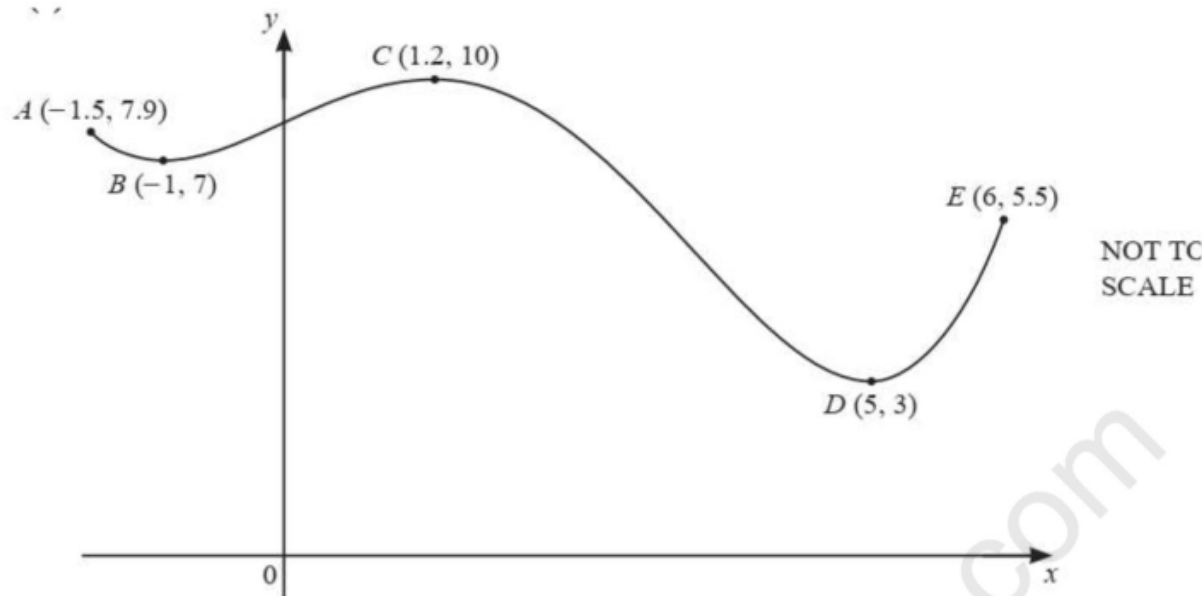




1.



The diagram shows a sketch of the graph of $y = f(x)$ for $-1.5 \leq x \leq 6$.

The coordinates of five points on the graph of $y = f(x)$ are shown on the diagram.

(i) $f(x) = k$ has two solutions in the interval $-1.5 \leq x \leq 6$.

Write down a possible integer value of k . [1]

(ii) $f(x) = j$ has no solutions in the interval $-1.5 \leq x \leq 6$ when $j < a$ or $j > b$.

Find the maximum value of a and the minimum value of b . [2]

0580/41/O/N/22 Q10(a) (i) 4 or 5 or 7 or 8 or 9 (ii) $[a =] 3, [b =] 10$

2. The table shows some values for $y = 2 \times 0.5^x - 1$.

x	-1	-0.5	0	0.5	1	1.5	2
y	3	1.83		0.41	0	-0.29	

(a) (i) Complete the table. [2]

(ii) On the grid, draw the graph of $y = 2 \times 0.5^x - 1$ for $-1 \leq x \leq 2$. [4]

(b) By drawing a suitable straight line, solve the equation $2 \times 0.5^x + 2x - 3.5 = 0$

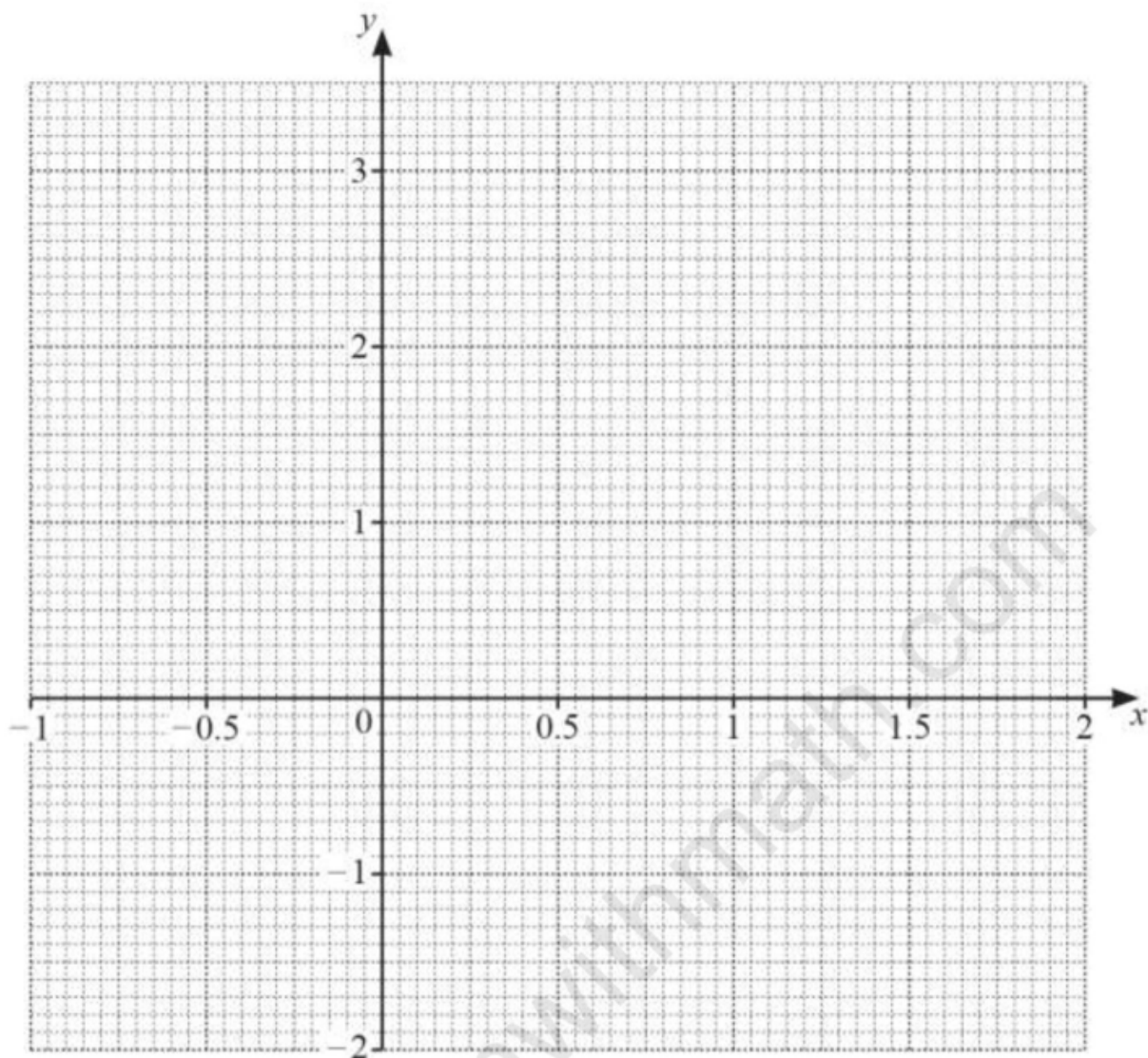
for $-1 \leq x \leq 2$. [3]

(c) There are no solutions to the equation $2 \times 0.5^x - 1 = k$ where k is an integer.

Complete the following statements.

The highest possible value of k is _____

The equation of the asymptote to the graph of $y = 2 \times 0.5^x - 1$ is _____ [2]



0580/42/M/J/21 Q2)a(i) 1, -0.5 (b) $y = 2.5 - 2x$ ruled ,1.3 to 1.4 (c) $k = -1$

3. The table shows some values for $y = \frac{3}{10}x^3 - 2x$ for $-3 \leq x \leq 3$.

x	-3	-2	-1.5	-1	0	1	1.5	2	3
y			2.0	1.7	0		-2.0	-1.6	

(a)

Complete the table. [3]

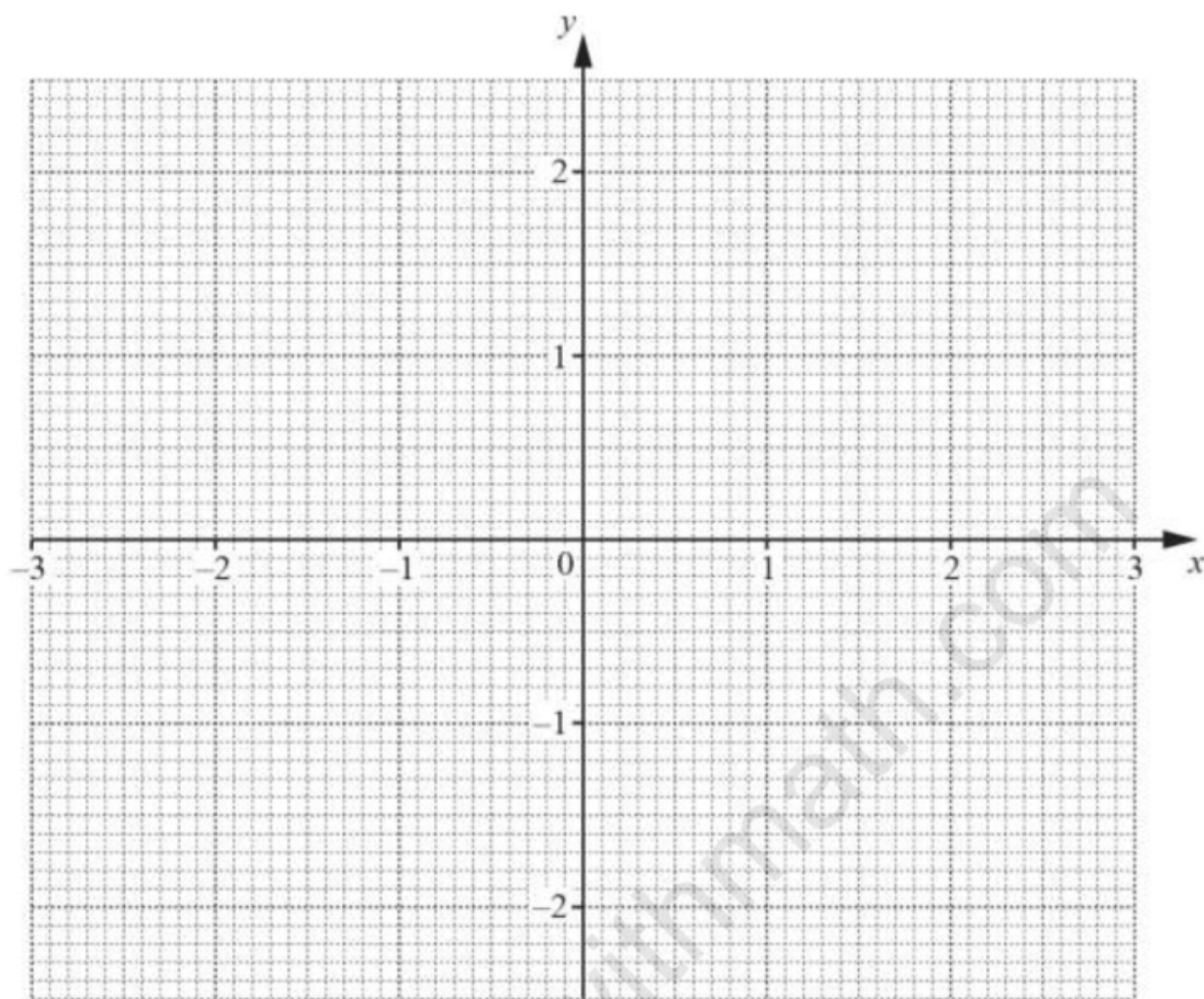
- (b) On the grid, draw the graph of $y = \frac{3}{10}x^3 - 2x$ for $-3 \leq x \leq 3$. [4]

- (c) On the grid opposite, draw a suitable straight line to solve the equation

$$\frac{3}{10}x^3 - 2x = \frac{1}{2}(1 - x) \text{ for } -3 \leq x \leq 3 \quad [4]$$

- (d) For $-3 \leq x \leq 3$, the equation $\frac{3}{10}x^3 - 2x = 1$ has n solutions.

Write down the value of n . [1]



0580/42/F/M/19 Q5) (a) $-2.1, 1.6, -1.7, 2.1$ (c) line $y = \frac{1}{2}(1 - x)$ ruled, -2.15 to -2.01
 -0.45 to -0.2 , 2.25 to 2.45 (d) number of intersections of their curve and the line $y = 1$ (3)

4. The table shows some values for $y = x^3 + 3x^2 + 2$

x	-3.5	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5
y	-4.1		5.1	6	5.4	4	2.6		2.9		12.1

(a)

Complete the table. [3]

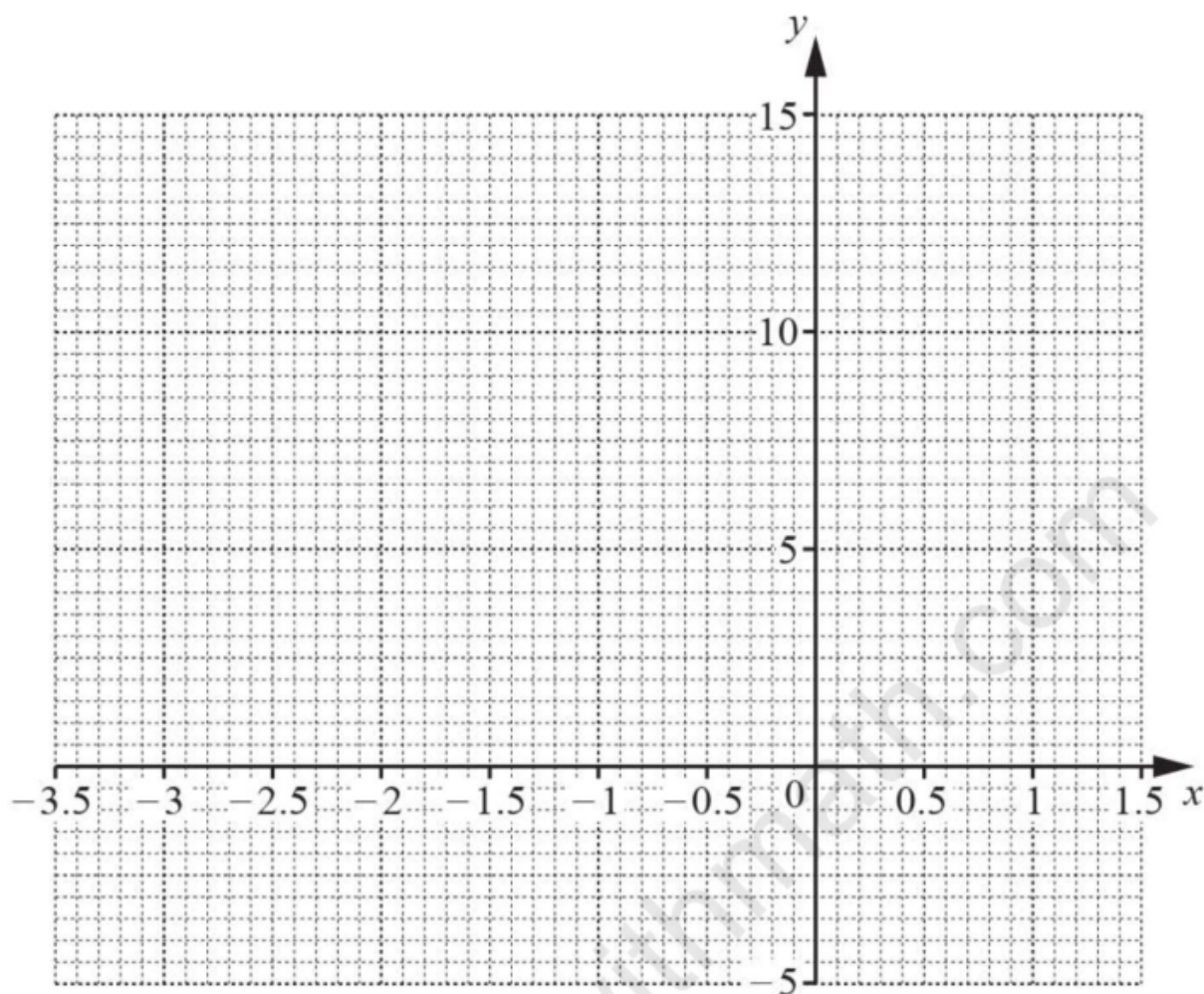
(b) On the grid, draw the graph of $y = x^3 + 3x^2 + 2$ for $-3.5 \leq x \leq 1.5$ [4]

(c) Use your graph to solve the equation $x^3 + 3x^2 + 2 = 0$ for $-3.5 \leq x \leq 1.5$ [1]

(d) By drawing a suitable straight line, solve the equation $x^3 + 3x^2 + 2x + 2 = 0$ for $-3.5 \leq x \leq 1.5$ [2]

(e) For $-3.5 \leq x \leq 1.5$ the equation $x^3 + 3x^2 + 2 = k$ has three solutions and k is an integer.

