1 **(a)** Complete the table of values for $y = \dfrac{5}{x}$.

x	−5	−4	−2.5	−2	−1		1	2	2.5	4	5
y	−1		−2	−2.5	−5		5	2.5	2		1

[2]

(b) On the grid, draw the graph of $y = \dfrac{5}{x}$ for $-5 \leqslant x \leqslant 5$ and $1 \leqslant x \leqslant 5$.
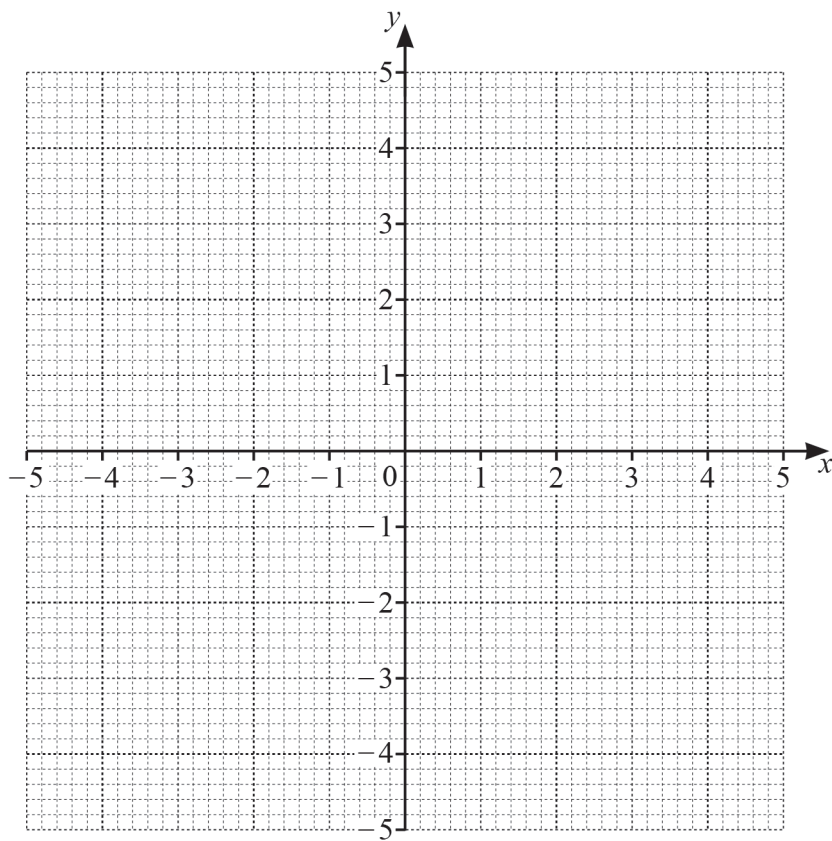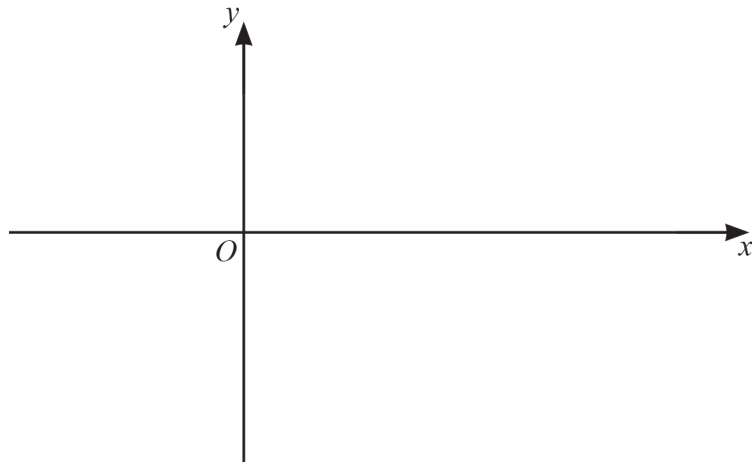

[4]

[Total: 6]

2 The graph of a cubic function has two turning points.
When $x < 0$ and when $x > 4$ the gradient of the graph is positive.
When $0 < x < 4$ the gradient of the graph is negative.
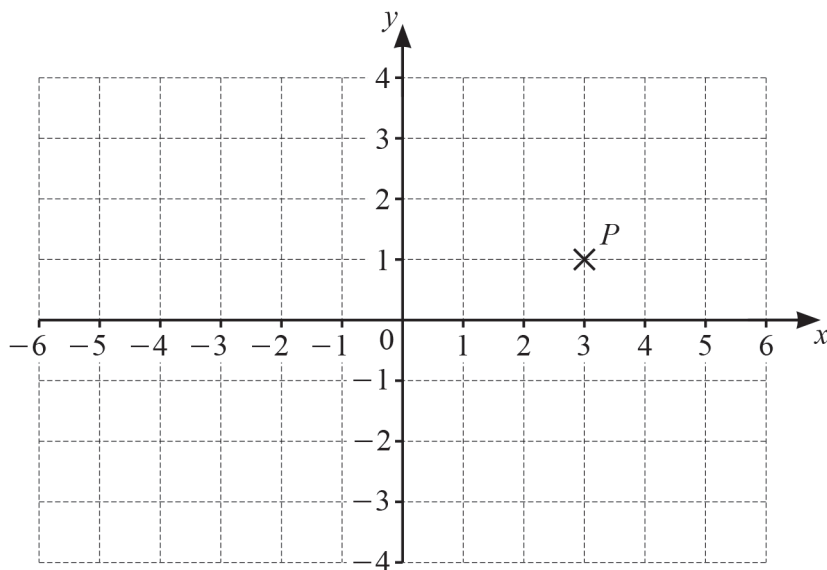The graph passes through the origin.

Sketch the graph.

[2]

[Total: 2]

3

(a) Write down the coordinates of point P.

