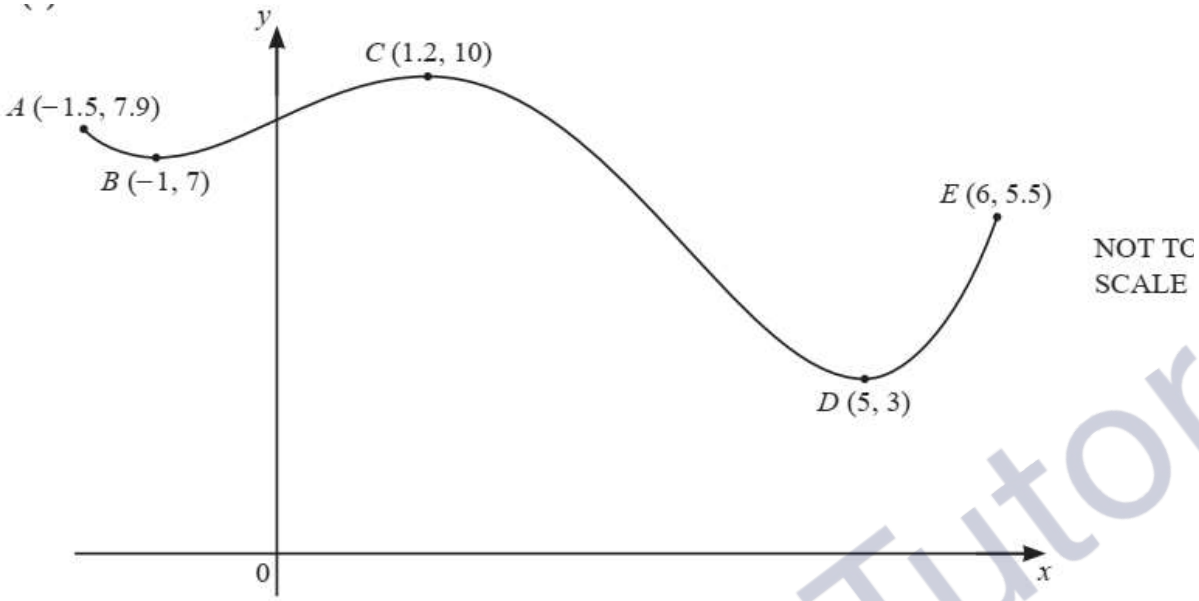
1.



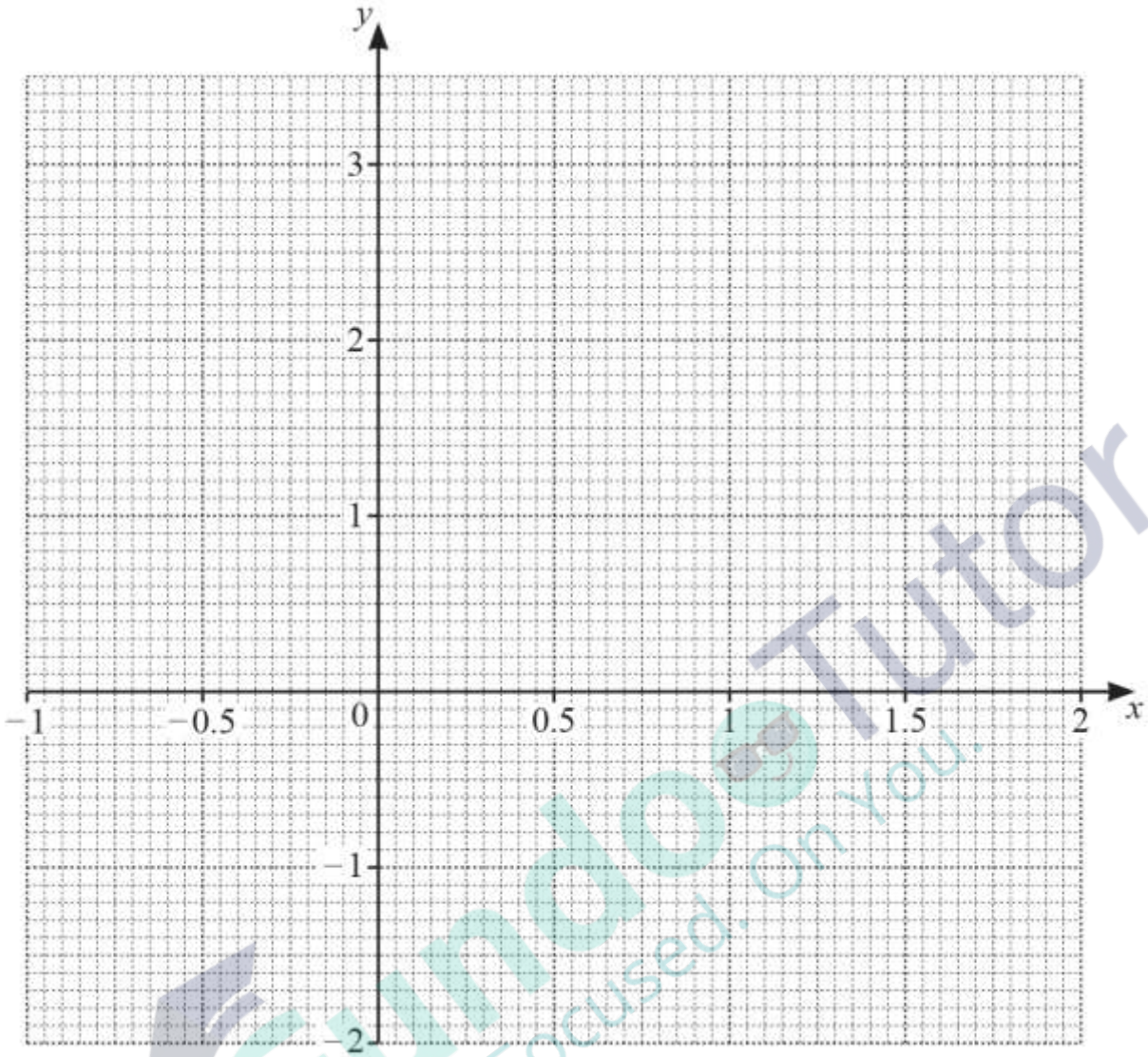
The diagram shows a sketch of the graph of $y = f(x)$ for $-1.5 \leqslant x \leqslant 6$.
The coordinates of five points on the graph of $y = f(x)$ are shown on the diagram.
(i) $f(x) = k$ has two solutions in the interval $-1.5 \leqslant x \leqslant 6$.
Write down a possible integer value of k. [1]
(ii) $f(x) = j$ has no solutions in the interval $-1.5 \leqslant x \leqslant 6$ 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 $-1 \leqslant x \leqslant 2$. [4]
(b) By drawing a suitable straight line, solve the equation $2 \times 0.5^x + 2x - 3.5 = 0$ for $-1 \leqslant x \leqslant 2$. [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]

