0.10	0.5		0.8		1.25		4

(2)

(b) On the grid opposite, draw the graph of

$$y = \frac{x^3 + 4}{5 - x} \qquad \text{for } -2 \leqslant x \leqslant 2$$
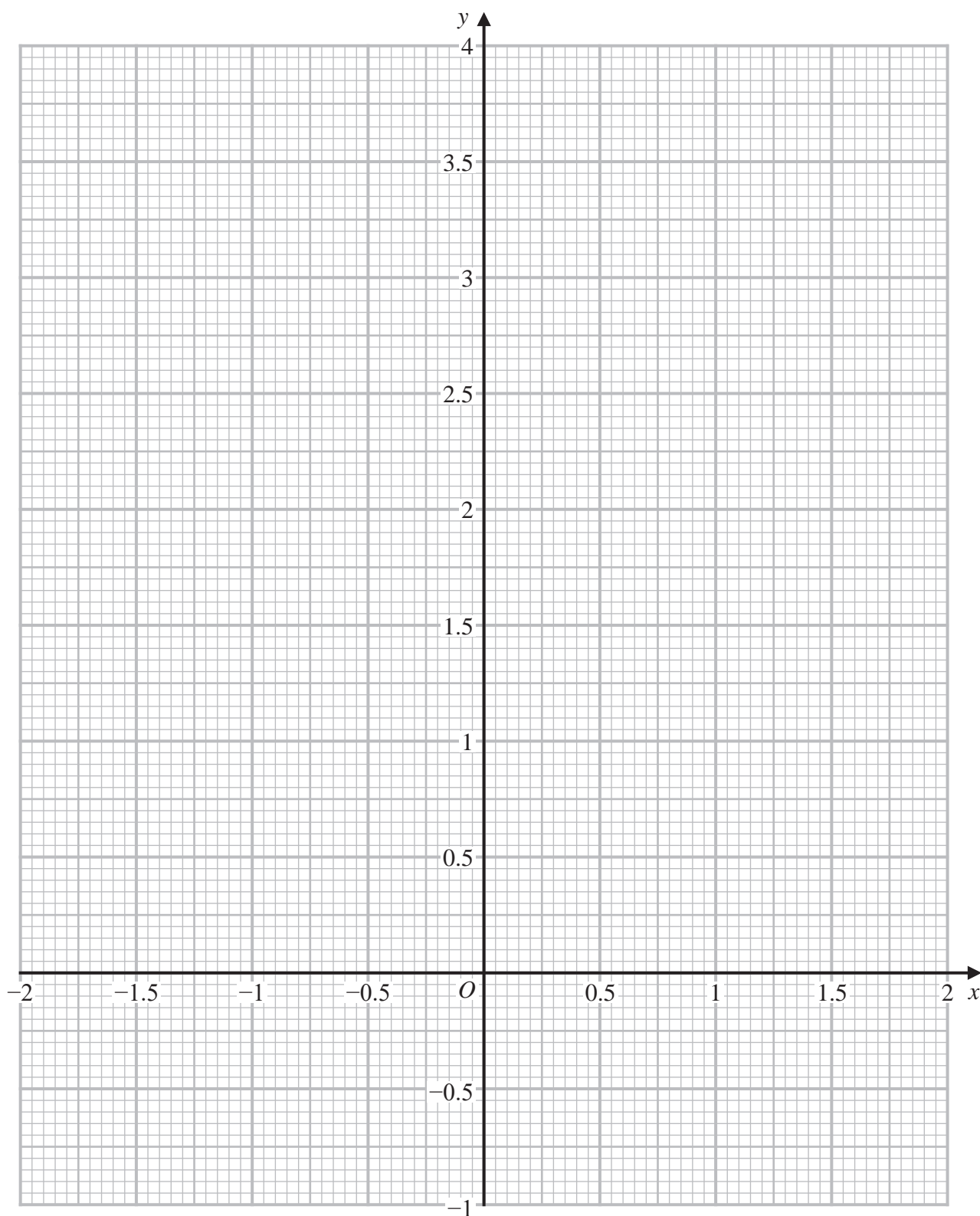
(2)

(c) By drawing a suitable straight line on the grid, obtain an estimate, to one decimal place, of the root of the equation $x^3 - x^2 + 8x - 11 = 0$ in the interval $-2 \leqslant x \leqslant 2$

(5)