Write down a possible value of k . [1]



0580/41/M/J/19 Q2) (a) 2, 2, 6 (c) -3.3 to -3.1 (d) $y = -2x$ ruled, -2.6 to -2.45 (e) 3 or 4 or 5

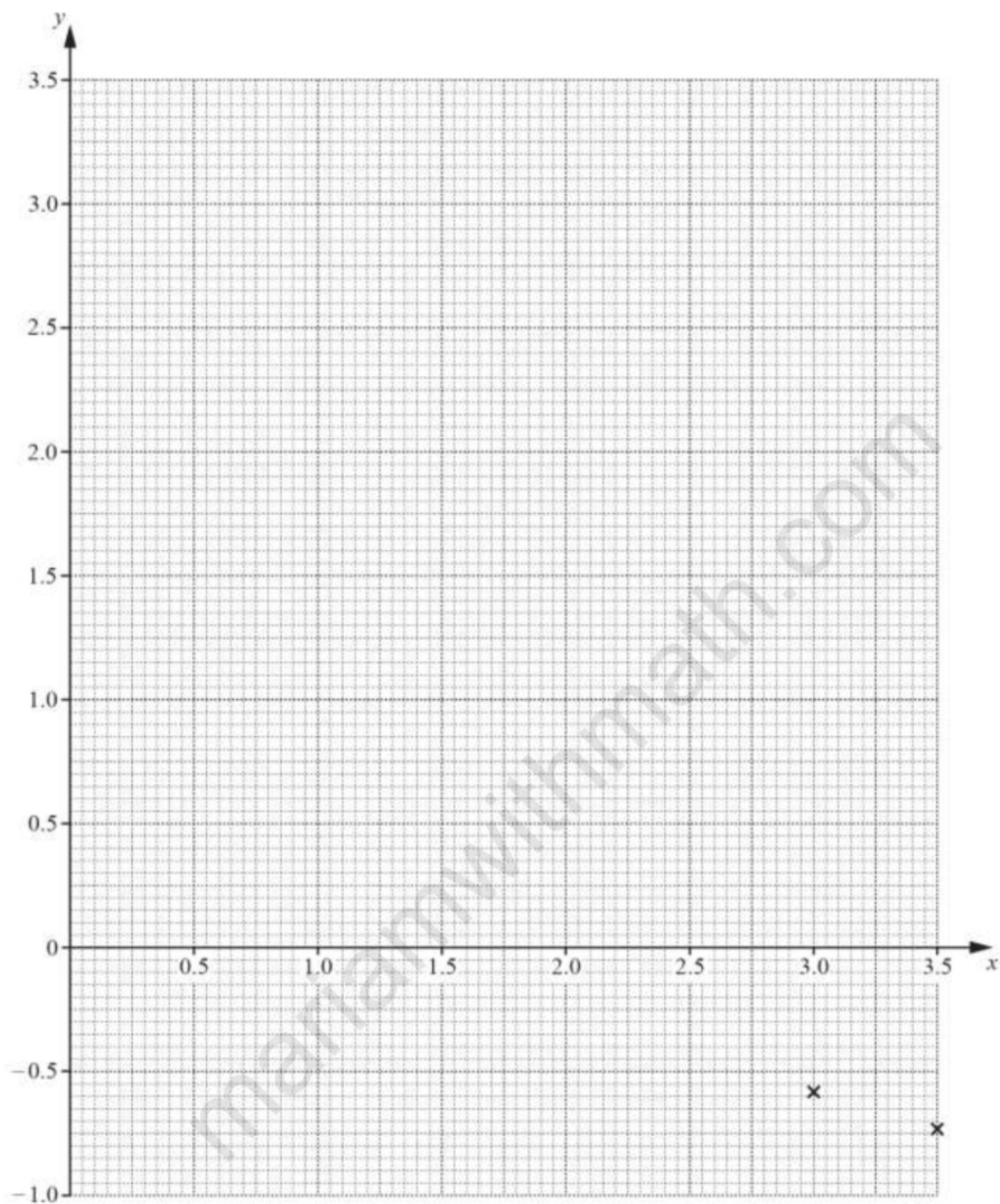
5. The table shows some values of $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$

x	0.15	0.2	0.5	1	1.5	2	2.5	3	3.5
y	3.30		0.88		-0.04		-0.43	-0.58	-0.73

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$

The last two points have been plotted for you. [4]



(c) Use your graph to solve the equation $\frac{1}{2x} - \frac{x}{4} = \frac{1}{2}$ for $0.15 \leq x \leq 3.5$ [1]

(d) (i) On the grid, draw the line $y = 2 - x$. [2]

(ii) Write down the x co-ordinates of the points where the line $y = 2 - x$ crosses the graph of

$$y = \frac{1}{2x} - \frac{x}{4} \text{ for } 0.15 \leq x \leq 3.5 \text{ [2]}$$

(e) Show that the graph of $y = \frac{1}{2x} - \frac{x}{4}$ can be used to find the value of $\sqrt{2}$ for $0.15 \leq x \leq 3.5$ [2]

0580/42/M/J/19 Q5) (a) 2.45, 0.25, - 0.25 (c) 0.7 to 0.8 (d)(ii) 0.27 to 0.28 and 2.38 to 2.39 (e) Substitutes $x = \sqrt{2}$ in $\frac{1}{2x} - \frac{x}{4}$ or identify $y = 0$ or correctly manipulate to single fraction eg $(2 - x^2)/4x$

6. The diagram shows the graph of $y = f(x)$ where $f(x) = x^2 - \frac{2}{x} - 2$, $x \neq 0$

(a) Use the graph to find

(i) $f(1)$, [1]

(ii) $ff(-2)$ [2]

(b) On the grid opposite, draw a suitable straight line to solve the equation

$$x^2 - \frac{2}{x} - 7 = -3x \text{ for } -3 \leq x \leq 3 \text{ [4] [Grid on next page]}$$

(c) By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = -2$ [3]

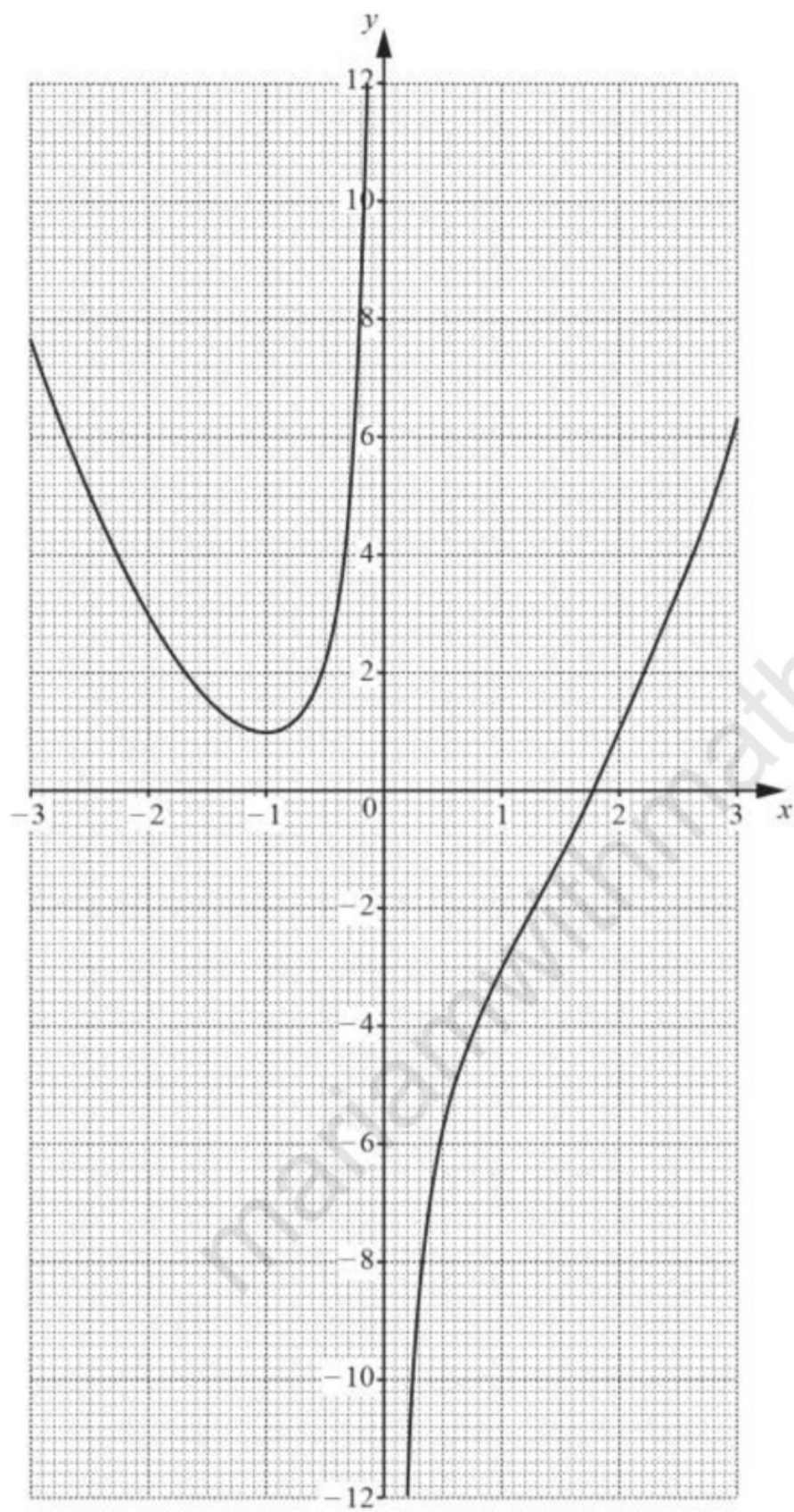
(d) (i) Complete the table for $y = g(x)$ where $g(x) = 2^{-x}$ for $-3 \leq x \leq 3$ [3]

x	-3	-2	-1	0	1	2	3
y			2	1	0.5		0.125

(ii) On the grid opposite, draw the graph of $y = g(x)$. [3]

(iii) Use your graph to find the positive solution to the equation $f(x) = g(x)$. [1]

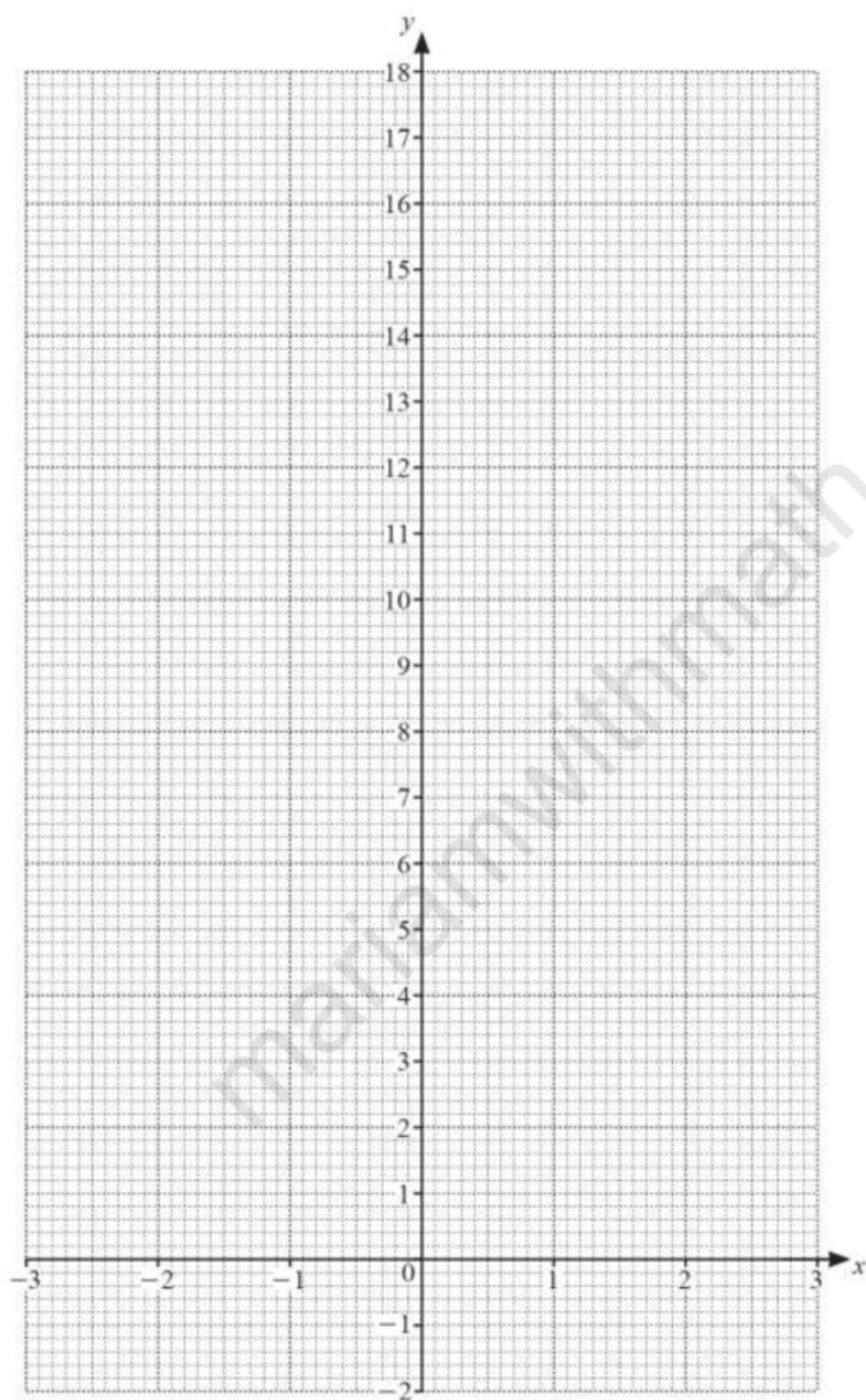
0580/43/M/J/19 Q5) (a)(i)-3 (ii) 6.2 to 6.4 (b) (b) $y = 5 - 3x$ ruled, -0.3 to -0.2 1.65 to 1.8 (c) -4.5 to -2.5 (d)(i) 8, 4, 0.25 ((iii) 1.8 to 1.9