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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 ≤ x ≤ 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 ≤ x ≤ 3. [4]

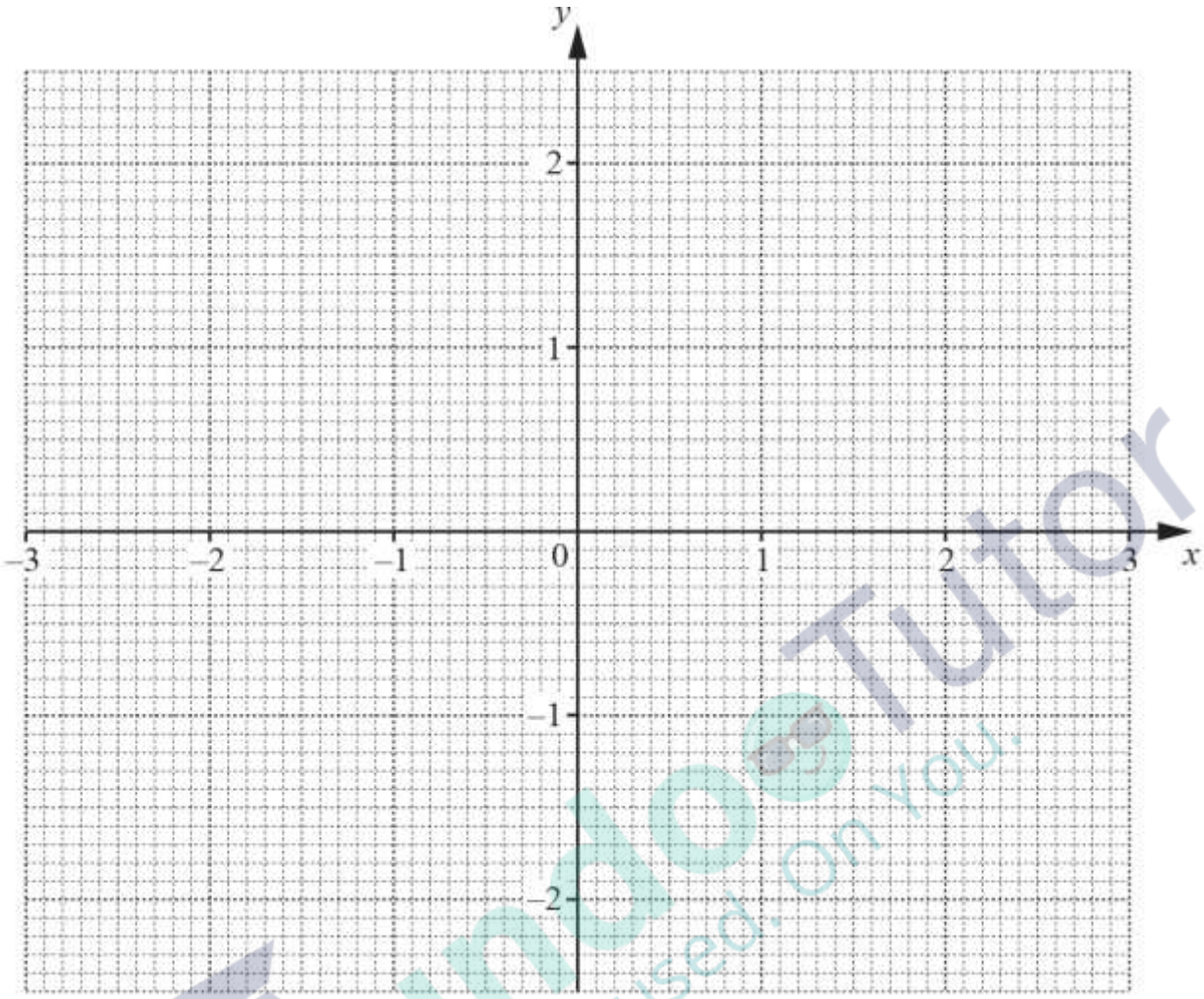
(c) On the grid opposite, draw a suitable straight line to solve the equation

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

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

Write down the value of n. [1]

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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]