(....................... , ...) [1]

(b) On the grid, plot point Q at $(-4, 2)$. [1]

(c) $\overrightarrow{PR} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$

On the grid, plot point *R*. [1]
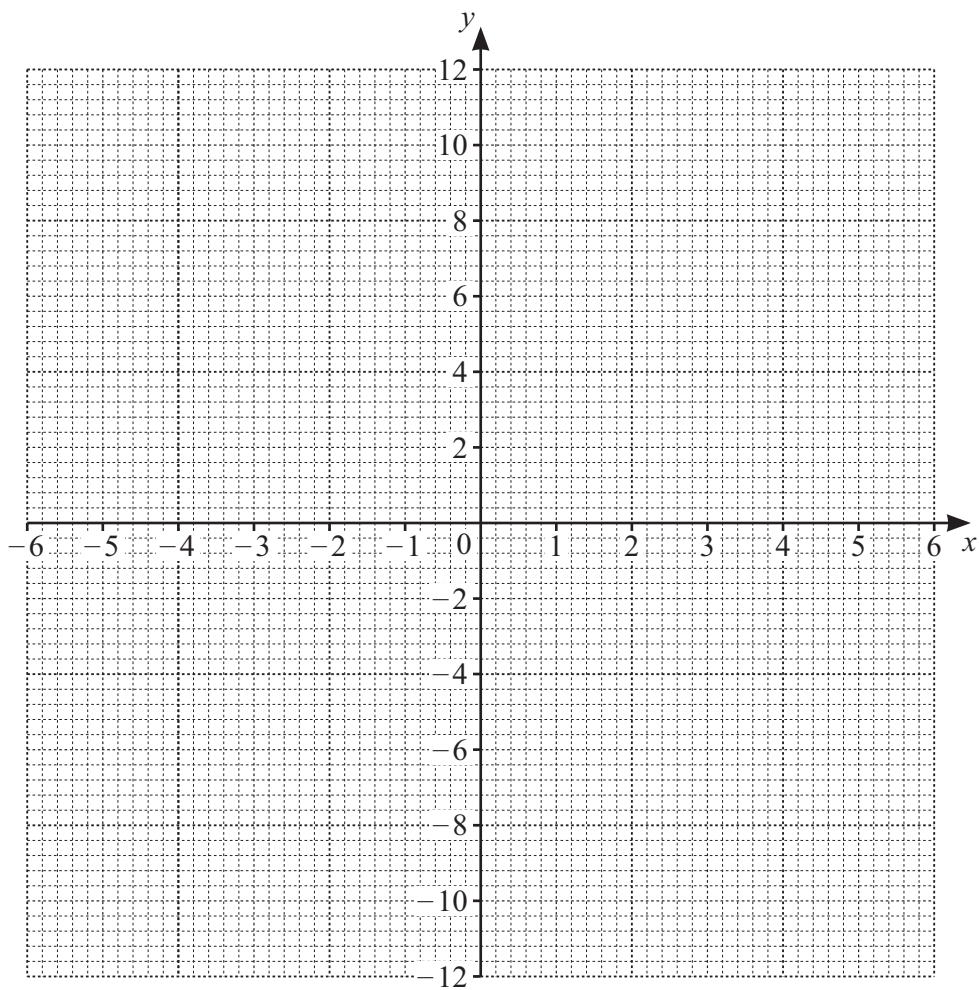
(d) On the grid, draw the line $y = 3$. [1]

[Total: 4]

4 **(a)** Complete the table of values for $y = \dfrac{12}{x}$, $x \neq 0$.

x	−6	−4	−3	−2	−1		1	2	3	4	6
y		−3		−6				6		3	

[3]

4 **(b)** On the grid, draw the graph of $y = \dfrac{12}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.

[4]

(c) On the grid, draw the line $y = 5$. [1]

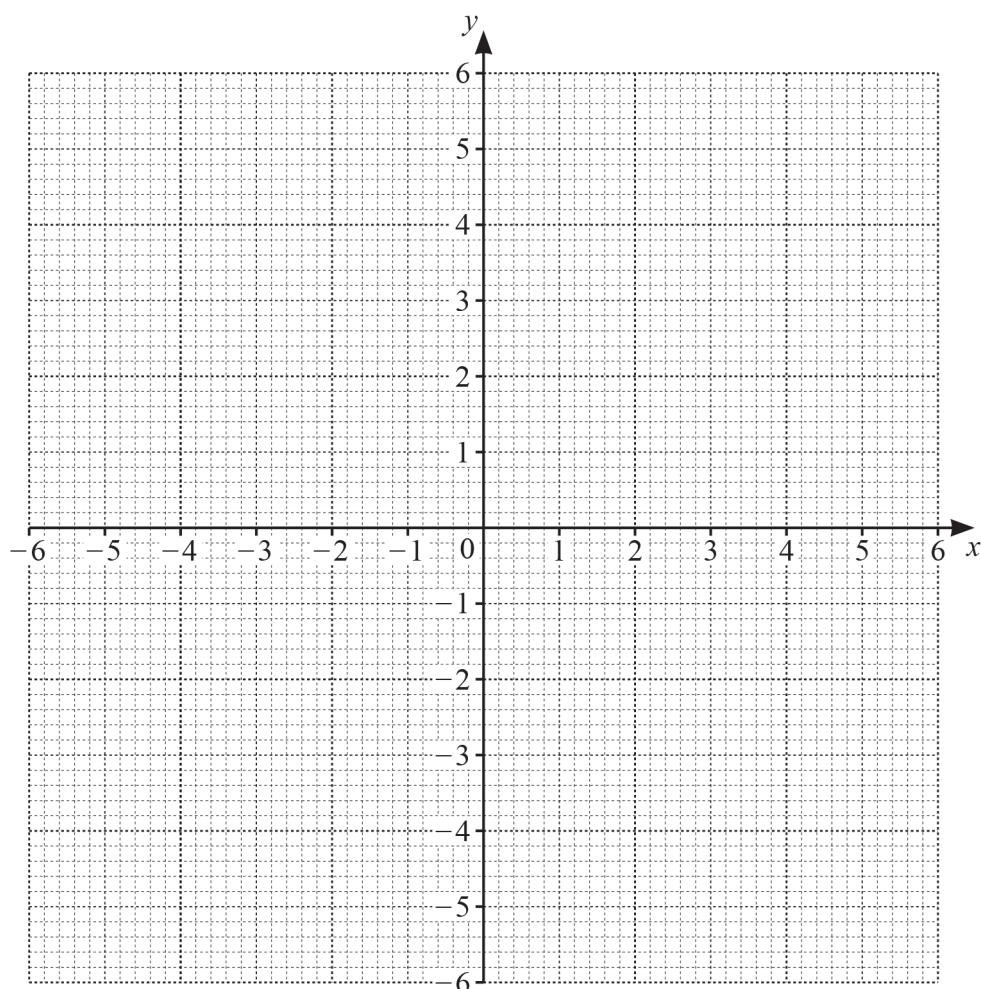**(d)** Use your graph to solve the equation $\dfrac{12}{x} = 5$.