[Grid for Q6]

7. The table shows some values of $y = \frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x}$, $x \neq 0$,

x	-3	-2	-1	-0.5	-0.3		0.2	0.3	0.5	1	2	3
y	5.3	3.3		8.1	17.8			4.5	0.1	-0.5	1.3	



(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = \frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x}$ for $-3 \leq x \leq -0.3$ and $0.2 \leq x \leq 3$ [5]

(c) Use your graph to solve $\frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x} \leq 0$, [2]

(d) Find the smallest positive integer value of k for which $\frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x} = k$ has two solutions for $-3 \leq x \leq -0.3$ and $0.2 \leq x \leq 3$ [1]

(e) (i) By drawing a suitable straight line, solve $\frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x} = 3x + 1$ for $-3 \leq x \leq -0.3$ and $0.2 \leq x \leq 3$ [3]

(ii) The equation $\frac{x^2}{2} + \frac{1}{x^2} - \frac{2}{x} = 3x + 1$ can be written as $x^4 + ax^3 + bx^2 + cx + 2 = 0$,

Find the values of a , b and c . [3]

0580/42/O/N/19 Q5) (a) 3.5, 15, 3.9 (c) $0.5 \leq x \leq 1.3$ to 1.6 (d) 1 (e)(i) $y = 3x + 1$ ruled, and 0.3 to 0.49

(e)(ii) [a =] -6 [b =] -2 [c =] -4

7. The table shows some values for $y = x^3 + x^2 - 5x$

x	-3	-2	-1.5	-1	0	1	1.5	2	2.5	3
y	-3	6	6.4		0		-1.9	2	9.4	

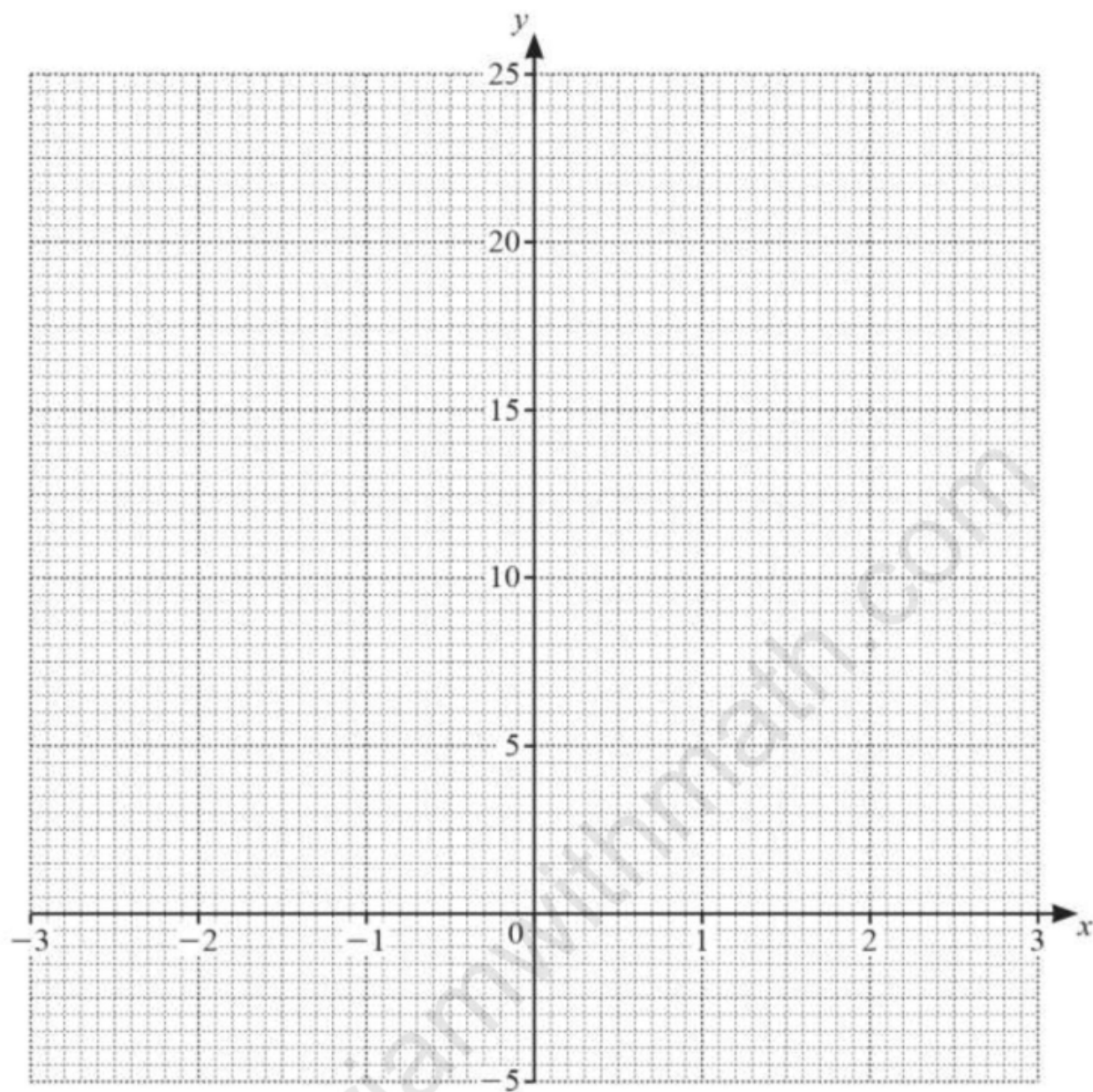
(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = x^3 + x^2 - 5x$ for $-3 \leq x \leq 3$ [4]

(c) Use your graph to solve the equation $x^3 + x^2 - 5x = 0$ [2]

(d) By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = 2$ [3]

(e) Write down the largest value of the integer, k , so that the equation $x^3 + x^2 - 5x = k$ has three solutions for $-3 \leq x \leq 3$ [1]



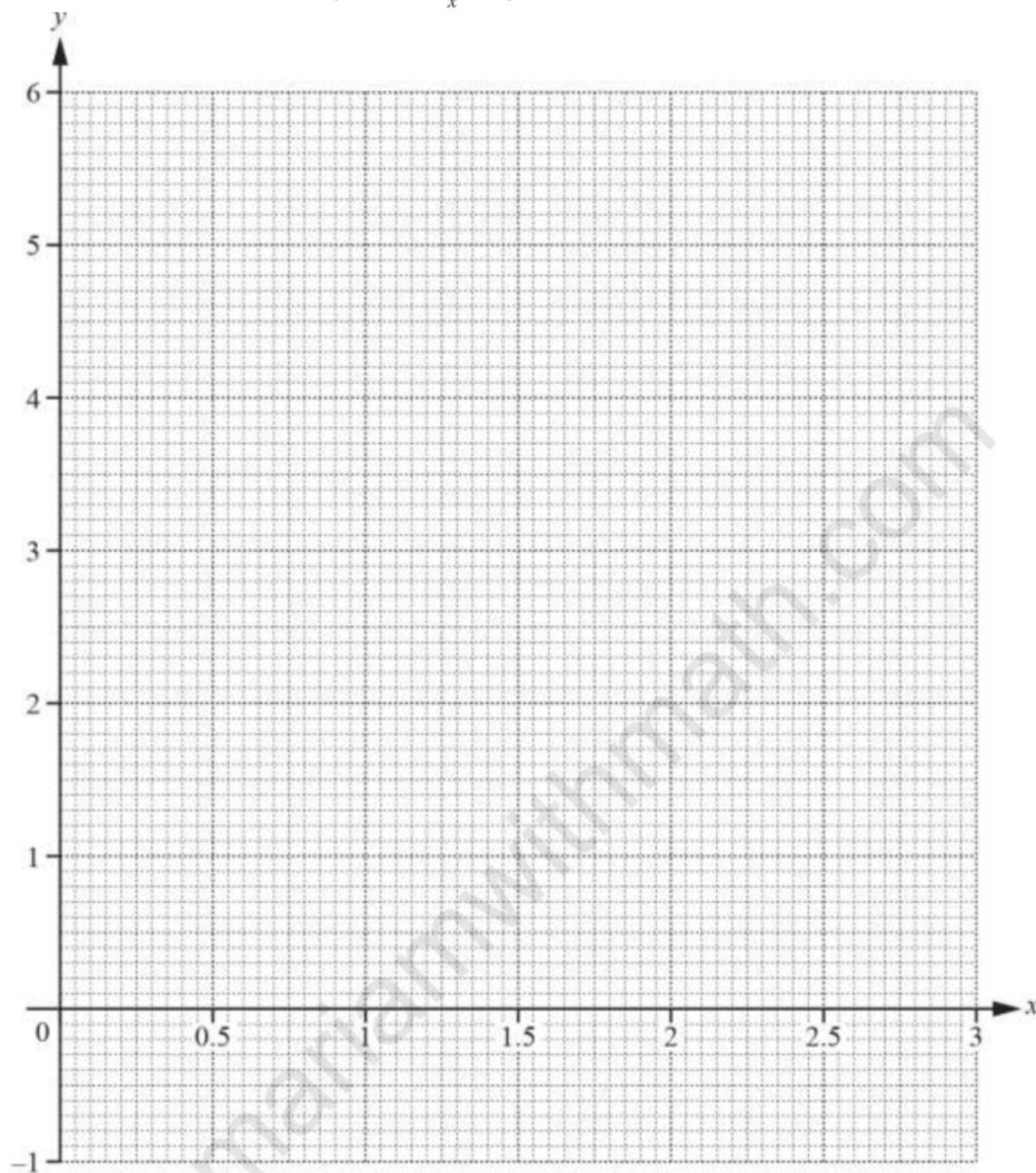
0580/43/O/N/19 Q3) (a) 5, -3, 21 (c) -2.9 to -2.7, 0, 1.7 to 1.9 (d) 10 to 14 (e) 6

8. The table shows some values for $y = 2x + \frac{1}{x} - 3$ for $0.125 \leq x \leq 3$.

x	0.125	0.25	0.375	0.5	0.75	1	1.5	2	2.5	3
y	5.25	1.5	0.42			0	0.67	1.5		3.33

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = 2x + \frac{1}{x} - 3$ for $0.125 \leq x \leq 3$ [4]



(c) Use your graph to solve $2x + \frac{1}{x} - 3 \geq 2$ [2]

(d) The equation $\frac{1}{x} = 7 - 3x$ can be solved using your graph in **part (b)** and a straight line.

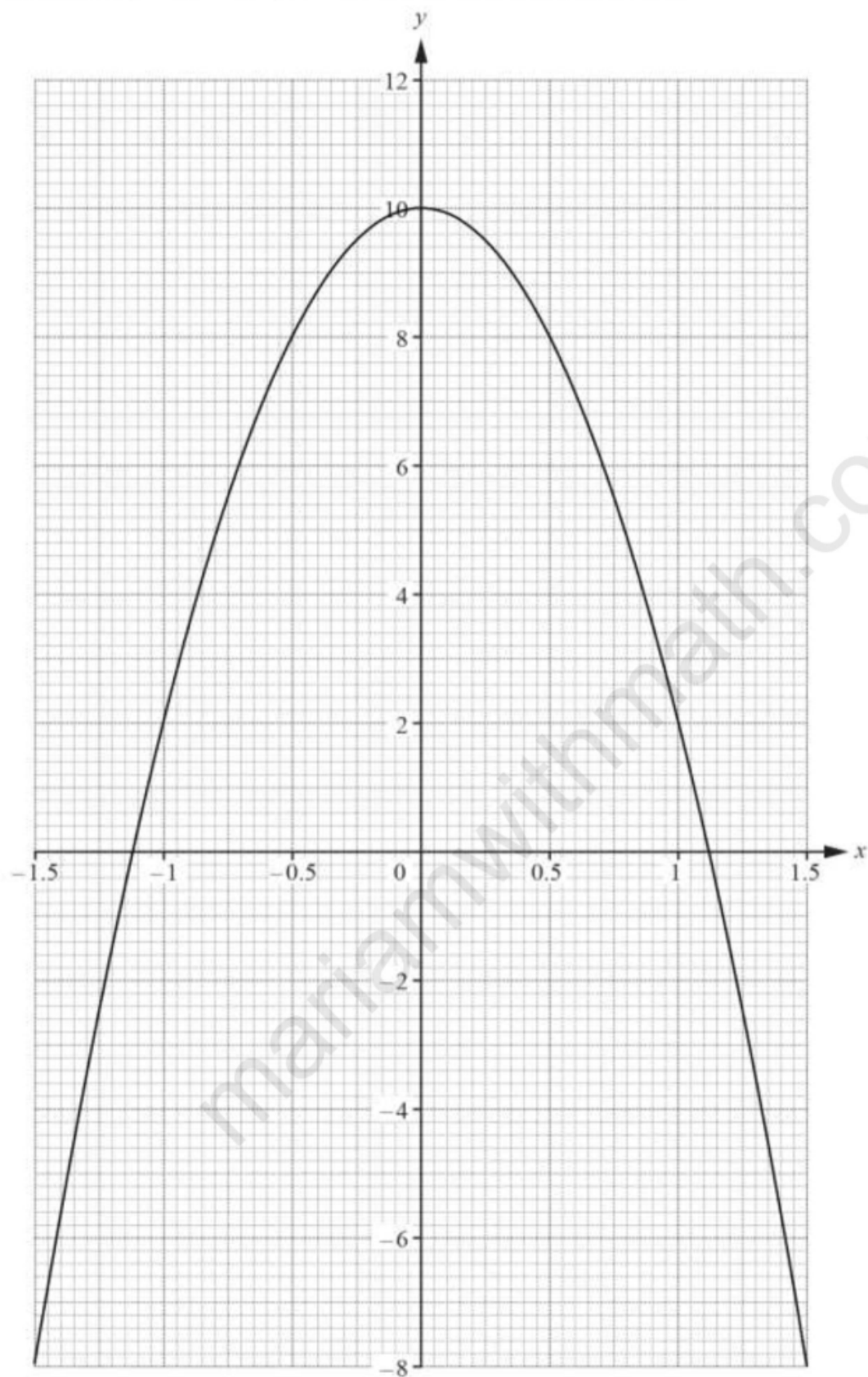
(i) Write down the equation of this straight line. [2]