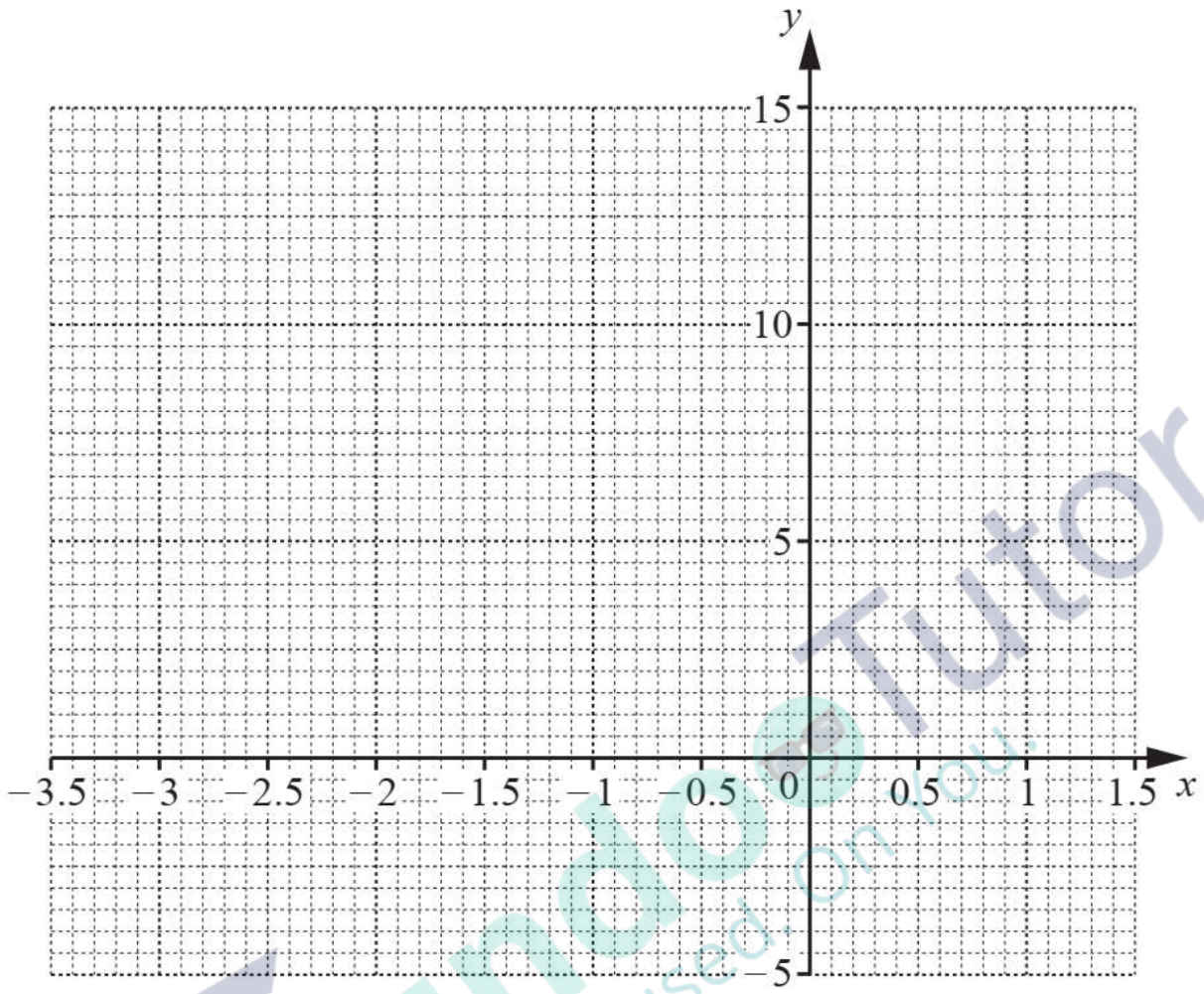
(b) On the grid, draw the graph of $y = x^3 + 3x^2 + 2$ for $-3.5 \leq x \leq 1.5$ [4]

(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]

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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 $0.15 \leq x \leq 3.5$

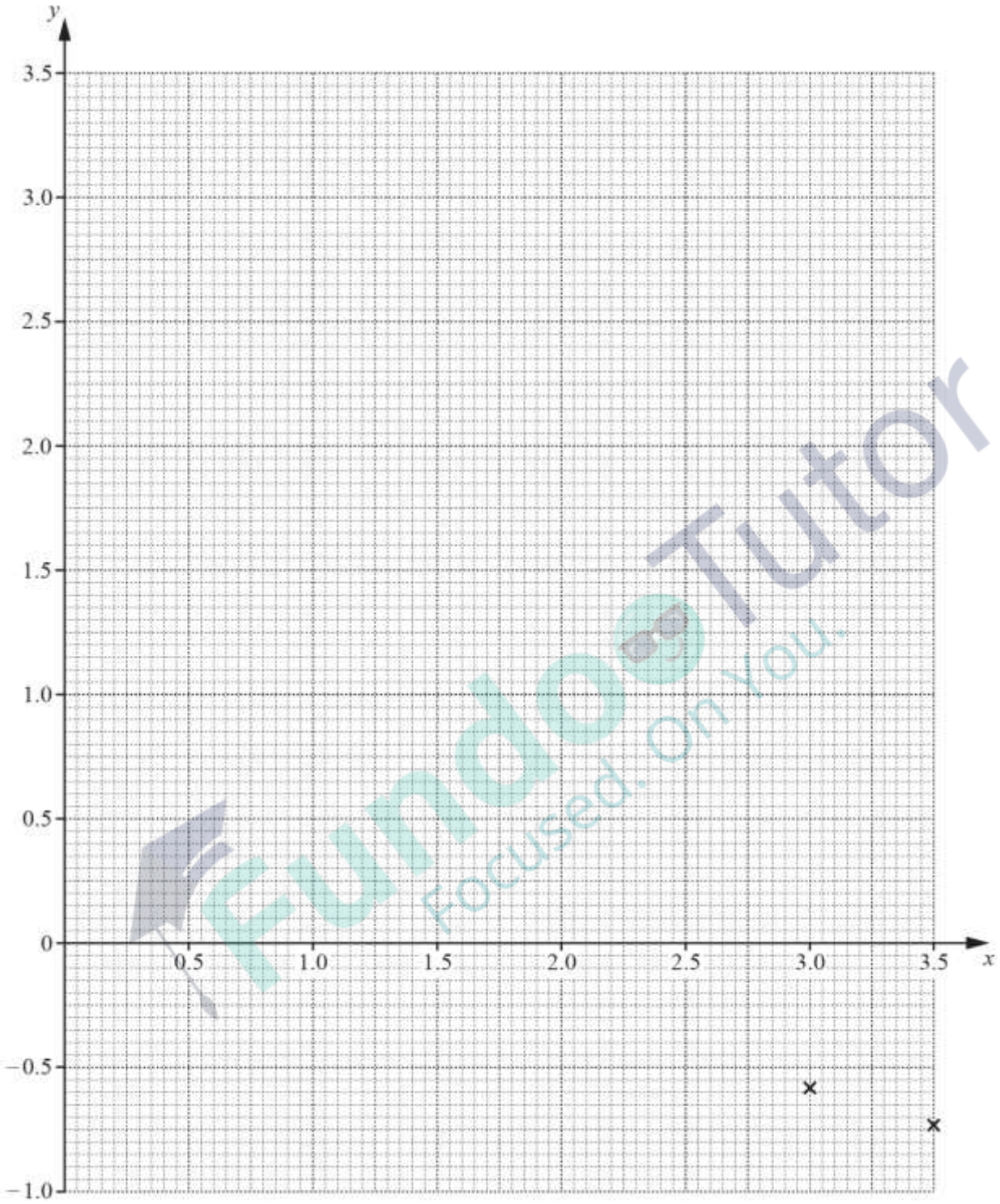
x	0.15	0.2	0.5	1	1.5	2	2.5	3	3.5
y	3.30		0.88		−0.04		−0.43	−0.58	−0.73