$x =$ .... [1]

[Total: 9]

5 **(a)** Complete the table of values for $y = \dfrac{-6}{x}$.

x	-6	-4	-3	-2	-1.5	-1		1	1.5	2	3	5	6
y	1		2	3		6		-6		-3	-2		-1

[3]

5 **(b)** On the grid, draw the graph of $y = \dfrac{-6}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.

[4]

(c) Write down the order of rotational symmetry of the graph.

.... [1]

(d) Write down the equation of each line of symmetry of the graph.

.... and .... [2]

(e) On the grid, draw the line $y = 2.5$. [1]

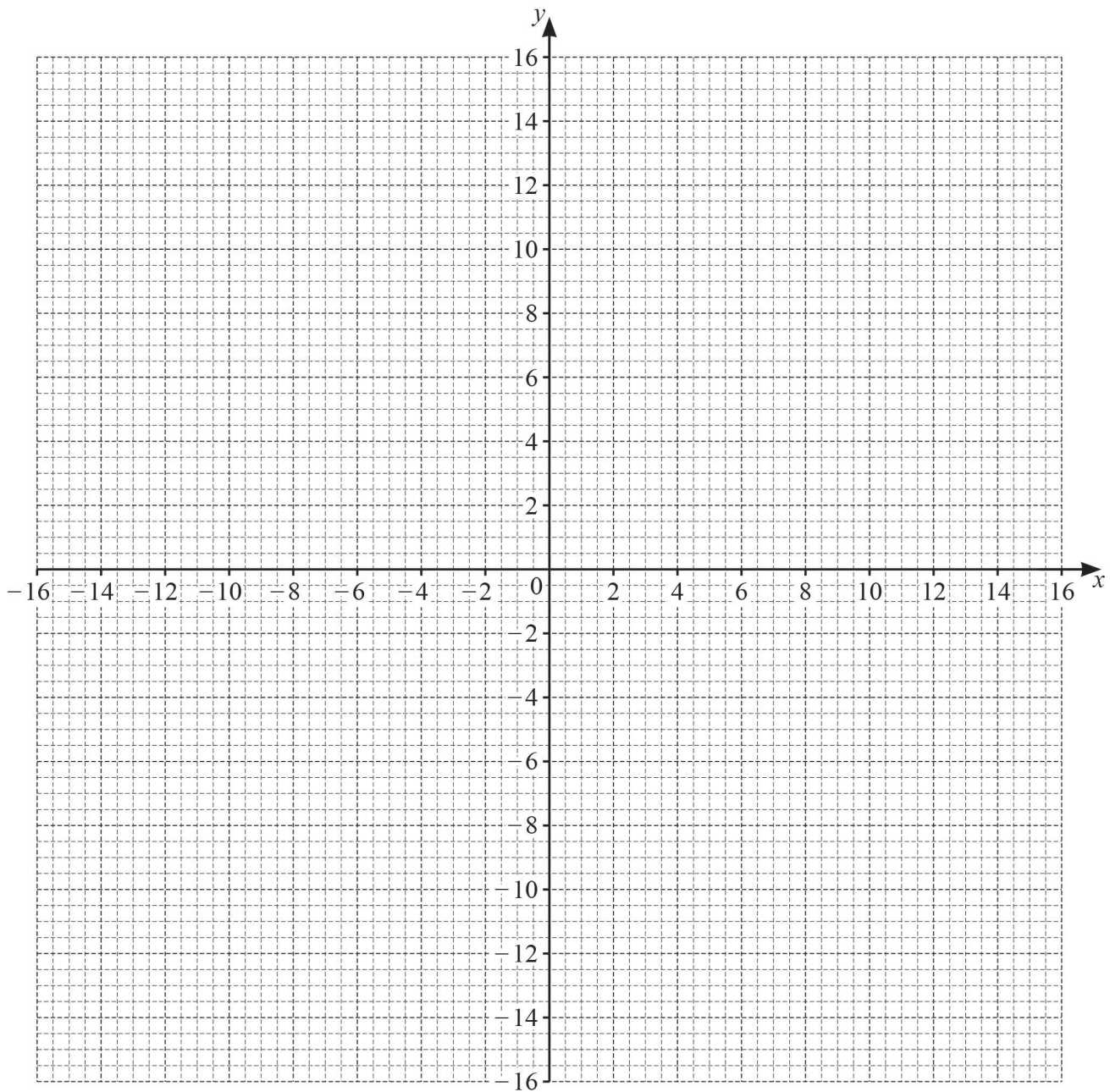**(f)** Use your graph to solve the equation $\dfrac{-6}{x} = 2.5$.

$x = $ .... [1]

[Total: 12]

6 **(a)** Complete the table of values for $y = \dfrac{15}{x}, x \neq 0$.

x	−15	−10	−5	−3	−2	−1	1	2	3	5	10	15
y		−1.5		−5		−15	15		5			

[3]

6 **(b)** On the grid, draw the graph of $y = \dfrac{15}{x}$ for $-15 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 15$.

[4]

(c) Write down the order of rotational symmetry of the graph.