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Question 9 continued

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

Question 9 continued

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Question 9 continued

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

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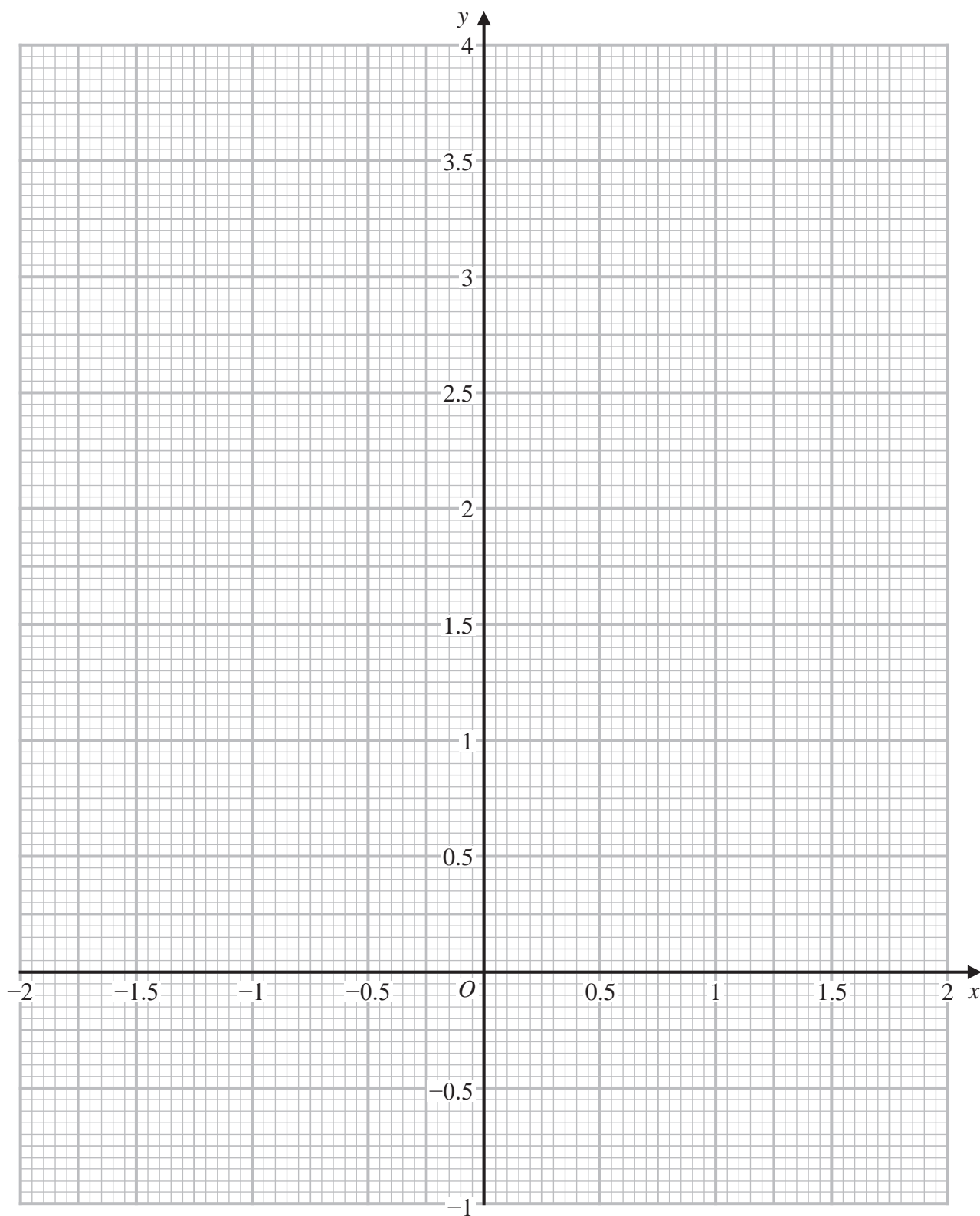
(Total for Question 9 is 9 marks)

P 6 6 3 0 9 A 0 2 7 3 6

10 (a) Use the factor theorem to show that $(4x - 3)$ is a factor of

$$16x^3 + 11x - 15$$

(2)

(b) Using formulae given on page 2, show that

(i) $\sin 2\theta = 2\sin\theta\cos\theta$

(ii) $\cos 2\theta = 2\cos^2\theta - 1$

(5)

(c) Show that the equation

$$27\cos\theta\cos 2\theta + 19\sin\theta\sin 2\theta - 15 = 0$$

becomes the equation

$$16x^3 + 11x - 15 = 0$$

by using the substitution $x = \cos\theta$

(4)

(d) Hence show that any solution of the equation

$$27\cos\theta\cos 2\theta + 19\sin\theta\sin 2\theta - 15 = 0$$

is given by $\cos\theta = \dfrac{3}{4}$

(4)

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 15 marks)

11
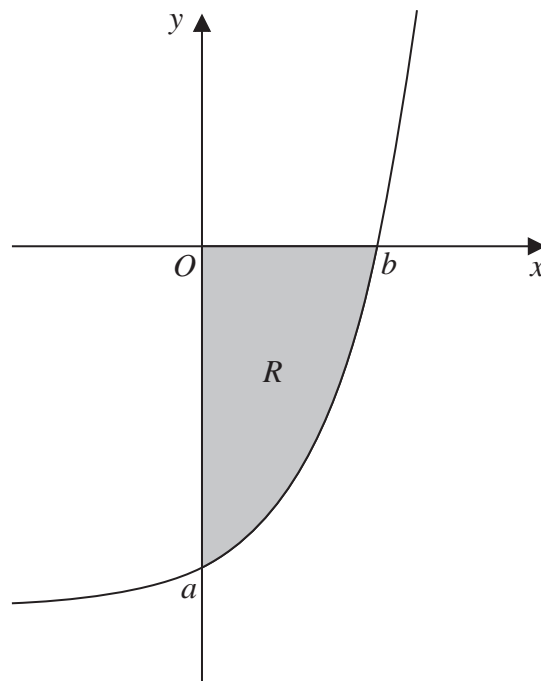
Figure 3

The finite region R, shown shaded in Figure 3, is bounded by the curve with equation $y = e^{2x} - 9$ and the coordinate axes.

The curve crosses the coordinate axes at the points with coordinates $(0, a)$ and $(b, 0)$

(a) (i) Find the value of a

(ii) Show that $b = \ln 3$

(3)

The region R is rotated through $360°$ about the x-axis.

(b) Use calculus to find the volume of the solid generated.

Give your answer in the form $\pi(p \ln 3 + q)$, where p and q are integers.

(6)

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Question 11 continued

Question 11 continued

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(Total for Question 11 is 9 marks)

TOTAL FOR PAPER IS 100 MARKS

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