(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]

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(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 $y = \frac{1}{2x} - \frac{x}{4}$ for $0.15 \leq x \leq 3.5$ [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 $(2 - x^2)/4x$

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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

$x^2 - \frac{2}{x} - 7 = -3x$ for $-3 \leq x \leq 3$ [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]

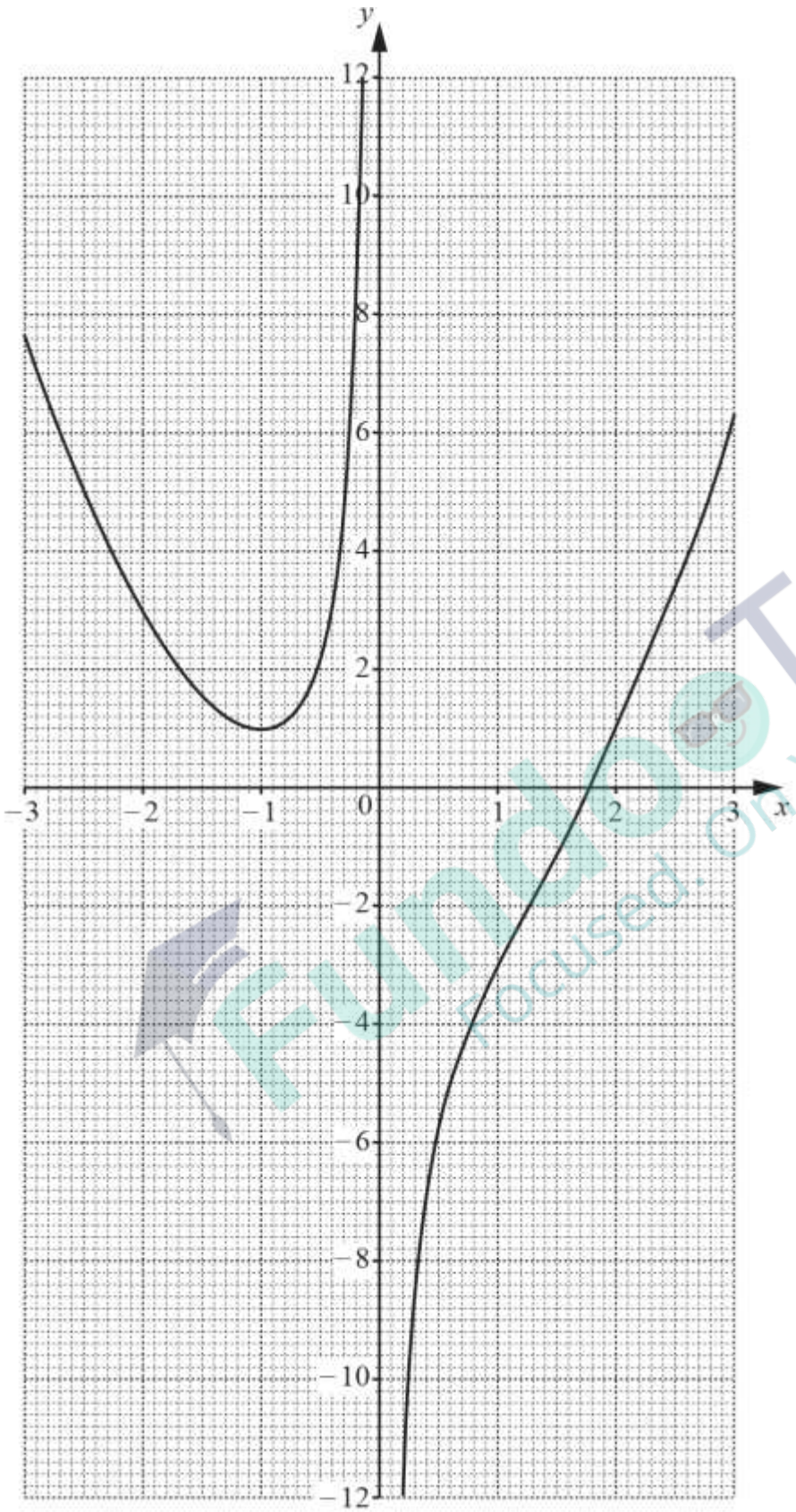
x	−3	−2	−1	0	1	2	3
y			2	1	0.5		0.125

(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 – 3*x* 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