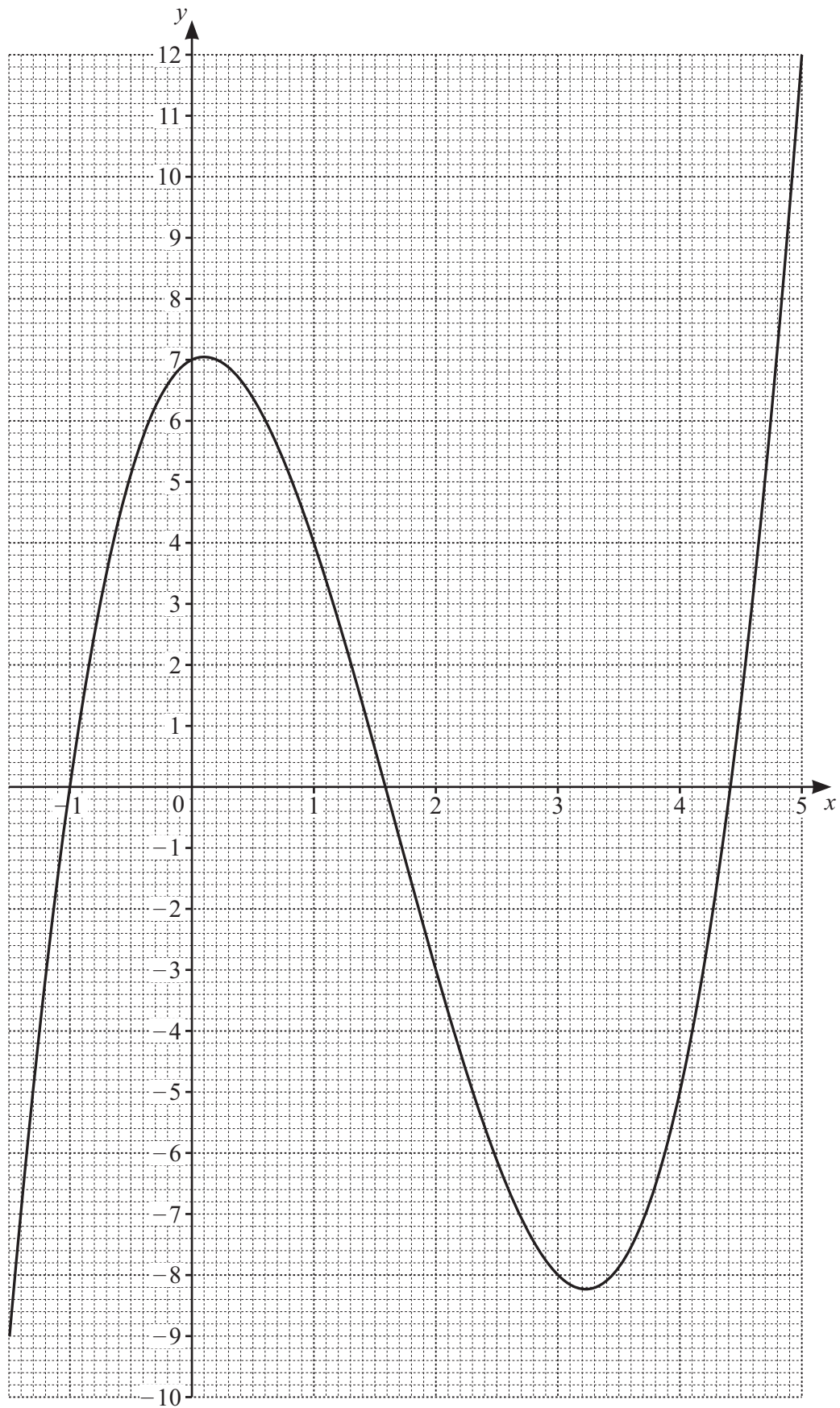.. [1]

(d) **(i)** On the grid, draw the lines of symmetry of the graph. [2]
   (ii) Write down the equation of the line of symmetry that does **not** intersect the graph.

.... [1]

(iii) Use your graph to solve the equation $\dfrac{15}{x} = -6$.

$x =$ .... [1]

[Total: 12]

7   The diagram shows the graph of $y = \mathrm{f}(x)$ for $-1.5 \leqslant x \leqslant 5$.

   (a)   Find $\mathrm{f}(2)$.

.... [1]

(b) Solve the equation f(x) = 0 for $-1.5 \leqslant x \leqslant 5$.

$x =$ .... or $x =$ .... or $x =$ .... [3]

(c) f(x) = k has three solutions for $-1.5 \leqslant x \leqslant 5$ where k is an integer.

Find the smallest possible value of k.

$k =$ .... [1]

(d) On the grid, draw a line $y = mx$ so that f(x) = mx has exactly one solution for $-1.5 \leqslant x \leqslant 5$. [2]

[Total: 7]

8 **(a)** Complete the table of values for $y = x^2 + 6x - 160$.

x	−20	−15	−10	−5	0	5	10	15
y	120		−120	−165	−160	−105		

[3]

