7 $f(x) = 2x^2 + px + q$ where p and q are integers

$g(x) = 14x^2 + 37x + 14$

The equation $f(x) = 0$ has roots α and β

The equation $g(x) = 0$ has roots $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$

Given that $p + q = -4$ where $p > 0$ and without solving the equation $g(x) = 0$

(a) find

(i) the value of p

(ii) the value of q

(9)

Given also that $\alpha > \beta$

(b) show that $\alpha^2 - \beta^2 = -\frac{3\sqrt{65}}{4}$

(4)

Question 7 continued

Question 7 continued

Question 7 continued

(Total for Question 7 is 13 marks)

8 (a) Given that x is measured in radians, complete the table of values for

$$y = \sin x - 3\cos 2x - 0.5$$

Give your answers to one decimal place.

x	0	0.5	0.8	1	1.6	2	2.5	3
y			0.3	1.6			–0.8	–3.2

(2)

(b) On the grid opposite, draw the graph of $y = \sin x - 3\cos 2x - 0.5$ for $0 \leqslant x \leqslant 3$

(2)

(c) Use a formula from page 2 to show that $\cos 2A = 1 - 2\sin^2 A$

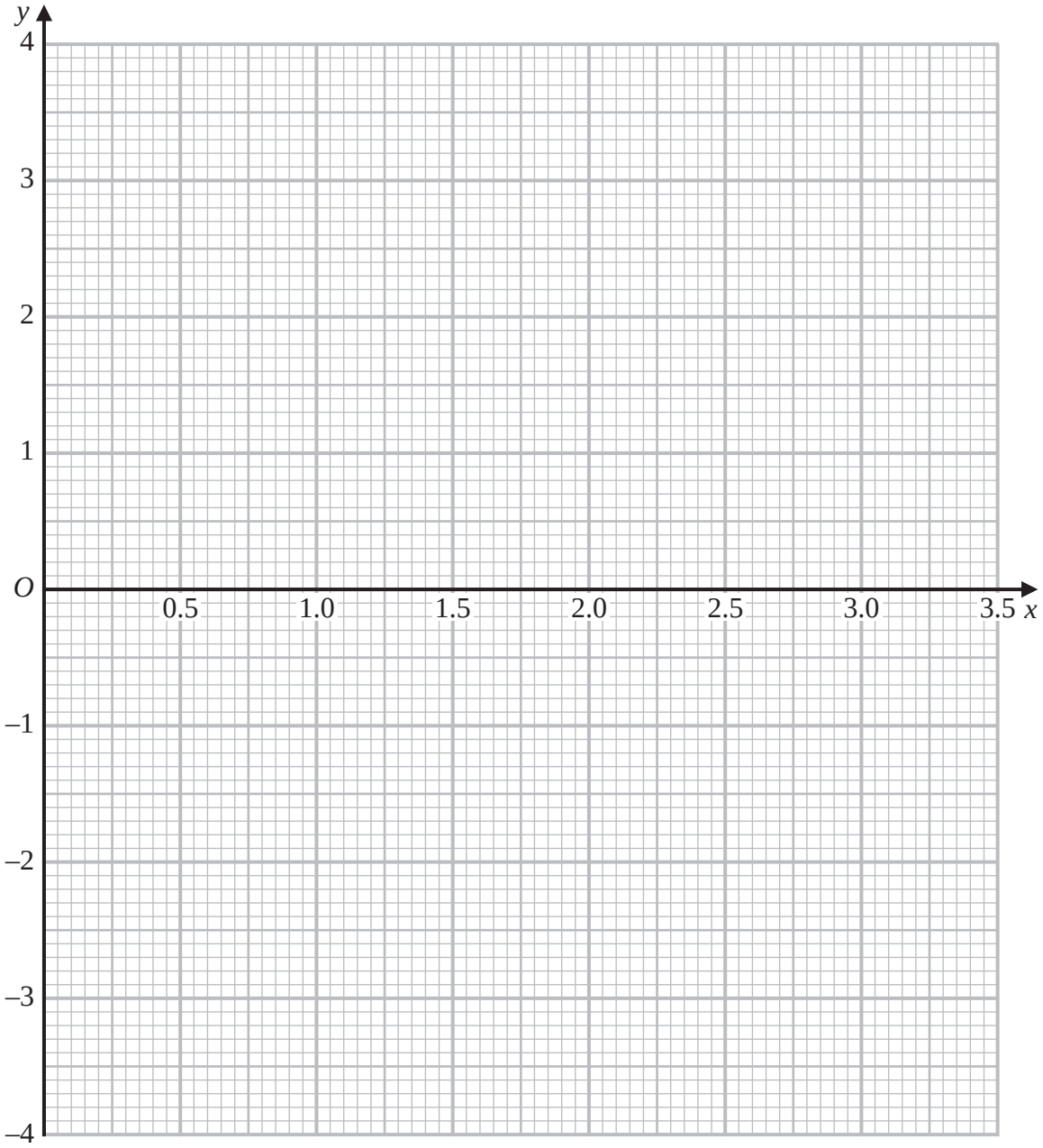
(2)

$$f(x) = 2\sin x + 12\sin^2 x - x - 5$$

(d) By drawing a suitable straight line on the grid, obtain estimates, to one decimal place, of the roots of the equation $f(x) = 0$ in the interval $0 \leqslant x \leqslant 3$