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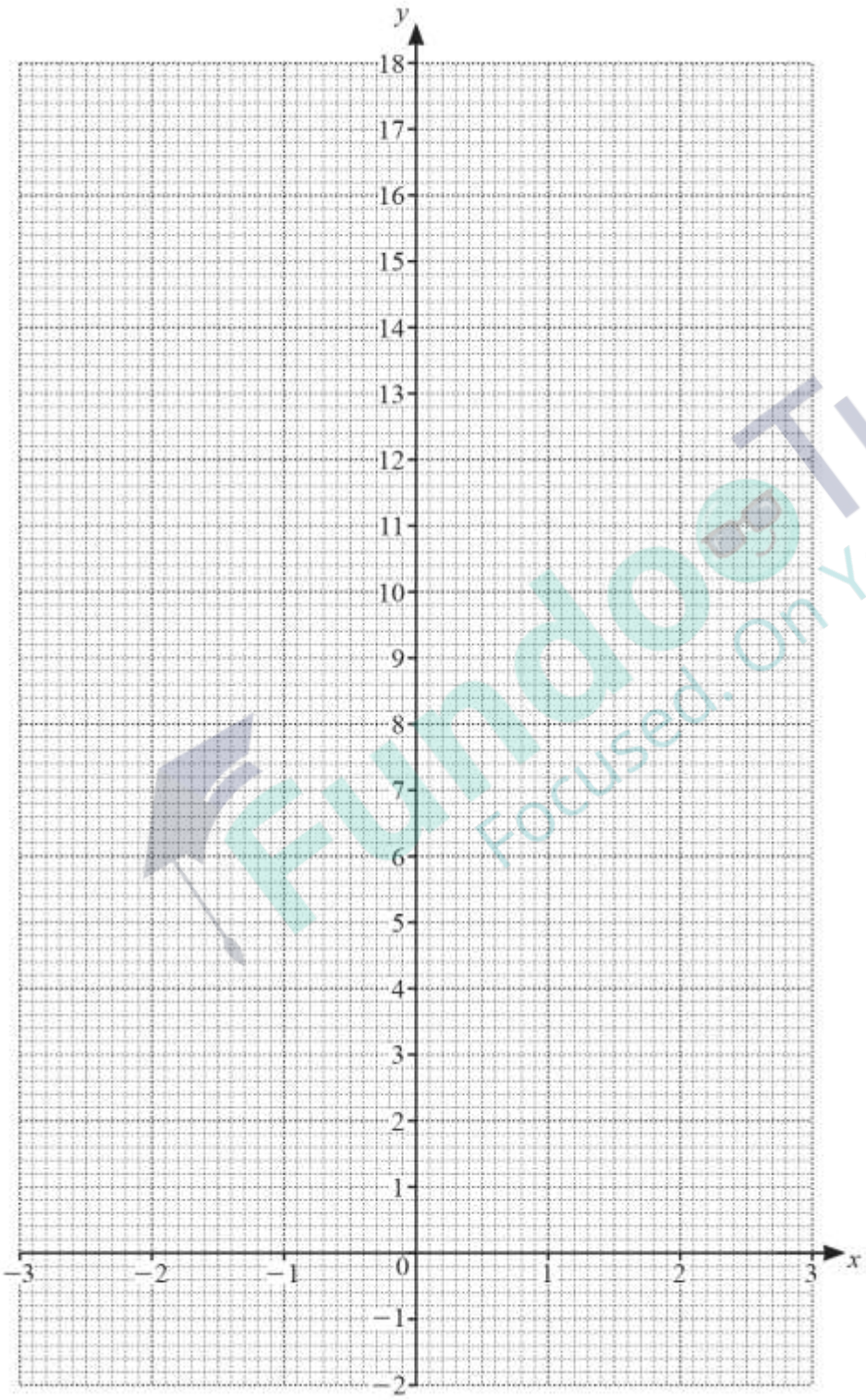


[Grid for Q6]

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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]

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(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 to 0.6 ≤ x ≤ 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]

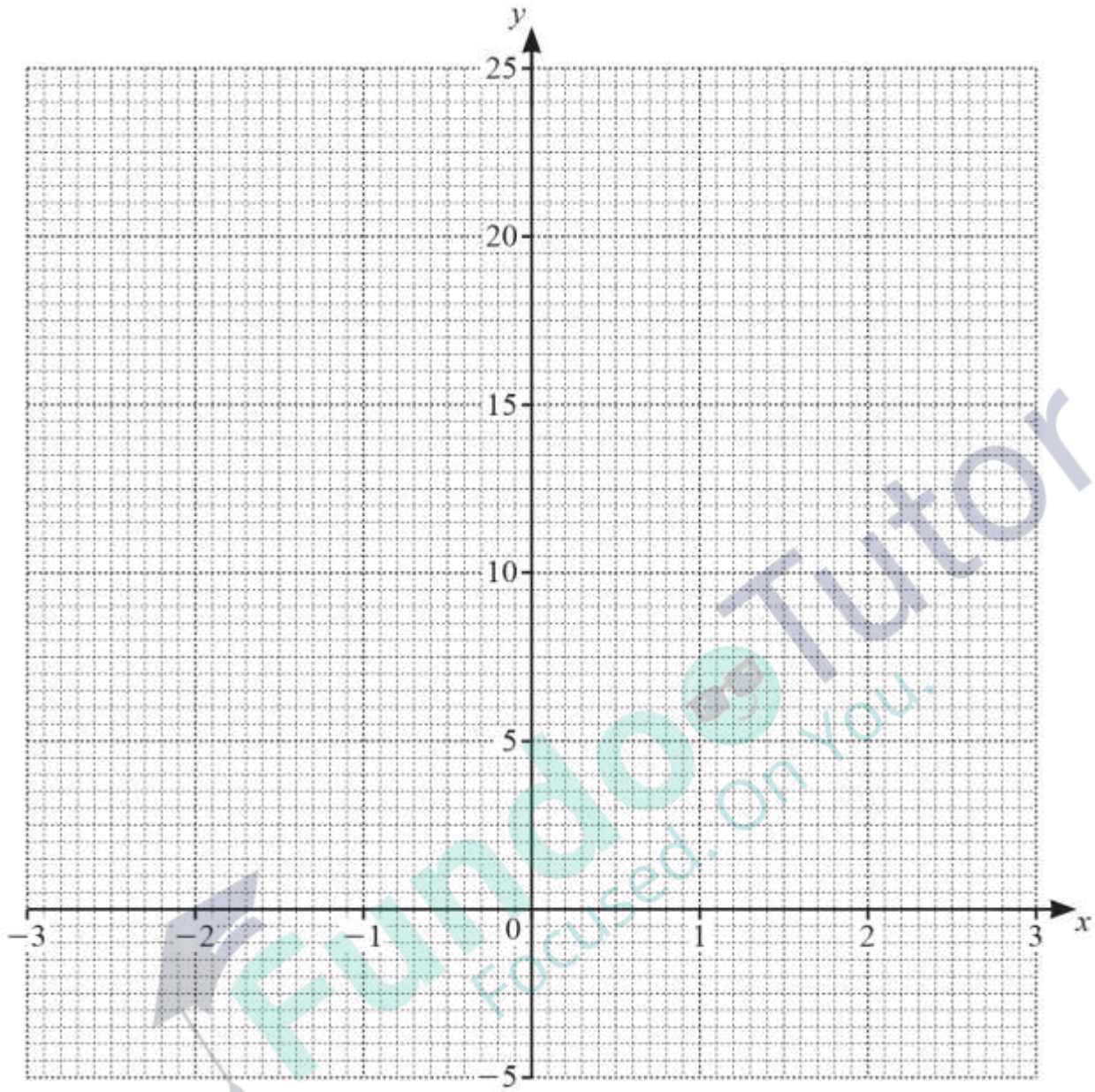
(b) On the grid, draw the graph of $y = x^3 + x^2 - 5x$ for -3 ≤ x ≤ 3 [4]

(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 ≤ x ≤ 3 [1]

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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