8   **(b)** On the grid, draw the graph of $y = x^2 + 6x - 160$ for $-20 \leqslant x \leqslant 15$.
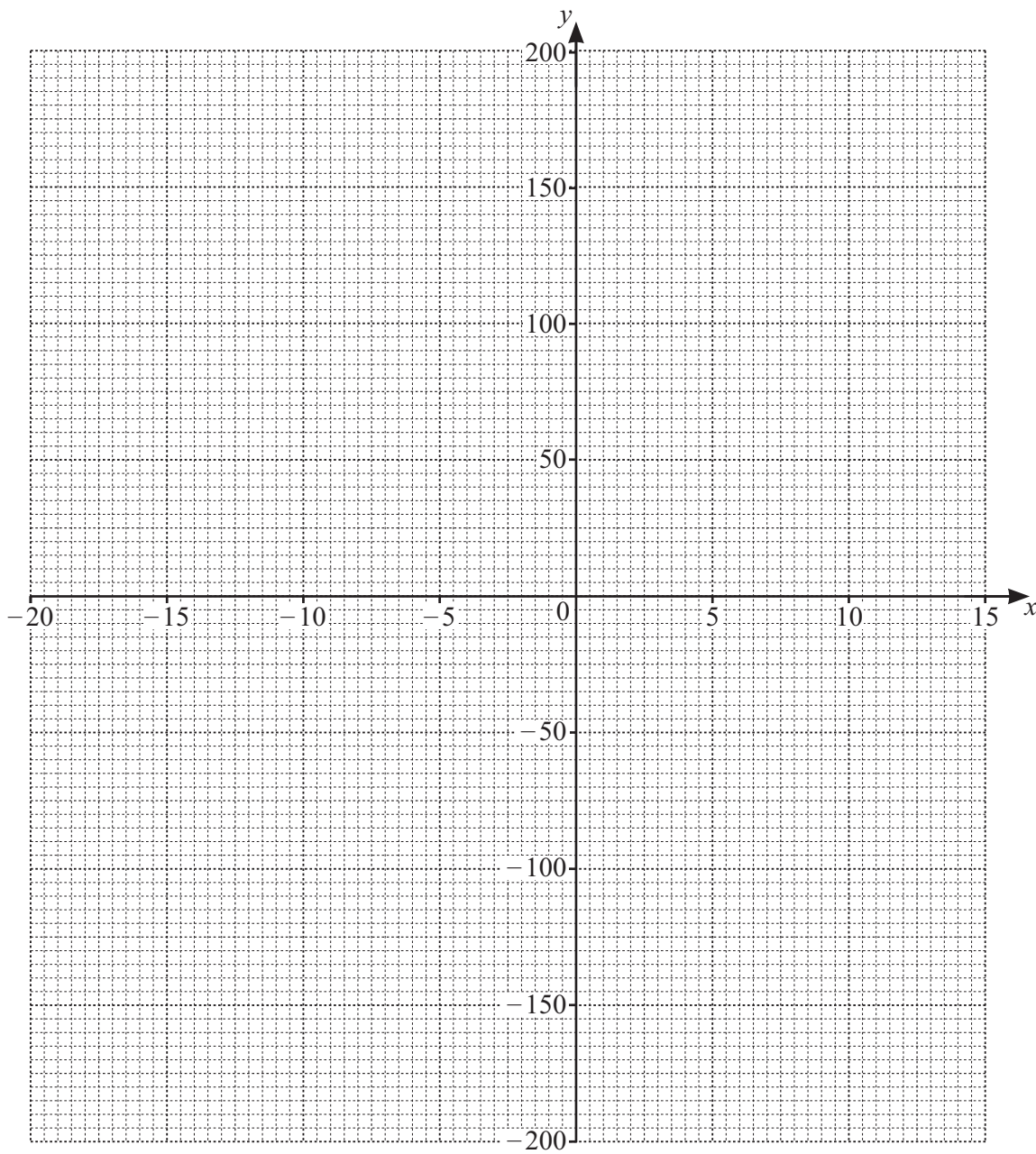
[4]

(c)   **(i)** Write down the equation of the line of symmetry of the graph.

....   [1]

(ii) Find the coordinates of the lowest point on the graph.

(............................ , ...)   [1]

(d) Use your graph to solve the equation $x^2 + 6x - 160 = 0$.

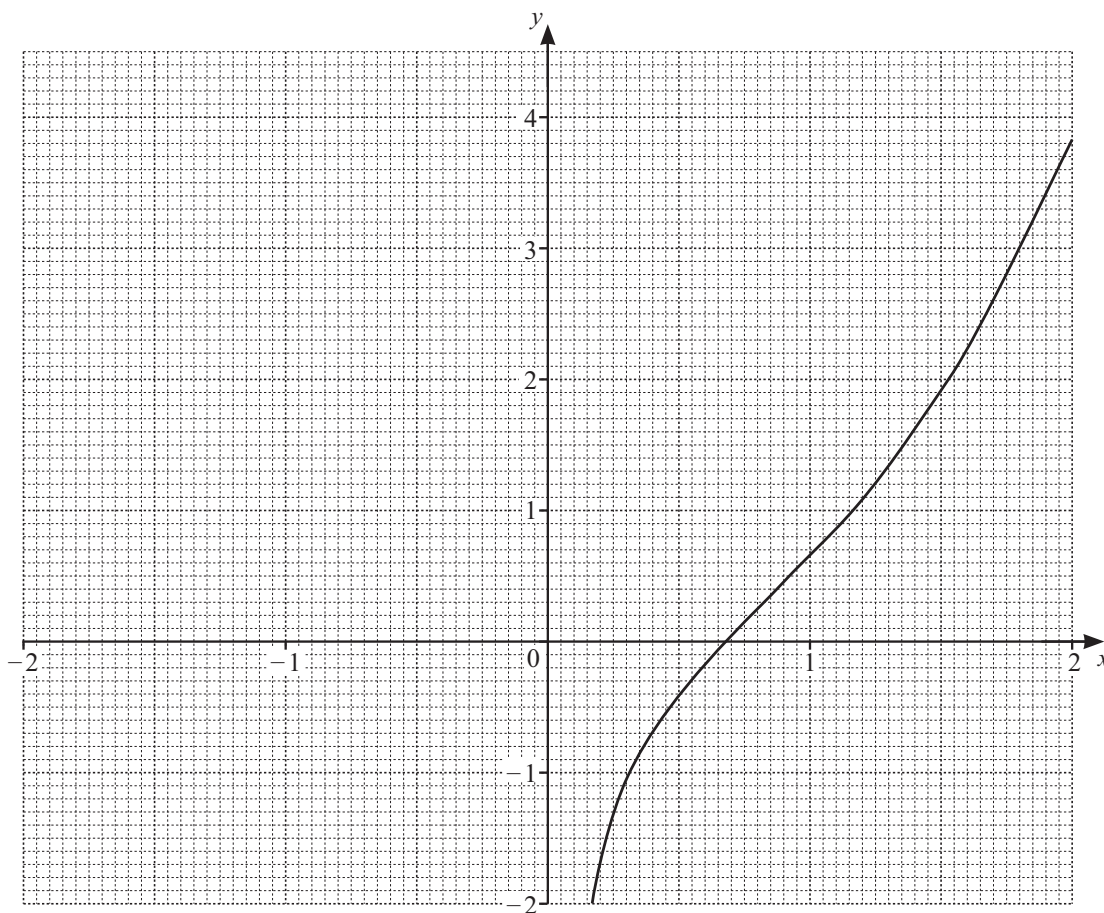$x =$ .... or $x =$ .... [2]

[Total: 11]

9 The table shows some values for $y = x^2 - \dfrac{1}{3x}$, $x \neq 0$.

The y-values are rounded to 1 decimal place.

x	-2	-1.5	-1	-0.75	-0.5	-0.25	-0.1
y	4.2	2.5	1.3			1.4	3.3

(a) Complete the table. [2]

(b) On the grid, draw the graph of $y = x^2 - \dfrac{1}{3x}$ for $-2 \leqslant x \leqslant -0.1$.