(ii) Draw this straight line and solve the equation $\frac{1}{x} = 7 - 3x$ [3]

0580/42/F/M/18 Q3) (a) 0 -0.17 2.4 (c) $x \leq 0.17$ to 0.25 and $x \geq 2.25$ to 2.3 (d)(i) $y = 4 - x$

(d)(ii) 0.125 to 0.2 and 2.15 to 2.2

9. The graph of $y = 10 - 8x^2$ for $-1.5 \leq x \leq 1.5$ is drawn on the grid.



- (a) Write down the equation of the line of symmetry of the graph [1]
(b) On the grid opposite, draw the tangent to the curve at the point where $x = 0.5$

Find the gradient of this tangent. [3]

(c) The table shows some values for $y = x^3 + 3x + 4$

x	-1.5	-1	-0.5	0	0.5	1	1.5
y	-3.9				5.6	8	11.9

(i) Complete the table. [3]

(ii) On the grid opposite, draw the graph of $y = x^3 + 3x + 4$ for $-1.5 \leq x \leq 1.5$ [4]

(d) Show that the values of x where the two curves intersect are the solutions to the equation $x^3 + 8x^2 + 3x - 6 = 0$. [1]

(e) By drawing a suitable straight line, solve the equation $x^3 + 5x + 2 = 0$ for $-1.5 \leq x \leq 1.5$ [3]

0580/41/M/J/18 Q7) (a) $x = 0$ (b) -9 to -6.5 (c)(i) 0, 2.4, 4 (d) $x^3 + 3x + 4 = 10 - 8x^2$ and correctly completed (e) line $y = -2x + 2$ drawn and -0.45 to -0.35

10. a) Complete the table of values for $y = \frac{x^3}{3} - \frac{1}{2x^2}, x \neq 0$ [3]

x	-3	-2	-1	-0.5	-0.3		0.3	0.5	1	2	3
y	-9.1	-2.8	-0.8		-5.6		-5.5	-2.0			8.9

(b) On the grid, draw the graph of $y = \frac{x^3}{3} - \frac{1}{2x^2}$ for $-3 \leq x \leq -0.3$ and $0.3 \leq x \leq 3$ [5]

(c) (i) By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = -2$. [3]

(ii) Write down the equation of the tangent to the curve at $x = -2$.

Give your answer in the form $y = mx + c$. [2]

(d) Use your graph to solve the equations.

(i) $\frac{x^3}{3} - \frac{1}{2x^2} = 0$ [1]

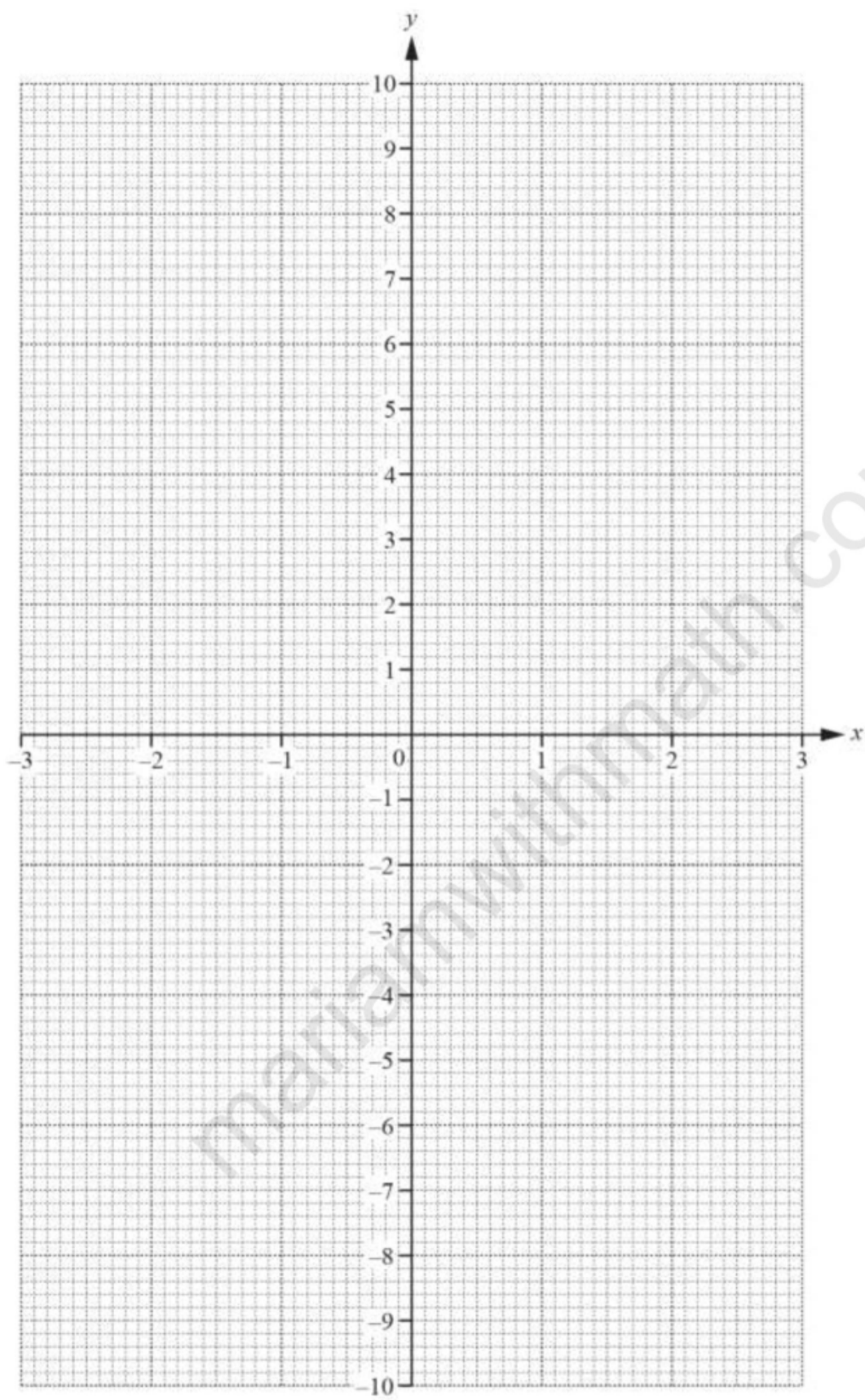
(ii) $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$ [3]

(e) The equation $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$ can be written in the form $ax^n + bx^{n-3} - 3 = 0$

Find the value of a , the value of b and the value of n [3]

0580/42/M/J/18 Q6) (a) -2, 0, -0.2, 2.5 (c)(i) 3 to 5 (c)(ii) $[y =]$ their (c)(i) $x +$ their y -intercept final answer

(d)(i) 1.05 to 1.25 (d)(ii) -2.3 to -2.2, -0.4 to -0.3, 0.3 to 0.4 (e) $[a =]$ 2 $[b =]$ 24 $[n =]$ 5



[Grid for Q10]

11. (a) (i) $y = 2^x$

Complete the table. [2]

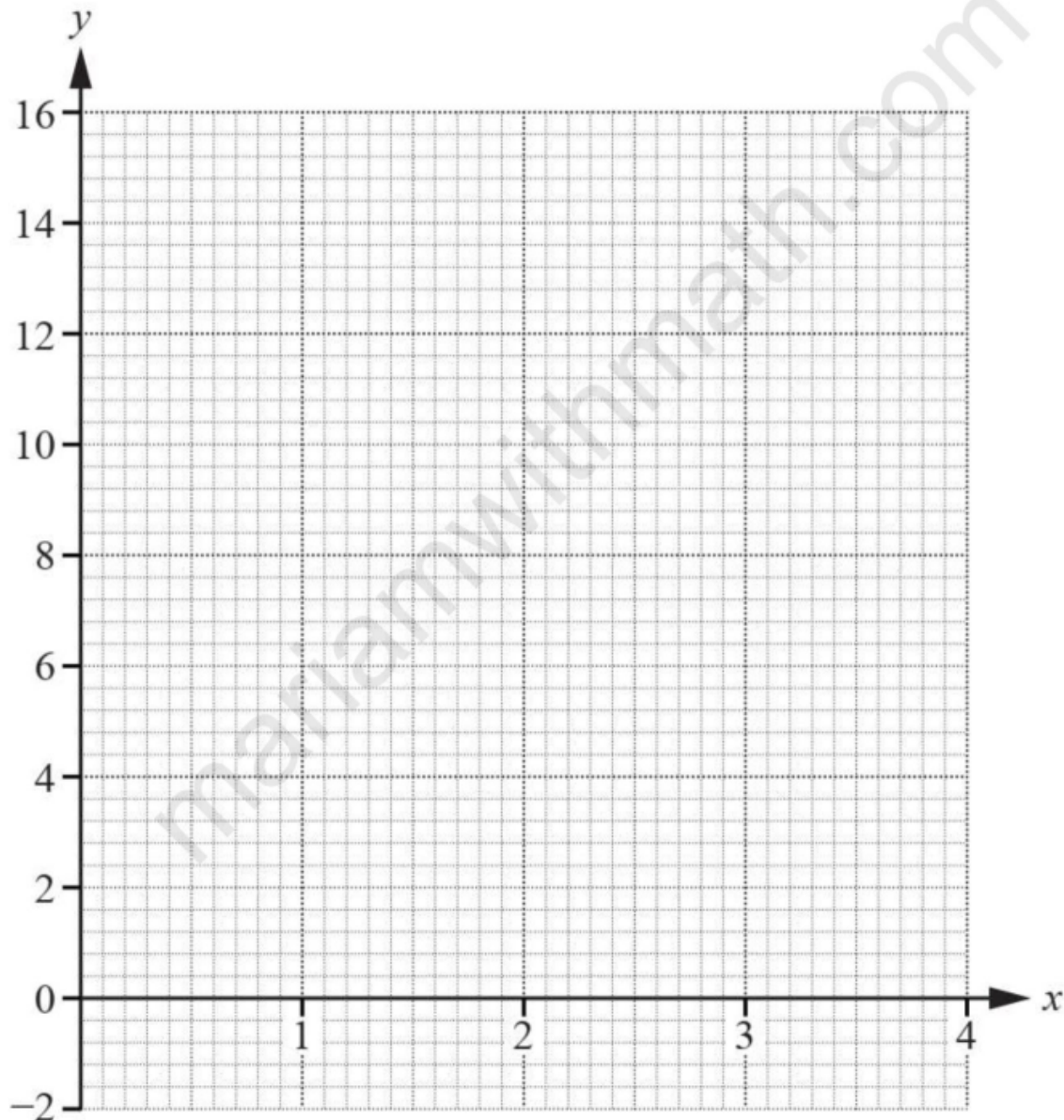
x	0	1	2	3	4
y		2	4	8	

(ii) $y = 14 - x^2$

Complete the table. [2]

x	0	1	2	3	4
y		13	10	5	

(b) On the grid, draw the graphs of $y = 2^x$ and $y = 14 - x^2$ for $0 \leq x \leq 4$. [6]



(c) Use your graphs to solve the equations.

(i) $2^x = 12$ [1]

(ii) $2^x = 14 - x^2$ [1]

(d) (i) On the grid, draw the line from the point (4, 2) that has a gradient of -4. [1]

(ii) Complete the statement

This straight line is a to the graph of $y = 14 - x^2$

at the point (..... ,). [2]

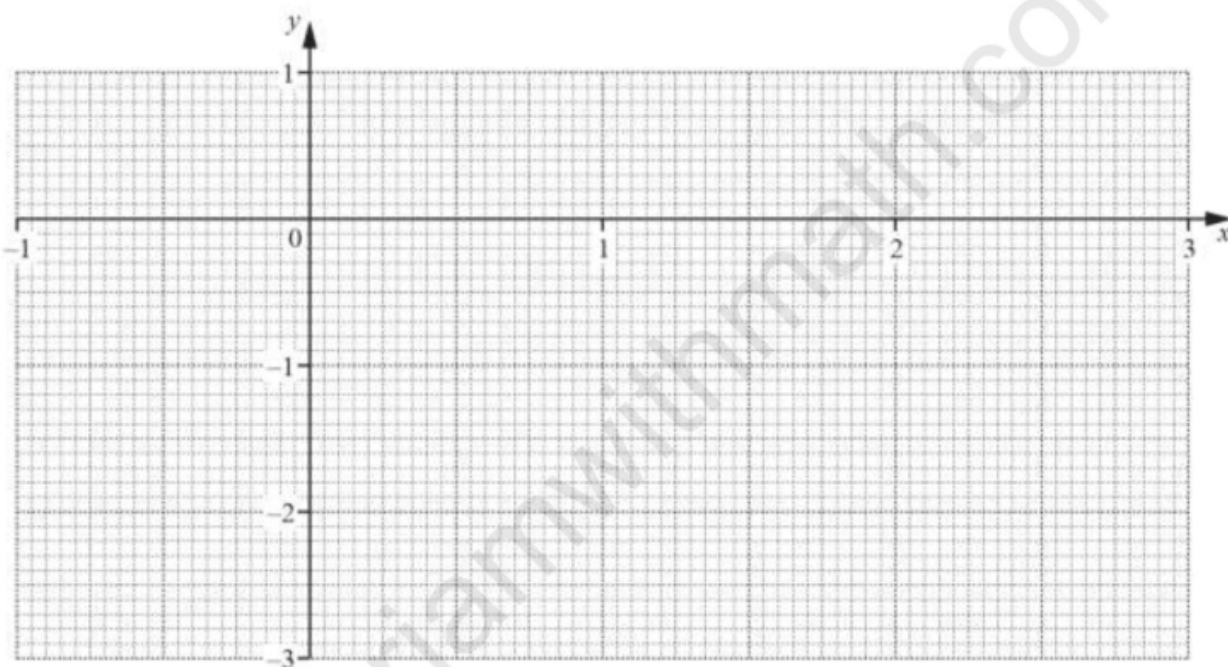
0580/43/M/J/18 Q2) (a)(i) 1,16 (a)(ii) 14,-2(c)(i) 3.5 to 3.7 (c)(ii) 2.65 to 2.8 (d)(ii) Tangent (2, 10)

12. The table shows some values of $y = x^3 - 3x^2 + x$

x	-0.75	-0.5	-0.25	0	0.5	1	1.5	2	2.5	2.75
y	-2.9	-1.4	-0.5		-0.1	-1	-1.9		-0.6	

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + x$ for $-0.75 \leq x \leq 2.75$



(c) Use your graph to complete the inequalities in x for which $y > -1$ [3]

(d) The equation $x^3 - 3x^2 + 2x - 1 = 0$ can be solved by drawing a straight line on the grid.