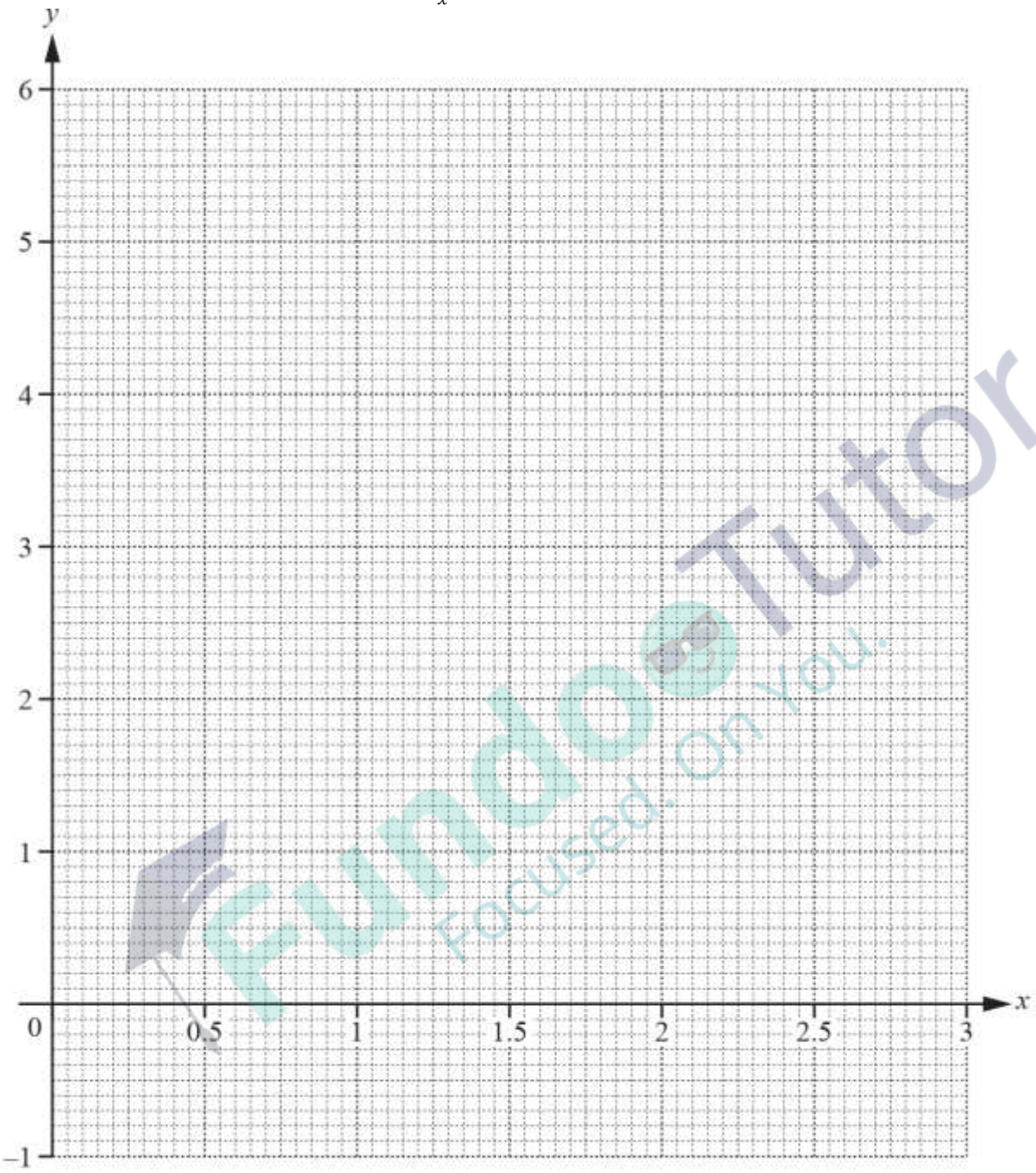
8. The table shows some values for $y = 2x + \frac{1}{x} - 3 \; for \; 0.125 \leq x \leq 3$.

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]

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



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(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.

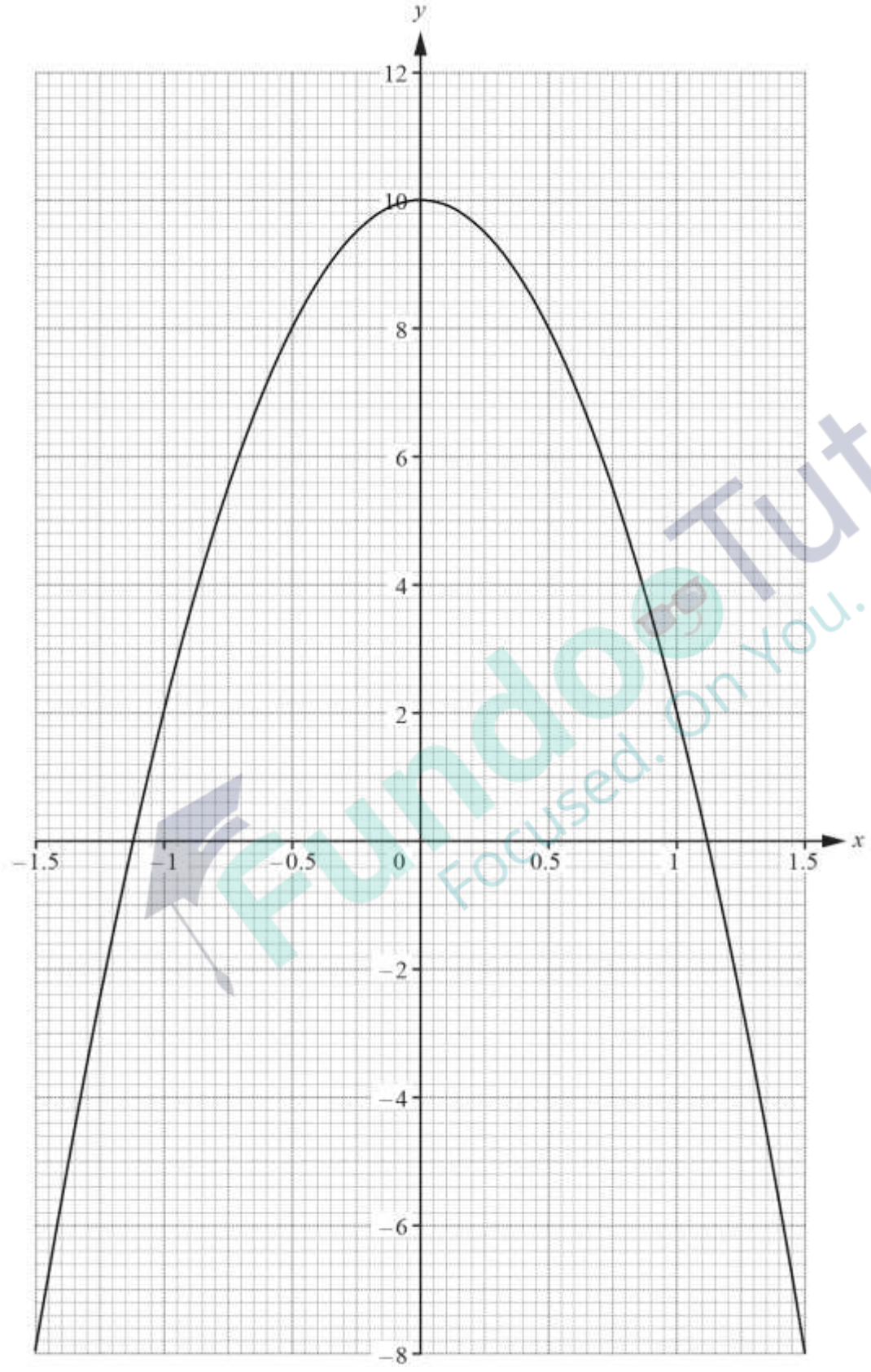
(i) Write down the equation of this straight line. [2]