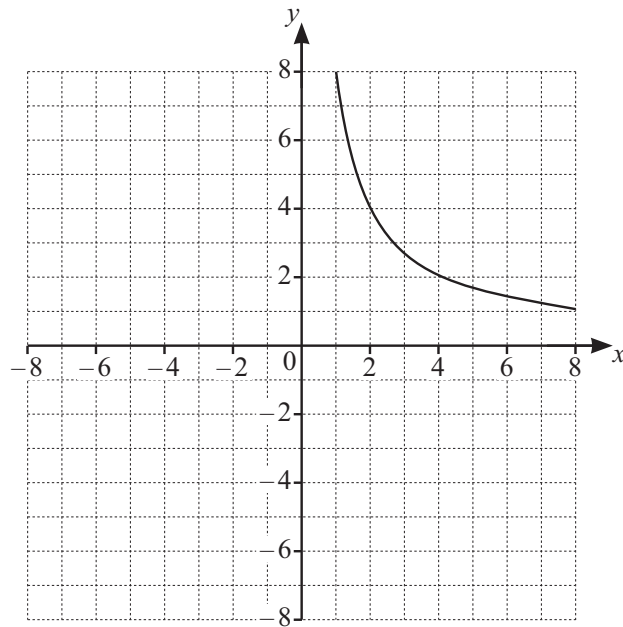The graph of $y = x^2 - \dfrac{1}{3x}$ for $x > 0$ has been drawn for you.

. [4]

(c) By drawing a suitable line on the grid, solve the equation $x^2 - \dfrac{1}{3x} + 1 = 0$.

$x =$ .... [2]

[Total: 8]

10

The diagram shows the graph of $y = \dfrac{k}{x}$ for $1 \leqslant x \leqslant 8$.

(a) Use the graph to find the value of x when $y = 4$.

$x =$ .... [1]

(b) **(i)** Show that $k = 8$.

[1]

(ii) Calculate the value of y when $x = 250$.

$y =$ .... [1]

(c) **(i)** Complete this table of values for $y = \dfrac{8}{x}$.

x	−8	−4	−2	−1
y				

[2]

(ii) On the grid, draw the graph of $y = \dfrac{8}{x}$ for $-8 \leqslant x \leqslant -1$. [3]

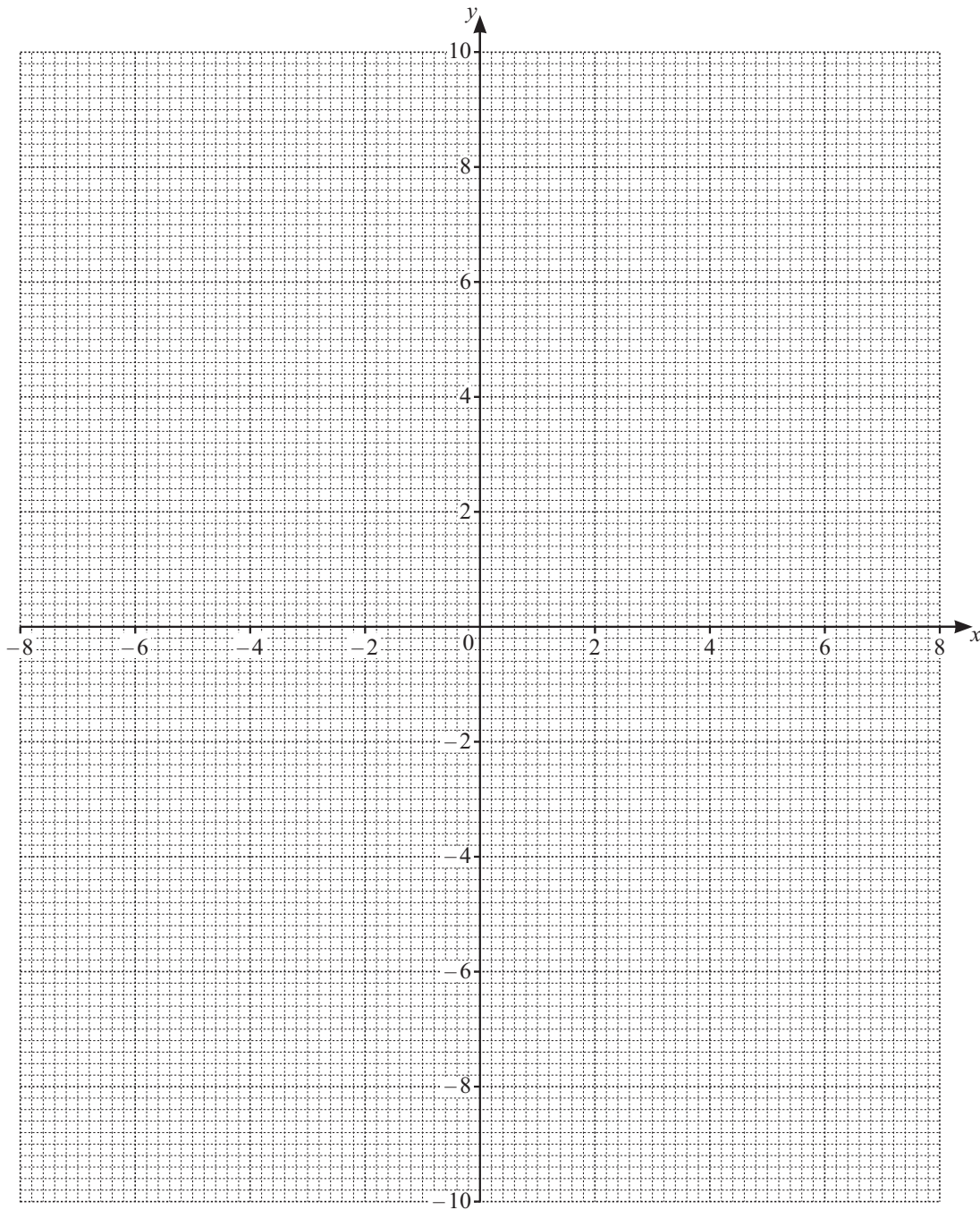**(d)** Write down the equation of each line of symmetry of the graph.