(5)

Question 8 continued

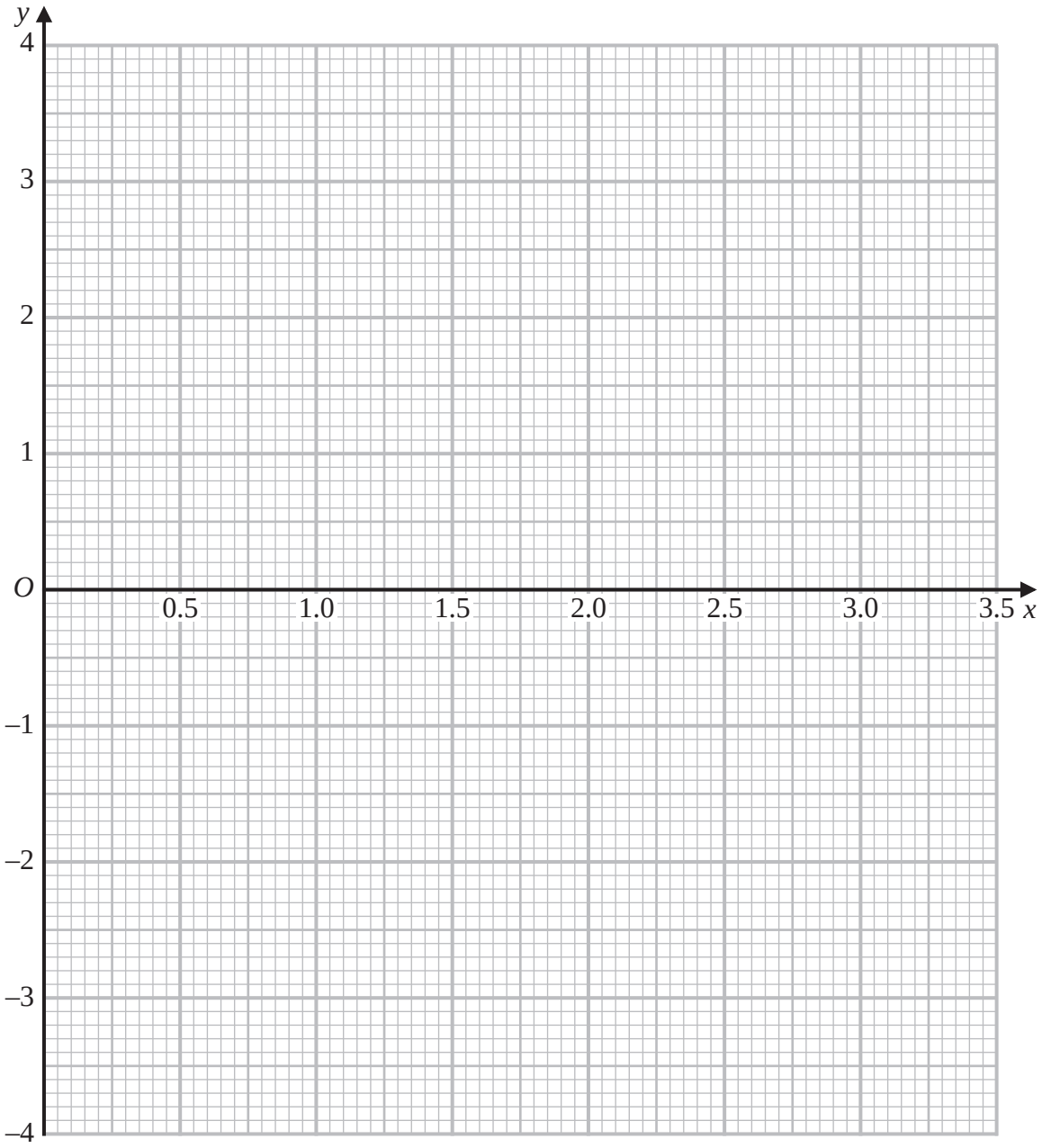


Turn over for a spare grid if you need to redraw your graph.

Question 8 continued

Question 8 continued

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



(Total for Question 8 is 11 marks)