(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

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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

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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 ≤ x ≤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 = -2 x + 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 ≤ x ≤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]

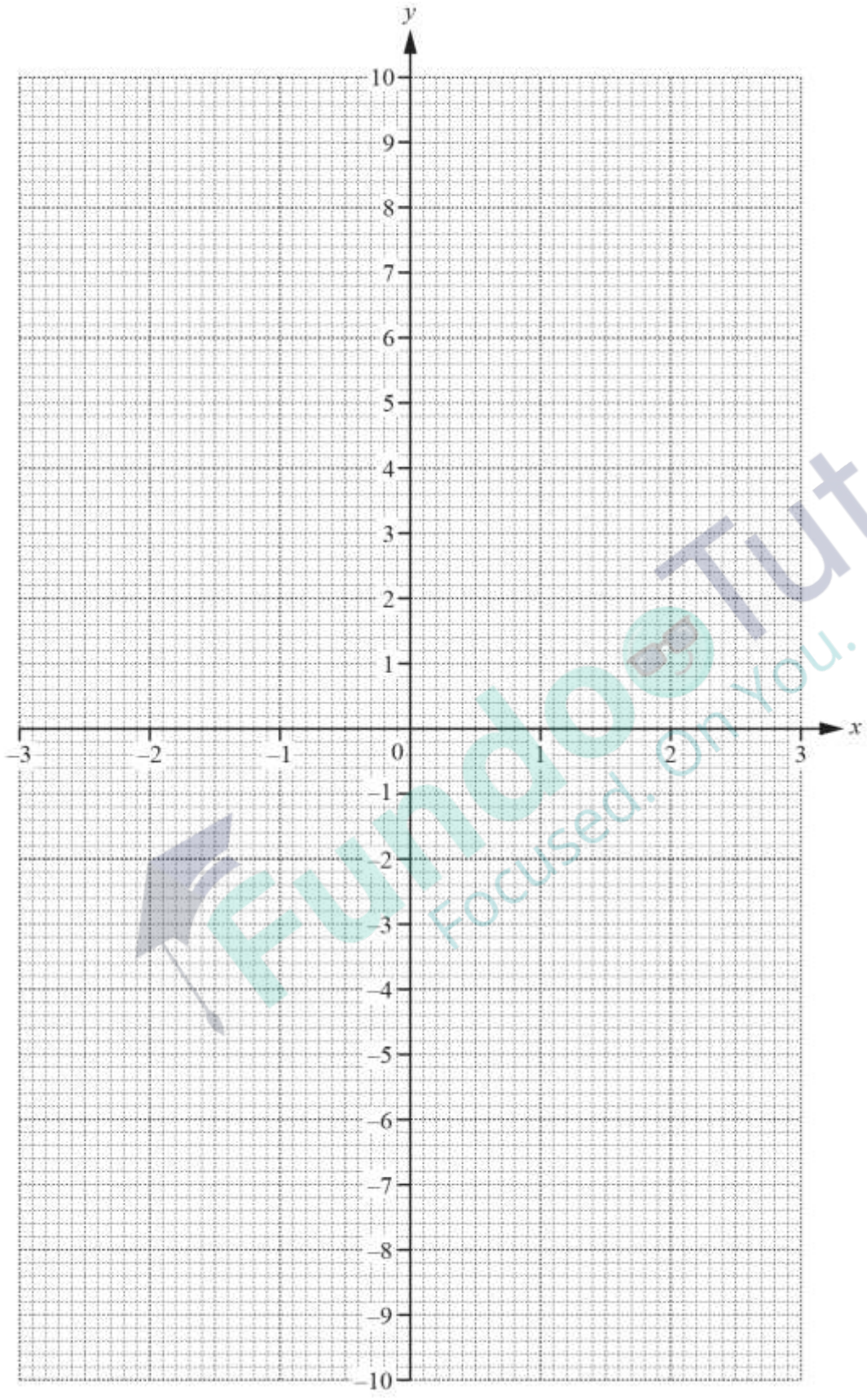
(ii) $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$ [3]

(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

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[Grid for Q10]

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

Complete the table. [2]