(i) Write down the equation of this line. [2]

(ii) On the grid, draw this line and use it to solve the equation $x^3 - 3x^2 + 2x - 1 = 0$ [3]

(e) By drawing a suitable tangent, find an estimate for the gradient of the graph of

$y = x^3 - 3x^2 + x$ at $x = -0.25$ [3]

0580/41/O/N/18 Q3) (a) 0 -2 0.9 (c) -0.45 to -0.35 < x < 1 and $x > 2.35$ to 2.45 (d)(i) $y = 1 - x$ (d)(ii) Correct ruled line and 2.25 to 2.4 (e) 1.7 to 3.7

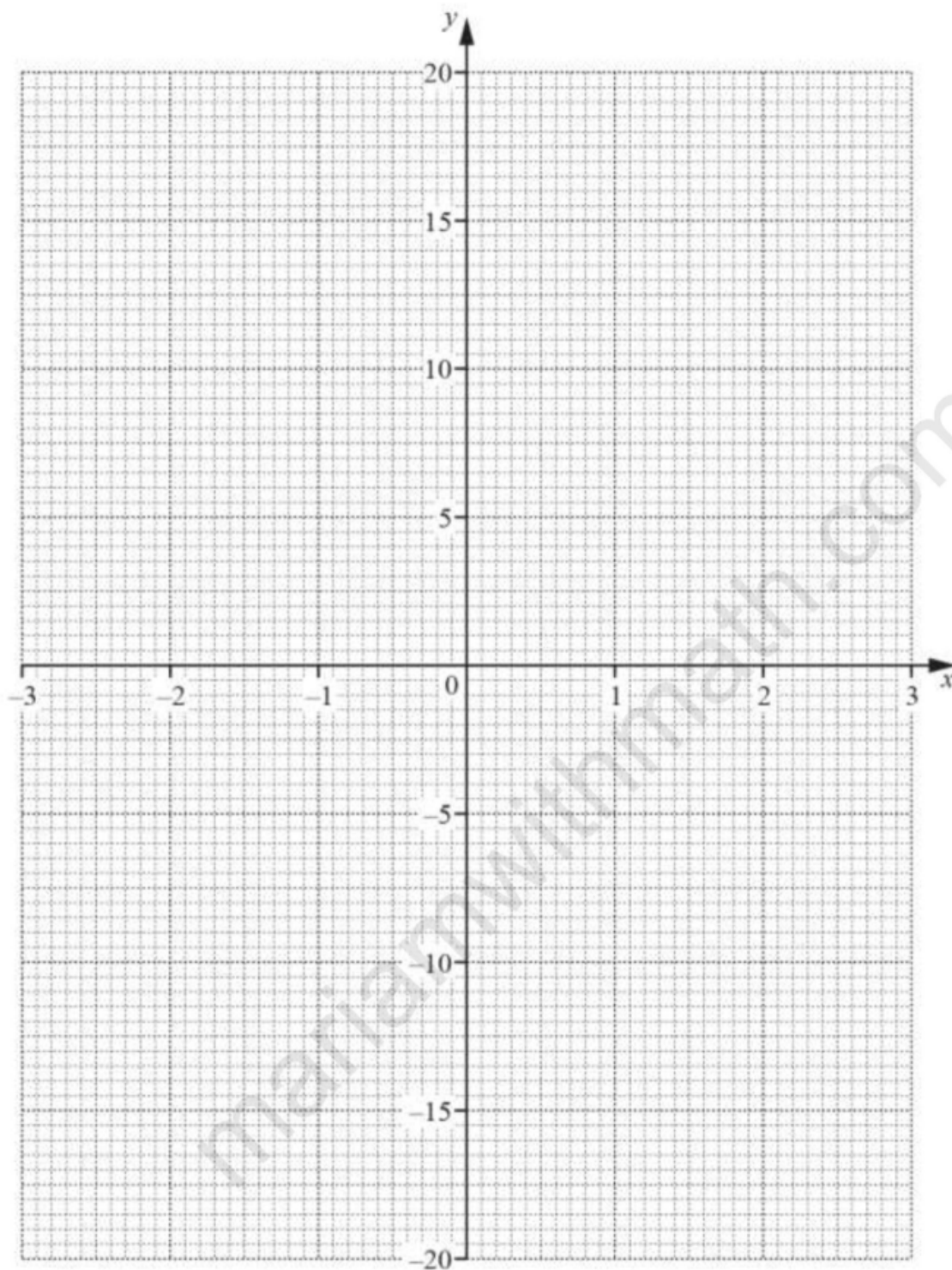
13. The table shows some values of $y = x^3 - 3x - 1$

x	-3	-2.5	-2	-1.5	-1	0	1	1.5	2	2.5	3
y	-19	-9.1		0.1	1	-1	-3	-2.1	1	7.1	

(a)

Complete the table of values. [2]

(b) Draw the graph of $y = x^3 - 3x - 1$ for $-3 \leq x \leq 3$ [4]



(c) A straight line through $(0, -17)$ is a tangent to the graph of $y = x^3 - 3x - 1$

(i) On the grid, draw this tangent. [1]

(ii) Find the co-ordinates of the point where the tangent meets your graph. [1]

(iii) Find the equation of the tangent. Give your answer in the form $y = mx + c$. [3]

(d) By drawing a suitable straight line on the grid, solve the equation $x^3 - 6x - 3 = 0$ [4]

0580/42/O/N/18 Q5) (a) $-3, 17$ (c)(i) Correct ruled tangent for their curve through $(0, -17)$ (c)(ii) $(1.7 \text{ to } 2.2, -1 \text{ to } 2.5)$ (c)(iii) $[y =] 9x - 17$ final answer (d) $y = 3x + 2$ ruled correctly and $-2.2 \text{ to } -2.1$ $-0.6 \text{ to } -0.4$, $2.6 \text{ to } 2.8$

14. $f(x) = \frac{x^2}{4} - \frac{4}{x}, x \neq 0$

(a) Complete the table for $f(x)$. [2]

x	0.5	1	2	3	4	5	6
$f(x)$	-7.9	-3.8		0.9		5.5	8.3

(b) The graph of $y = f(x)$ for $-6 \leq x \leq -0.5$ is drawn on the grid.

On the same grid, draw the graph of $y = f(x)$ for $0.5 \leq x \leq 6$ [3]

(c) By drawing a suitable tangent, estimate the gradient of the graph of $y = f(x)$ at the point $(-4, 5)$ [3]

(d) $g(x) = \frac{9}{x}, x \neq 0$, Complete the table for $g(x)$. [1]

x	-4	-3	-2	-1		1	2	3	4
$g(x)$	-2.3		-4.5	-9		9	4.5		2.3

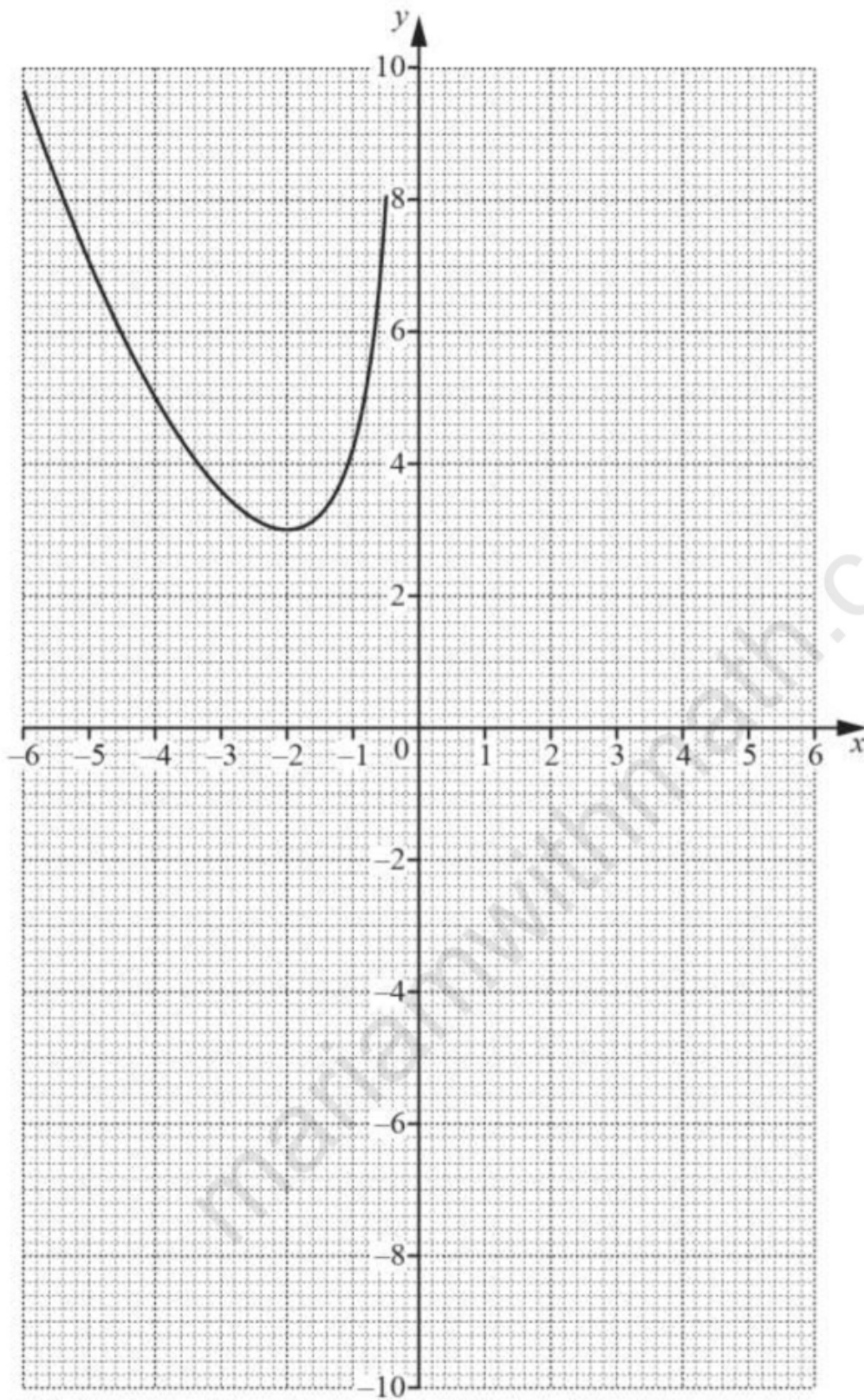
(e) On the same grid, draw the graph of $y = g(x)$ for $-4 \leq x \leq -1$ and $1 \leq x \leq 4$ [4]

(f) (i) Use your graphs to find the value of x when $f(x) = g(x)$ [1]

(ii) Write down an inequality to show the positive values of x for which $f(x) > g(x)$ [1]

(g) The exact answer to **part (f)(i)** is $\sqrt[3]{k}$.

Use algebra to find the value of k . [2]



0580/43/O/N/18 Q4) (a) -1, 3 (c) -2 to -1.5 (d) -3, 3 (f)(i) 3.6 to 3.85 (f)(ii) $x > \text{their (f)(i)}$ (g) $\frac{x^2}{4} = \frac{9}{x} + \frac{4}{x}$ or

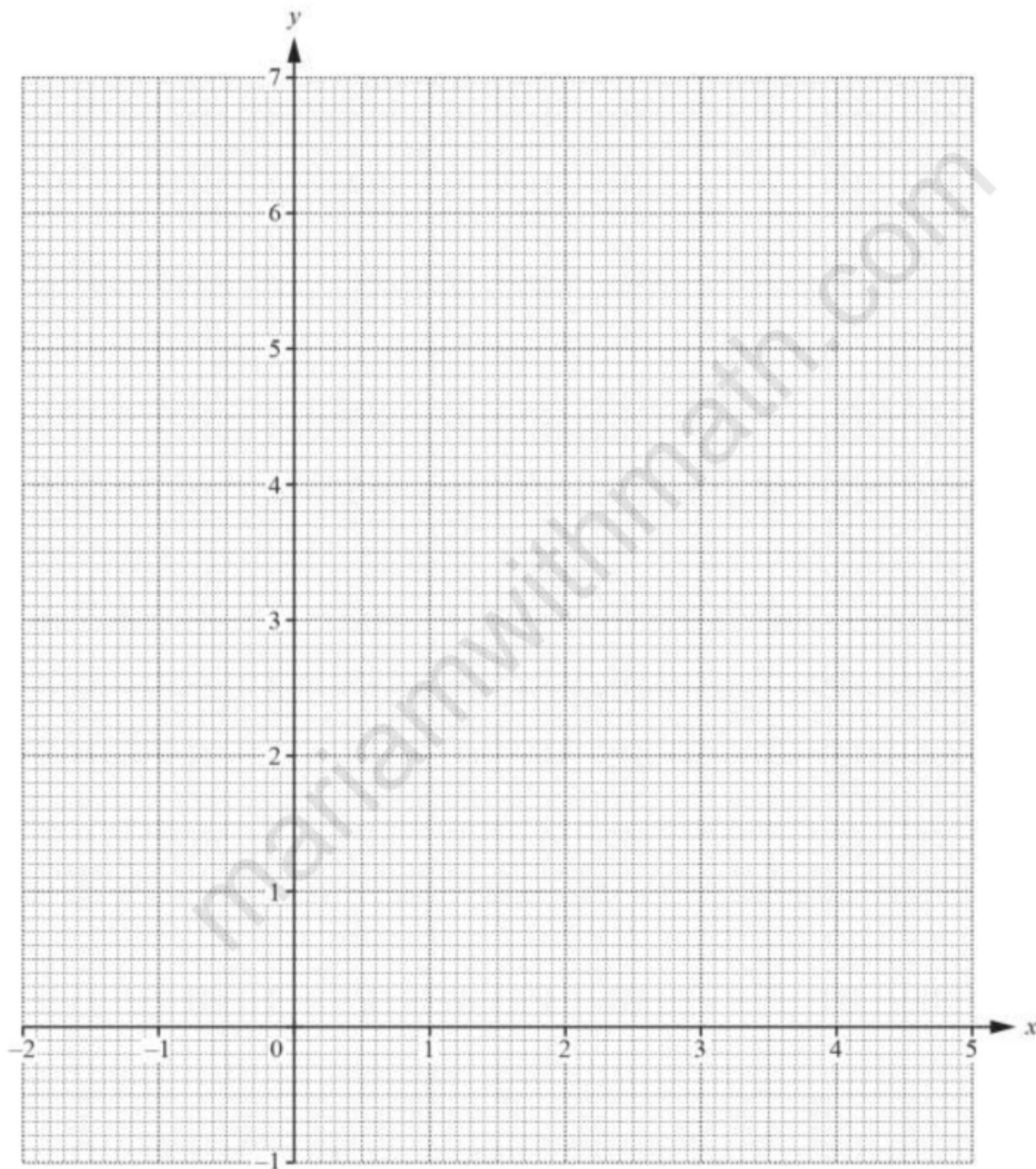
$$\frac{x^3}{4} - 4 = 9, 52$$

15. The table shows some values for $y = 1.5^x - 1$

x	-2	-1	0	1	2	3	4	5
y	-0.56	-0.33				2.38	4.06	6.59

(a) Complete the table. [3]

(b) Draw the graph of $y = 1.5^x - 1$ for $-2 \leq x \leq 5$ [4]



(c) Use your graph to solve the equation $1.5^x - 1 = 3.5$ [2]

(d) By drawing a suitable straight line, solve the equation $1.5^x - x - 2 = 0$ [3]