.... and .... [2]

[Total: 10]

11 **(a)** Complete the table of values for $y = \dfrac{18}{x}$.

x	−8	−6	−4	−3	−2		2	3	4	6	8
y		−3		−6				6		3	

[3]

11 **(b)** On the grid, draw the graph of $y = \dfrac{18}{x}$ for $-8 \leqslant x \leqslant -2$ and $2 \leqslant x \leqslant 8$.

[4]

(c) Write down the order of rotational symmetry of the graph.

.... [1]

(d) **(i)** On the grid, plot and join the points $(-8, -3)$ and $(6, 4)$. [2]

(ii) Write down the values of x where this line intersects the graph of $y = \dfrac{18}{x}$.

$x =$ .... and $x =$ .... [2]

(iii) Find the equation of this line in the form $y = mx + c$.

$y =$ .... [2]
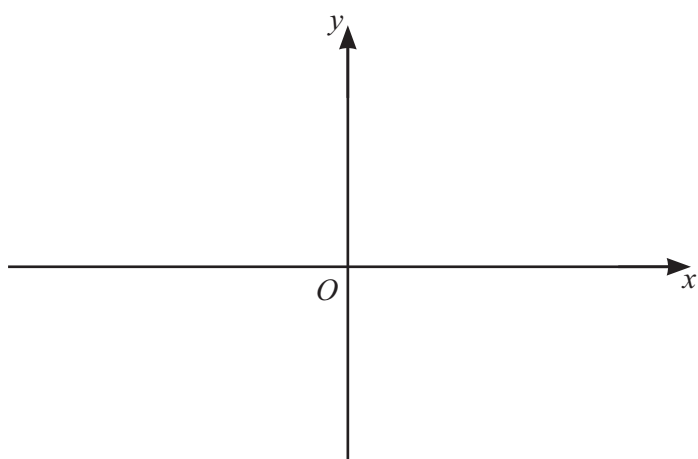
[Total: 14]

12 On the axes, sketch the graph of each of these functions.

(a) $y = \dfrac{1}{x}$
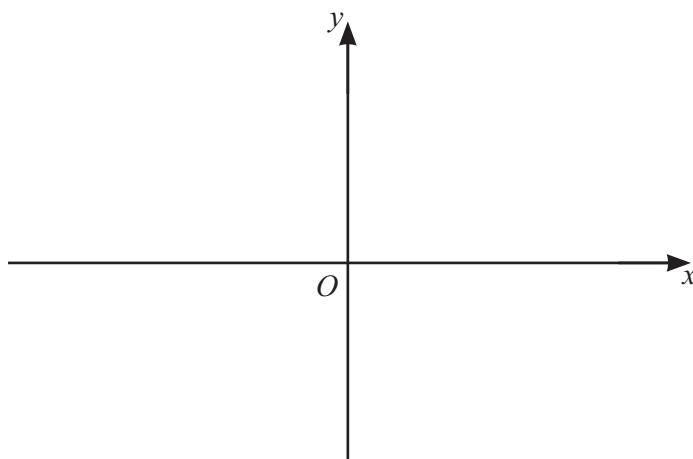
[2]

(b) $y = 4^x$

[2]

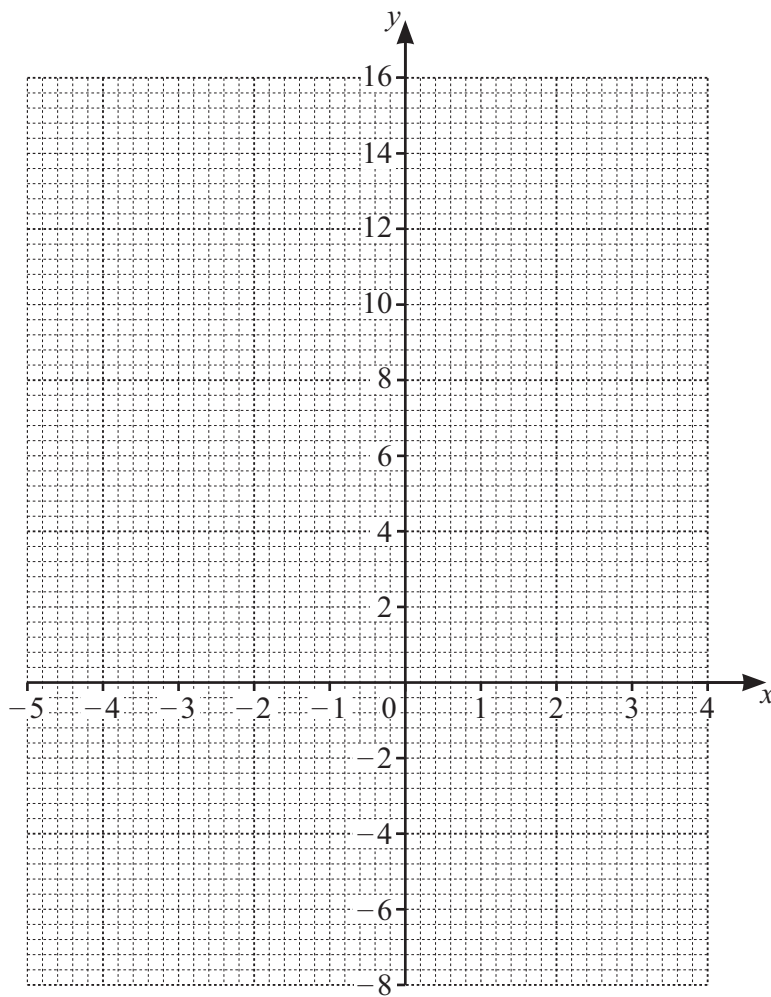[Total: 4]

13 **(a)** Complete the table of values for $y = -x^2 - x + 14$.

x	−5	−4	−3	−2	−1	0	1	2	3	4
y			8	12			12	8		

[3]

13 **(b)** On the grid, draw the graph of $y = -x^2 - x + 14$ for $-5 \leqslant x \leqslant 4$.