(e) (i) On the grid, plot the point A at (5, 5) [1]

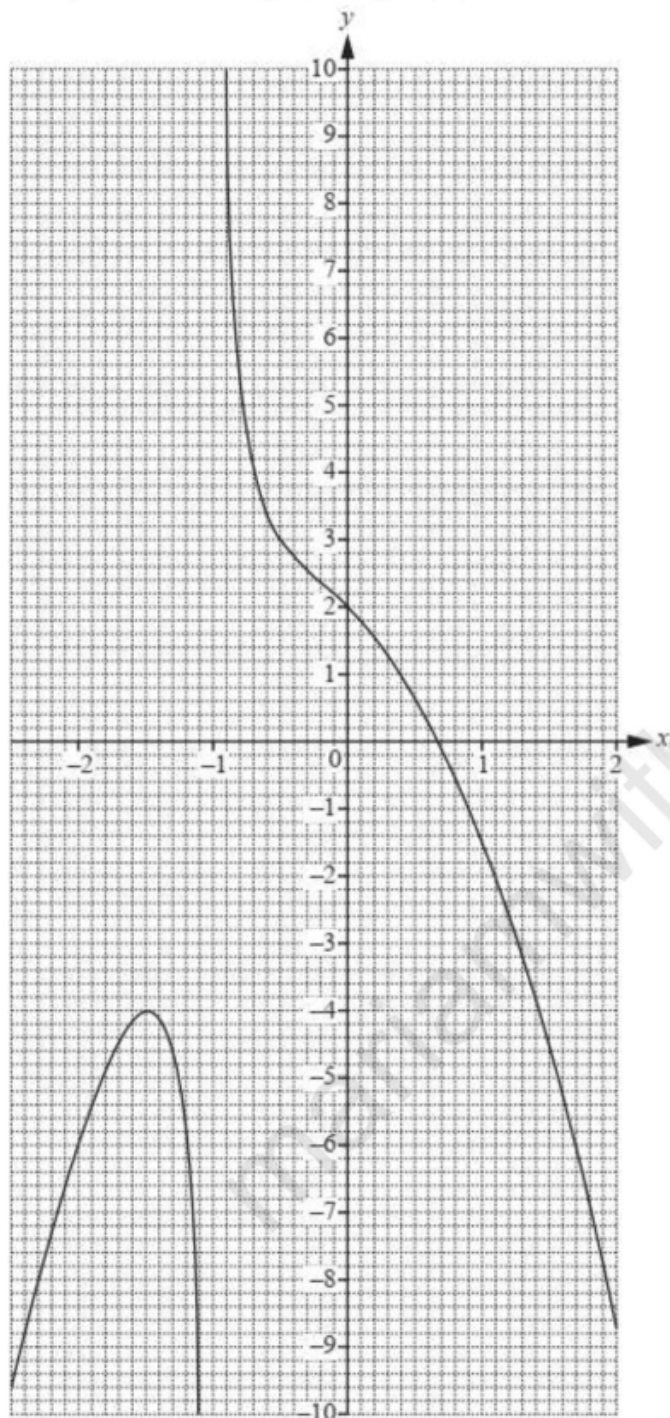
(ii) Draw the tangent to the graph of $y = 1.5^x - 1$ that passes through the point A. [1]

(iii) Work out the gradient of this tangent. [2]

0580/42/F/M/17 Q3) (a) 0 0.5 1.25 (c) 3.6 to 3.8 (d) line $y = x + 1$ ruled -1.55 to -1.40 4.55 to 4.8

(e) (i) Point plotted at $(5, 5)$ (ii) Tangent ruled from A (iii) 1.2 to 1.4

16. The diagram shows the graph of $y = f(x)$ for $-2.5 \leq x \leq 2$.



(a) Find $f(1)$. [1]

(b) Solve $f(x) = 3$. [1]

(c) The equation $f(x) = k$ has only one solution for $-2.5 \leq x \leq 2$

Write down the range of values of k for which this is possible. [2]

(d) By drawing a suitable straight line, solve the equation $f(x) = x - 5$. [3]

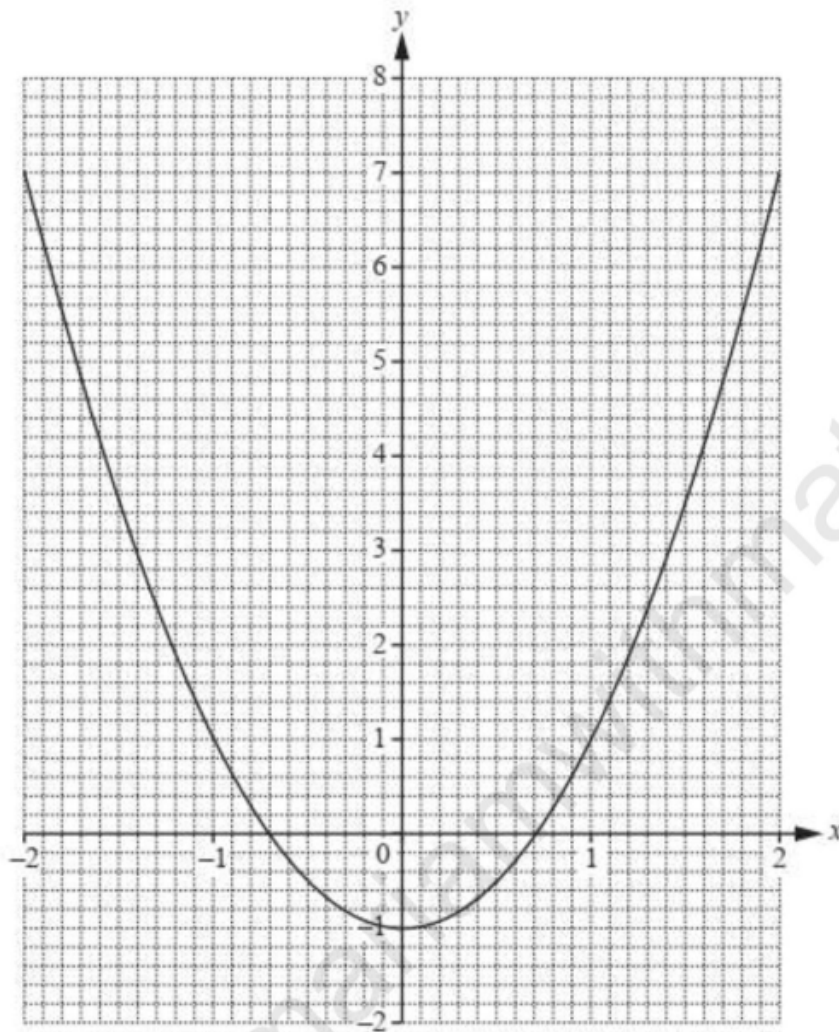
(e) Draw a tangent to the graph of $y = f(x)$ at the point where $x = 1$.

Use your tangent to estimate the gradient of $y = f(x)$ when $x = 1$. [3]

0580/41/M/J/17 Q4) (a) -1.6 to -1.4 (b) -0.5 (c) $k > -4$ (d) $y = x - 5$ ruled and -2.3 to -2.1
 -1.2 to -1.1 , 1.3 to 1.4 (e) Tangent ruled at $x = 1$, -6 to -4

17. $f(x) = 2x^2 - 1$

The graph of $y = f(x)$ for $-2 \leq x \leq 2$, is drawn on the grid



(a) Use the graph to solve the equation $f(x) = 5$ [2]

(b) (i) Draw the tangent to the graph of $y = f(x)$ at the point $(-1.5, 3.5)$. [1]

(ii) Use your tangent to estimate the gradient of $y = f(x)$ when $x = -1.5$ [2]

(c) $g(x) = 2^x$

(i) Complete the table for $y = g(x)$. [1]

x	-2	-1	0	1	2
y	0.25	0.5		2	4

(ii) On the grid opposite, draw the graph of $y = g(x)$ for $-2 \leq x \leq 2$. [3]

(d) Use your graphs to solve

(i) the equation $f(x) = g(x)$ [2]

(ii) the inequality $f(x) < g(x)$ [1]

(e) (i) Write down the three values

$g(-3) = \dots\dots\dots g(-5) = \dots\dots\dots g(-10) = \dots\dots\dots$ [1]

(ii) Complete the statement.

As x decreases, $g(x)$ approaches the value $\dots\dots\dots$ [1]

0580/42/M/J/17 Q4) (a) -1.75 to -1.7 , 1.7 to 1.75 (b)(i) Correct ruled solid tangent at $(-1.5, 3.5)$ (b)(ii) -7 to -5 (c)(i) 1 (d)(i) -0.95 to -0.8 , 1.1 to 1.45 (d)(ii) their $(-0.95 \text{ to } -0.8) < x < \text{their}(1.1 \text{ to } 1.45)$ oe (e)(i) 0.125 oe and 0.03125 oe and 0.000976 to 0.000977 oe e(ii) 0

18. The table shows some values for $y = 2x^3 + 4x^2$

x	-2.2	-2	-1.5	-1	-0.5	0	0.5	0.8
y	-1.94				0.75	0		3.58

(a) Complete the table. [4]

(b) Draw the graph of $y = 2x^3 + 4x^2$ for $-2.2 \leq x \leq 0.8$ [4]

(c) Find the number of solutions to the equation $2x^3 + 4x^2 = 3$ [1]

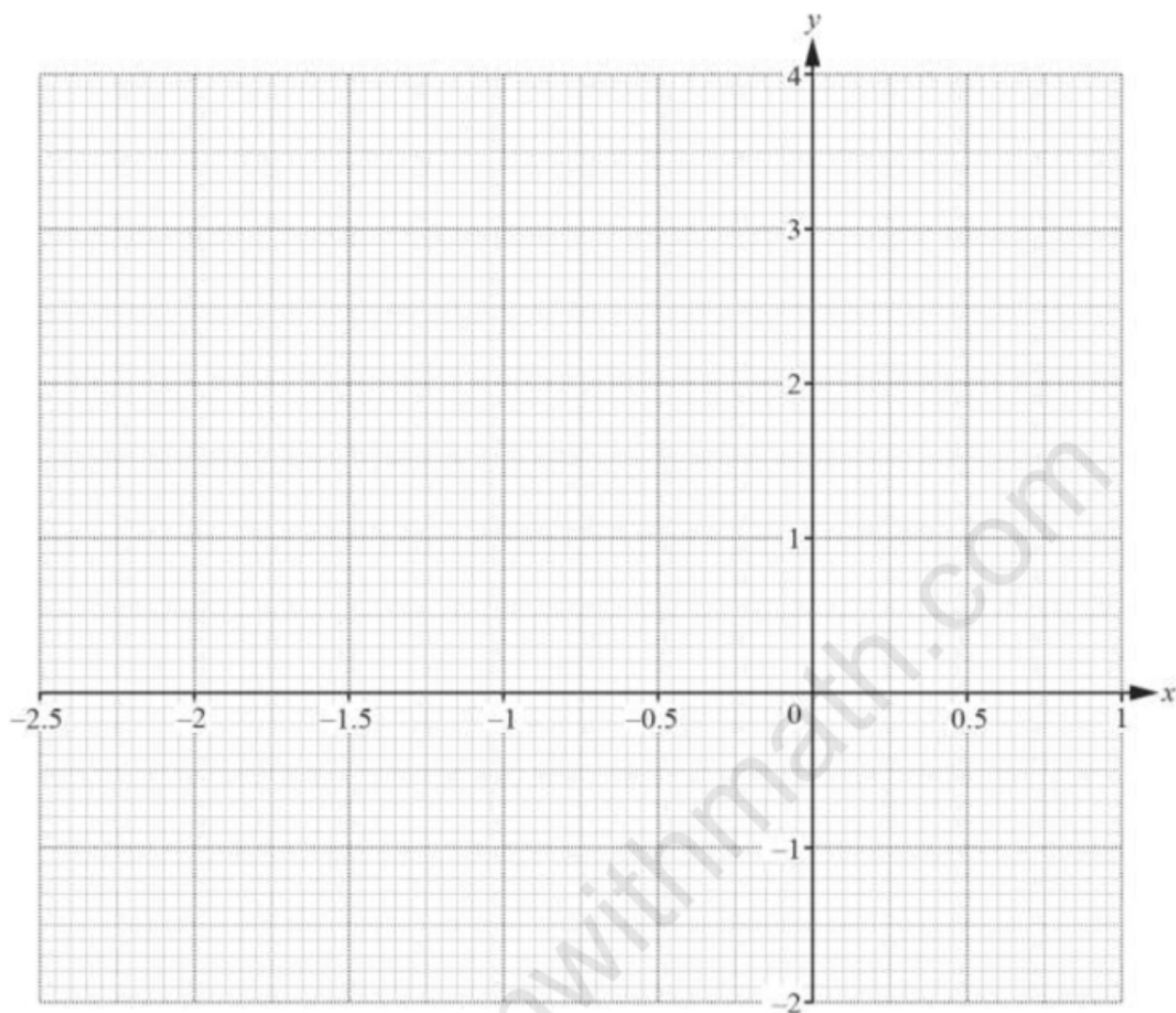
(d) (i) The equation $2x^3 + 4x^2 - x = 1$ can be solved by drawing a straight line on the grid.

Write down the equation of this straight line. [1]

(ii) Use your graph to solve the equation $2x^3 + 4x^2 - x = 1$ [3]

(e) The tangent to the graph of $y = 2x^3 + 4x^2$ has a negative gradient when $x = k$.

Complete the inequality for k [2]



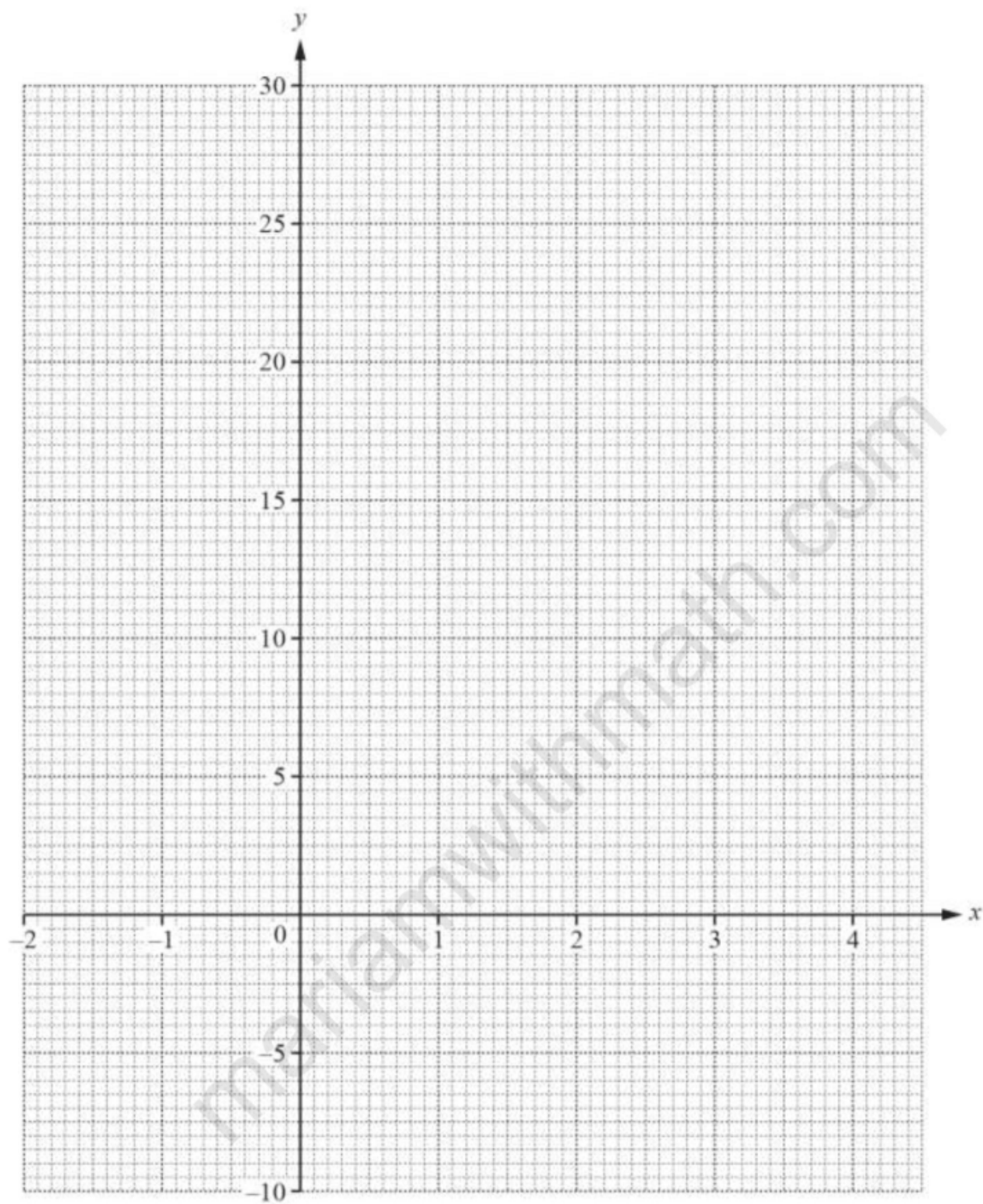
0580/43/M/J/17 Q3) (a) 0 2.25 2 1.25 (c) 1(d)(i) [$y=$] $x + 1$ (d)(ii) -2.2 to -2.1 , -0.45 to -0.4 , 0.51 to 0.6 (e) $-1.33 < k < 0$ to 0.1 (accept correct answer from calculus)

19. $f(x) = x^3 - 4x^2 + 15$

(a) Complete the table of values for $y = f(x)$ [2]

x	-2	-1	-0.5	0	1	2	2.5	3	3.5	4	4.5
y	-9		13.9	15	12		5.6	6	8.9	15	25.1

(b) On the grid, draw the graph of $y = f(x)$ for $-2 \leq x \leq 4.5$. [4]



(c) Use your graph to solve the equation $f(x) = 0$. [1]

(d) By drawing a suitable tangent, estimate the gradient of the graph of $y = f(x)$ when $x = 3.5$. [3]

(e) By drawing a suitable straight line on the grid, solve the equation $x^3 - 4x^2 - 2x + 5 = 0$ [4]

0580/41/O/N/17 Q4) (a) 10, 7 (c) -1.7 to -1.55 (d) 6.5 to 11 (e) line $y = 2x + 10$ ruled AND
-1.3 to -1.1, 1, 4.1 to 4.25

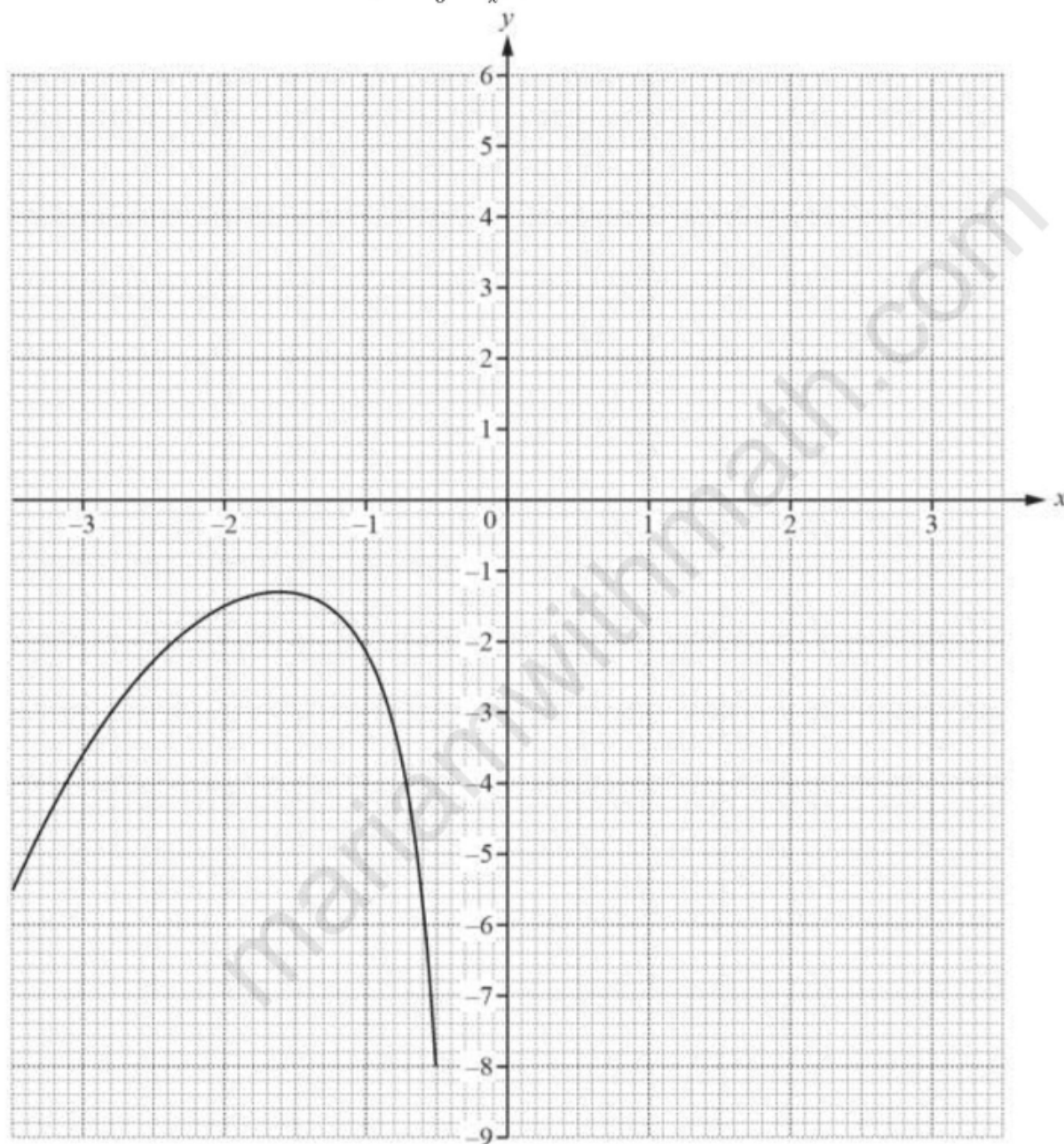
20. $y = \frac{x^3}{8} - \frac{2}{x^2}, x \neq 0$

(a) Complete the table of values. [2]

x	0.5	1	1.5	2	2.5	3	3.5
y	-8.0	-1.9	-0.5	0.5	1.6		

(b) The graph of $y = \frac{x^3}{8} - \frac{2}{x^2}$ for $-3.5 \leq x \leq -0.5$ has already been drawn

On the grid, draw the graph of $y = \frac{x^3}{8} - \frac{2}{x^2}$ for $0.5 \leq x \leq 3.5$ [4]



(c) Use your graph to solve the equation $\frac{x^3}{8} - \frac{2}{x^2} = 0$ [1]

(d) $\frac{x^3}{8} - \frac{2}{x^2} = k$ and k is an integer

Write down a value of k when the equation $\frac{x^3}{8} - \frac{2}{x^2} = k$ has

(i) one answer, [1] (ii) three answers. [1]

(e) By drawing a suitable tangent, estimate the gradient of the curve where $x = -3$. [3]

(f) (i) By drawing a suitable line on the grid, find x when $\frac{x^3}{8} - \frac{2}{x^2} = 6 - x$ [3]

(ii) The equation $\frac{x^3}{8} - \frac{2}{x^2} = 6 - x$ can be written as $x^5 + ax^3 + bx^2 + c = 0$

Find the values of a , b and c . [4]

0580/42/O/N/17 Q5) (a) 3.2 or 3.15 or 3.152 to 3.153, 5.2 or 5.19 or 5.20 or 5.196 (c) 1.7 to 1.8 (d)(i) Any integer $k \geq -1$ (d)(ii) Any integer $k < -1$ (e) 2.5 to 4 (f)(i) $y = 6 - x$, $2.85 \leq x \leq 3$

(f)(ii) $a = 8$, $b = -48$, $c = -16$

21. The table shows some values of $y = x + \frac{1}{x^2}$, $x \neq 0$

x	-2	-1.5	-1	-0.75	-0.5		0.5	0.75	1	1.5	2	3
y	-1.75	-1.06	0	1.03			4.50	2.53	2		2.25	

(a) Complete the table of values. [3]

(b) On the grid, draw the graph of $y = x + \frac{1}{x^2}$, for $-2 \leq x \leq -0.5$ and $0.5 \leq x \leq 3$ [5]

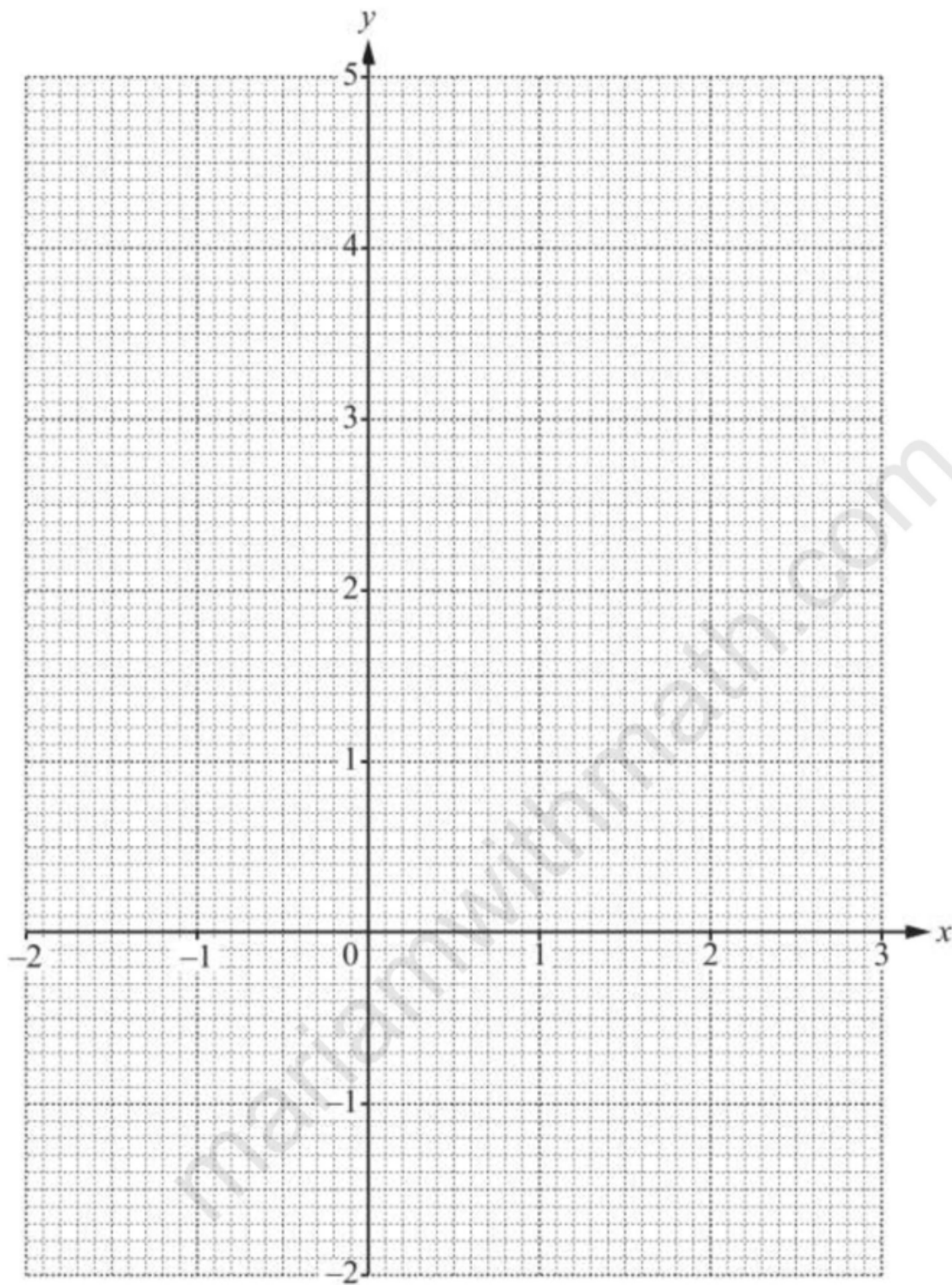
(c) Use your graph to solve the equation $x + \frac{1}{x^2} = 1.5$ [1]

(d) The line $y = ax + b$ can be drawn on the grid to solve the equation $\frac{1}{x^2} = 2.5 - 2x$

(i) Find the value of a and the value of b . [2]

(ii) Draw the line $y = ax + b$ to solve the equation $\frac{1}{x^2} = 2.5 - 2x$ [3]

(e) By drawing a suitable tangent, find an estimate of the gradient of the curve at the point where $x = 2$. [3]



0580/42/F/M/16 Q7) (a) 3.5[0] 1.94 3.11 (c) -0.7 to -0.6 (d) (i) -1 , 2.5 , (ii) -0.6 to -0.5 with correct ruled line (e) 0.5 to 0.85