[4]

(c) **(i)** Write down the equation of the line of symmetry of the graph.

.... [1]

(ii) Find the coordinates of the highest point on the graph.

(.................... , ...) [1]

(d) Use your graph to solve the equation $-x^2 - x + 14 = -2$.

$x =$ .... or $x =$ .... [2]

[Total: 11]

14
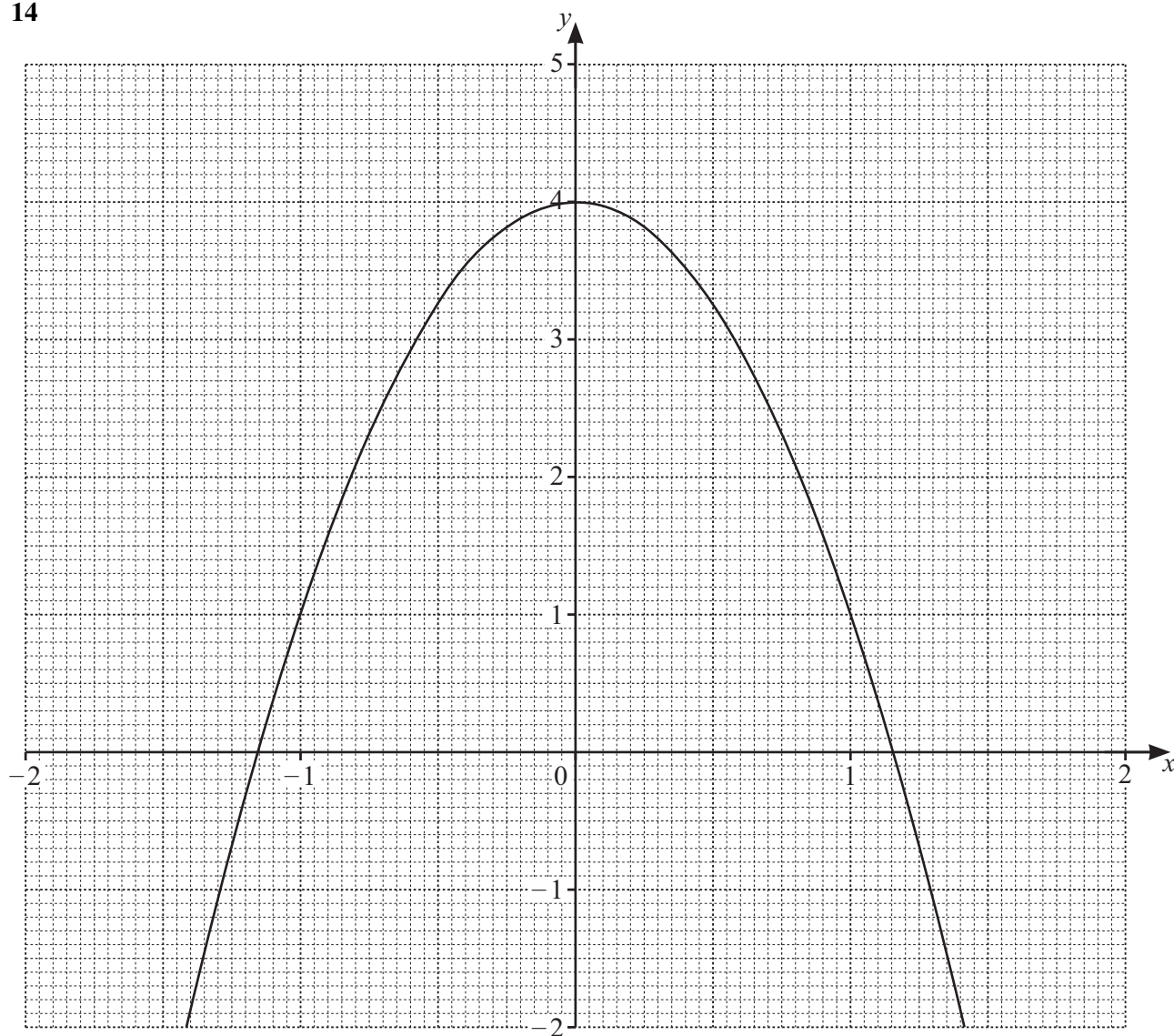
(a) The grid shows the graph of $y = a + bx^2$.

The graph passes through the points with coordinates (0, 4) and (1, 1).

(i) Find the value of a and the value of b.

$a = $ ....

$b = $ .... [2]

(ii) Write down the equation of the tangent to the graph at $(0, 4)$.

.... [1]

(iii) The equation of the tangent to the graph at $x = -1$ is $y = 6x + 7$.

Find the equation of the tangent to the graph at $x = 1$.

.... [2]

(b) The table shows some values for $y = 1 + \dfrac{5}{3 - x}$ for $-2 \leqslant x \leqslant 1.5$.

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5
y	2	2.11		2.43		3		4.33

(i) Complete the table. [3]

(ii) On the grid, draw the graph of $y = 1 + \dfrac{5}{3 - x}$ for $-2 \leqslant x \leqslant 1.5$. [4]

(c) **(i)** Write down the values of x where the two graphs intersect.

$x =$ .... or $x =$ .... [2]

(ii) The answers to **part(c)(i)** are two solutions of a cubic equation in terms of x.

Find this equation in the form $ax^3 + bx^2 + cx + d = 0$, where a, b, c and d are integers.

.... [4]

[Total: 18]