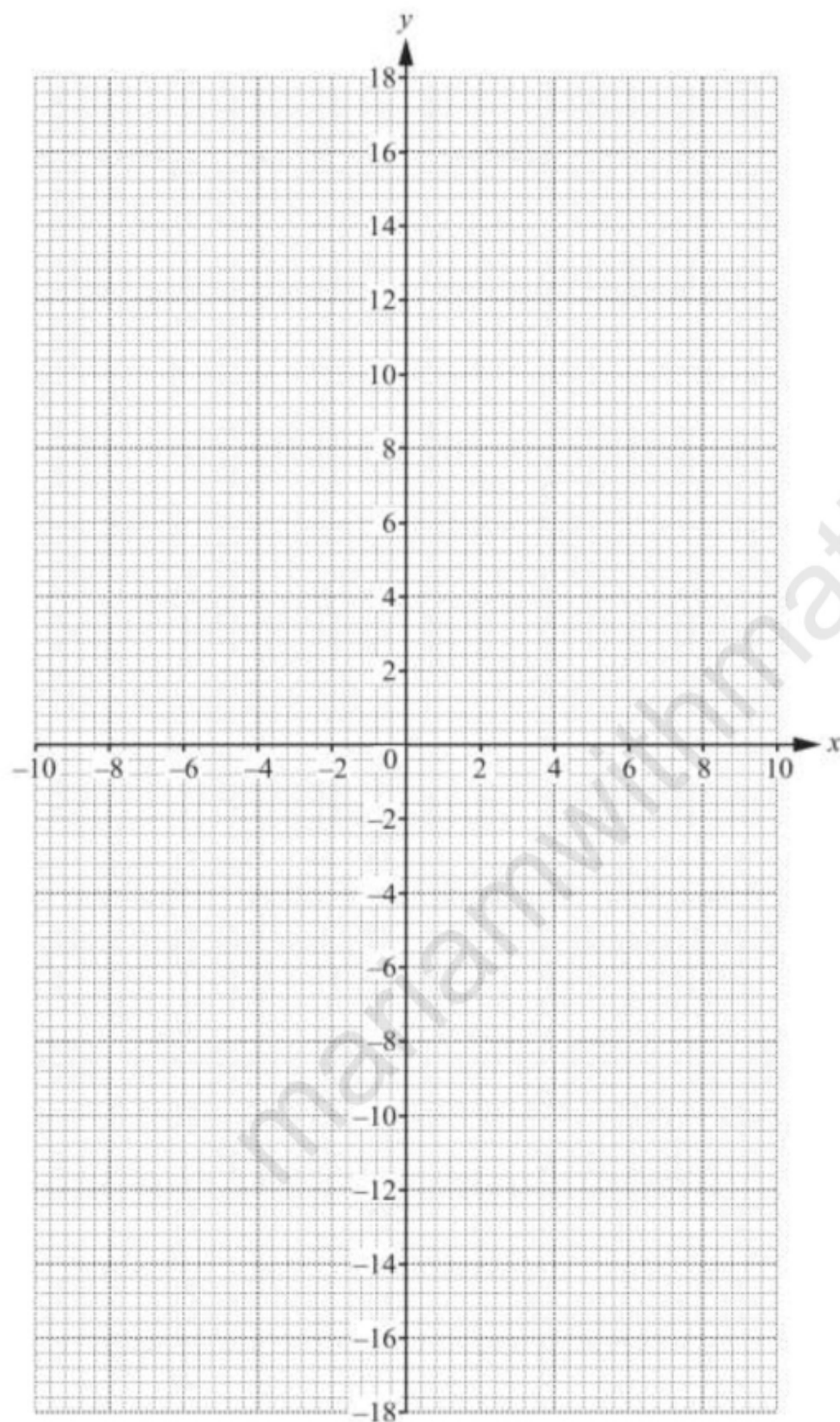
22. $f(x) = \frac{20}{x} + x$

(a) Complete the table. [2]

x	-10	-8	-5	-2	-1.6	1.6	2	5	8	10
$f(x)$	-12	-10.5	-9	-12	-14.1	14.1	12			12

(b)

On the grid, draw the graph of $y = f(x)$ for $-10 \leq x \leq -1.6$ and $1.6 \leq x \leq 10$ [5]



(c) Using your graph, solve the equation $f(x) = 11$ [2]

(d) k is a prime number and $f(x) = k$ has no solutions.

Find the possible values of k . [2]

(e) The gradient of the graph of $y = f(x)$ at the point $(2, 12)$ is -4 .

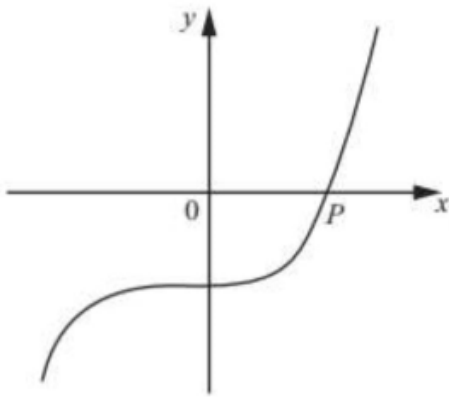
Write down the co-ordinates of the other point on the graph of $y = f(x)$ where the gradient is -4. [1]

(f) (i) The equation $f(x) = x^2$ can be written as $x^3 + px^2 + q = 0$. Show that $p = -1$ and $q = -20$. [1]

(ii) On the grid opposite, draw the graph of $y = x^2$ for $-4 \leq x \leq 4$. [2]

(iii) Using your graphs, solve the equation $x^3 - x^2 - 20 = 0$ [1]

(iv) The diagram shows a sketch of the graph of $y = x^3 - x^2 - 20$



P is the point $(n, 0)$. Write down the value of n [1]

0580/41/M/J/16 Q5) (a) 9 10.5 (c) 2.1 to 2.6 ,8.5 to 9 (d) 2, 3, 5, 7 (e) $(-2, -12)$ (f) (i) $20 + x^2 = x^3$

(ii) Fully correct curve $y = x^2$ (iii) 2.5 to 3.5 (iv) 3.[0] to 3.1 or FT their answer to (iii)

23. $f(x) = x^2 - \frac{1}{x} - 4$, $x \neq 0$

(a) (i) Complete the table. [2]

x	-3	-2	-1	-0.5	-0.1		0.2	0.5	1	2	3
$f(x)$	5.3	0.5		-1.8	6.0		-9.0	-5.8	-4		4.7

(ii) On the grid, draw the graph of $y = f(x)$ for $-3 \leq x \leq -0.1$ and $0.2 \leq x \leq 1$ [5]

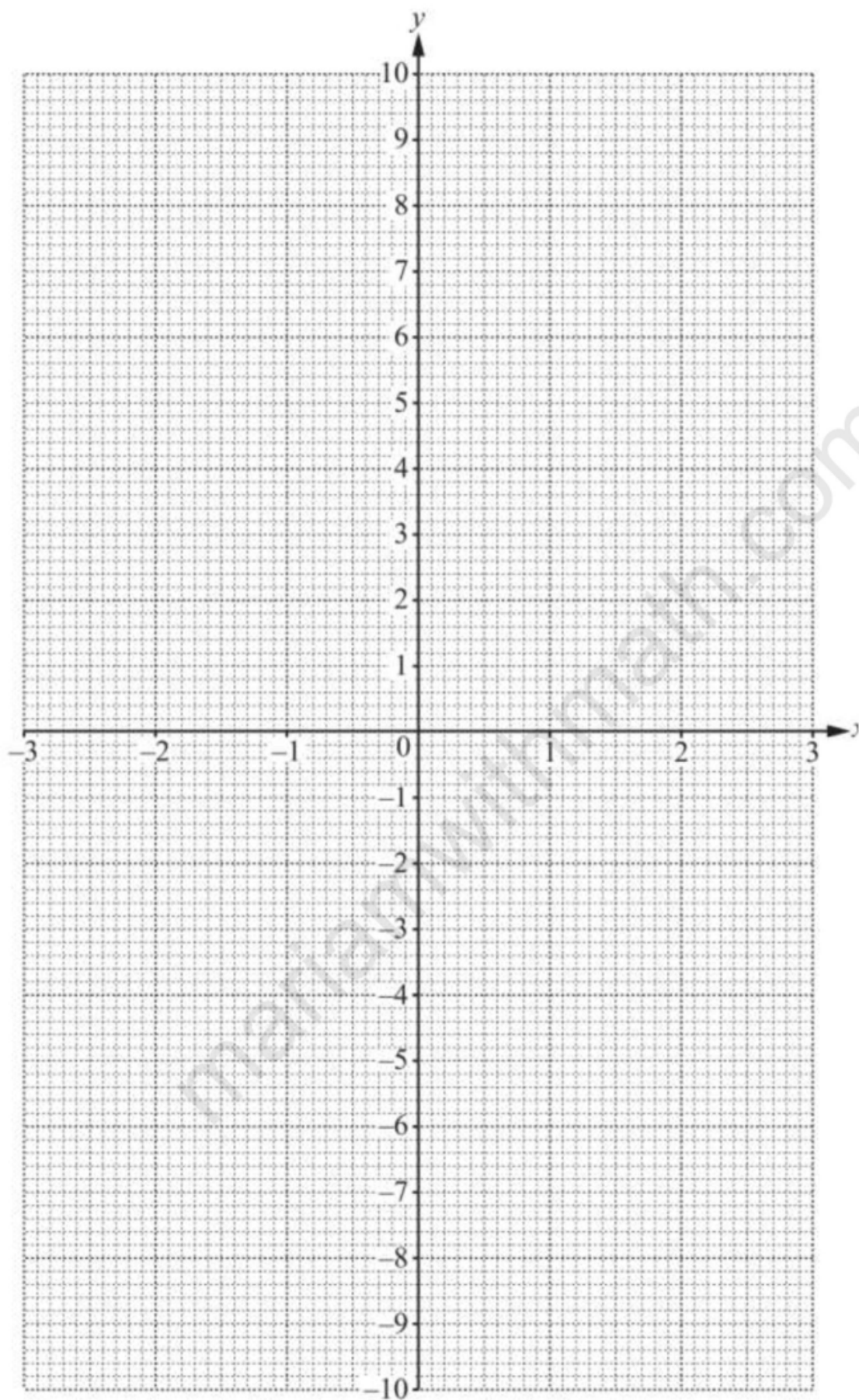
(b) Use your graph to solve the equation $f(x) = 0$. [3]

(c) Find an integer k , for which $f(x) = k$ has one solution [1]

(d) (i) By drawing a suitable straight line, solve the equation $f(x) + 2 = -5x$ [4]

(ii) $f(x) + 2 = -5x$ can be written as $x^3 + ax^2 + bx - 1 = 0$

Find the value of a and the value of b . [2]



0580/42/M/J/16 Q4)(a) (i) $-2, -0.5$ (b) -1.95 to -1.8 , -0.4 to -0.2 , 2.05 to 2.2

(c) Any integer k where $k \leq -3$ (d) (i) Correct line $y = -5x - 2$ ruled and -0.4 to -0.2

,0.55 to 0.75 (ii) [a =] 5 and [b =] - 2

24. The diagram shows the graph of $y = f(x)$ for $-3.5 \leq x \leq 2.5$

(a) (i) Find $f(-2)$. [1]

(ii) Solve the equation $f(x) = 2$. [3]

(iii) Two tangents, each with gradient 0, can be drawn to the graph of $y = f(x)$.

Write down the equation of each tangent. [2]

(b) (i) Complete the table for $g(x) = \frac{2}{x} + 3$ for $-3.5 \leq x \leq -0.5$ and $0.5 \leq x \leq 2.5$ [3]

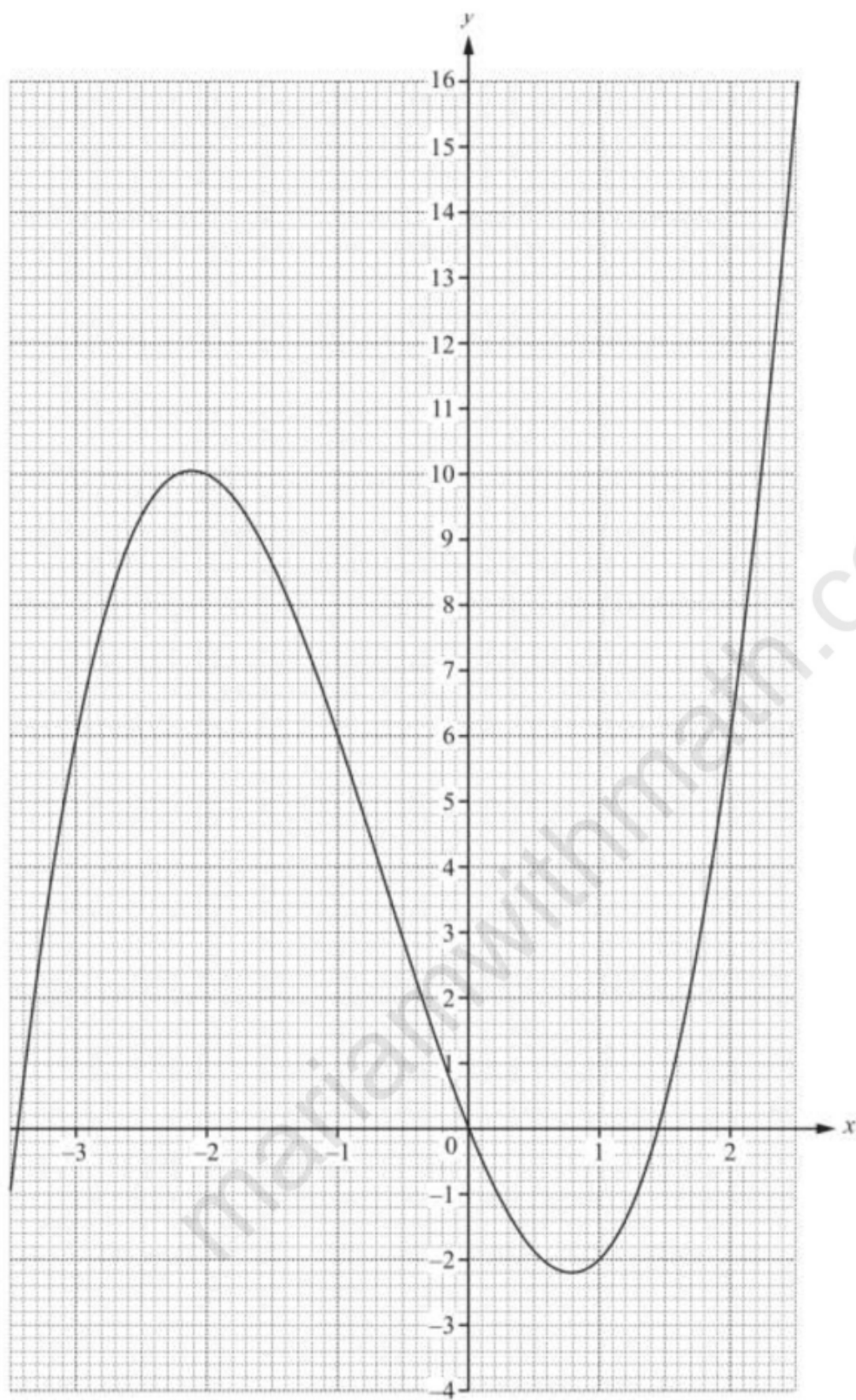
x	-3.5	-3	-2	-1	-0.5		0.5	1	2	2.5
$g(x)$	2.4	2.3		1			7	5		3.8

(ii) On the grid opposite, draw the graph of $y = g(x)$. [4]

(iii) Use your graph to solve the equation $f(x) = g(x)$. [2]

(c) Find $gf(-2)$. [2]

(d) Find $g^{-1}(5)$. [1]



0580/43/M/J/16 Q3) (a) (i) 10 (ii) -3.4 to -3.3 and -0.4 to -0.3 and 1.6 to 1.7 (iii) $y = -2.3$ to -2.1 or $y = 10$ to 10.1 or (b) (i) 2, -1, 4 (iii) -3.4 to -3.2 and 1.8 to 1.9 (c) 3.2 (d) 1