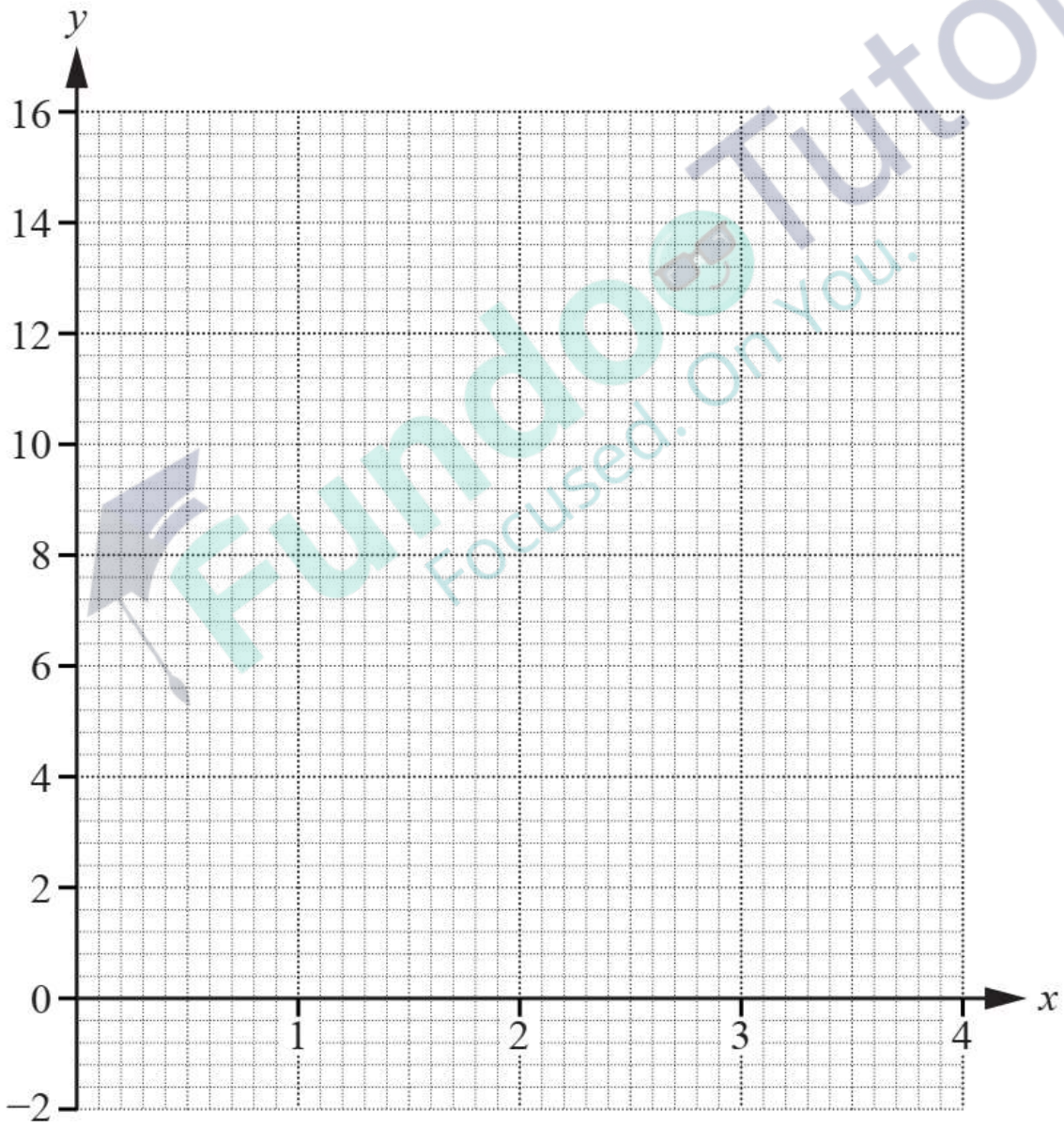
x	0	1	2	3	4
y		2	4	8	

(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 $0 \le x \le 4$. [6]



(c) Use your graphs to solve the equations.

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

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

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(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]

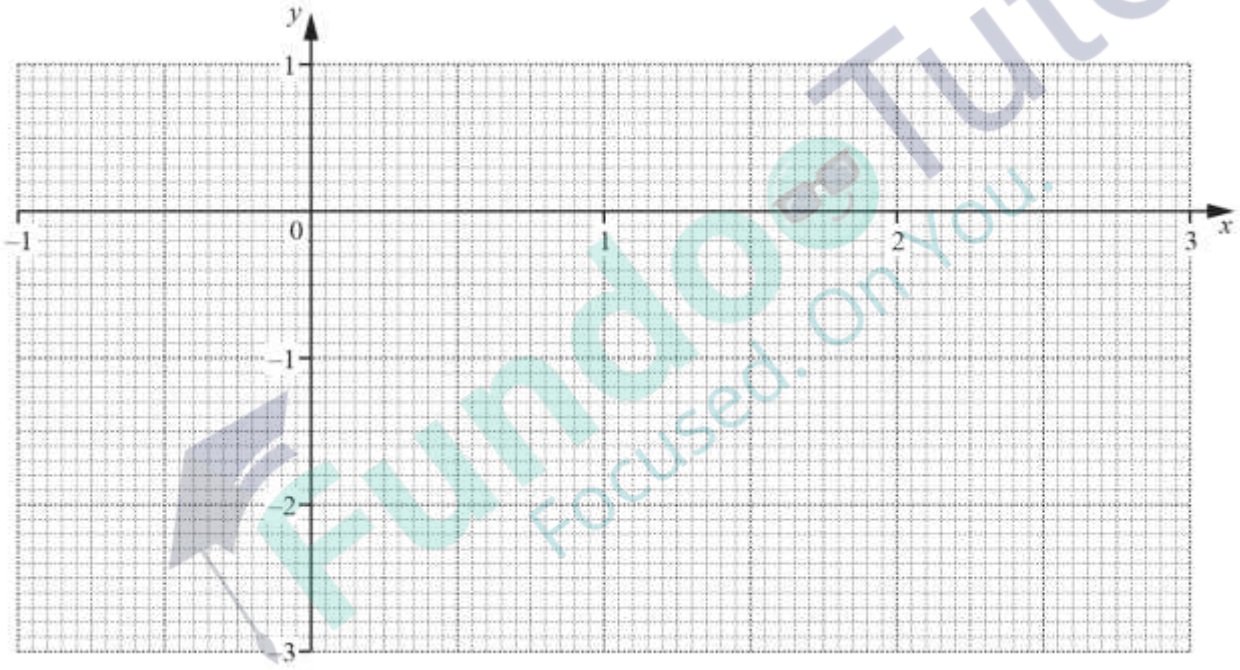
0580/43/M/J/18 Q2) (a)(i) 1,16 (a)(ii) 14,-2(c)(i) 3.5 to 3.7 (c)(ii) 2.65 to 2.8 (d)(ii) Tangent (2, 10)

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 ≤ x ≤ 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

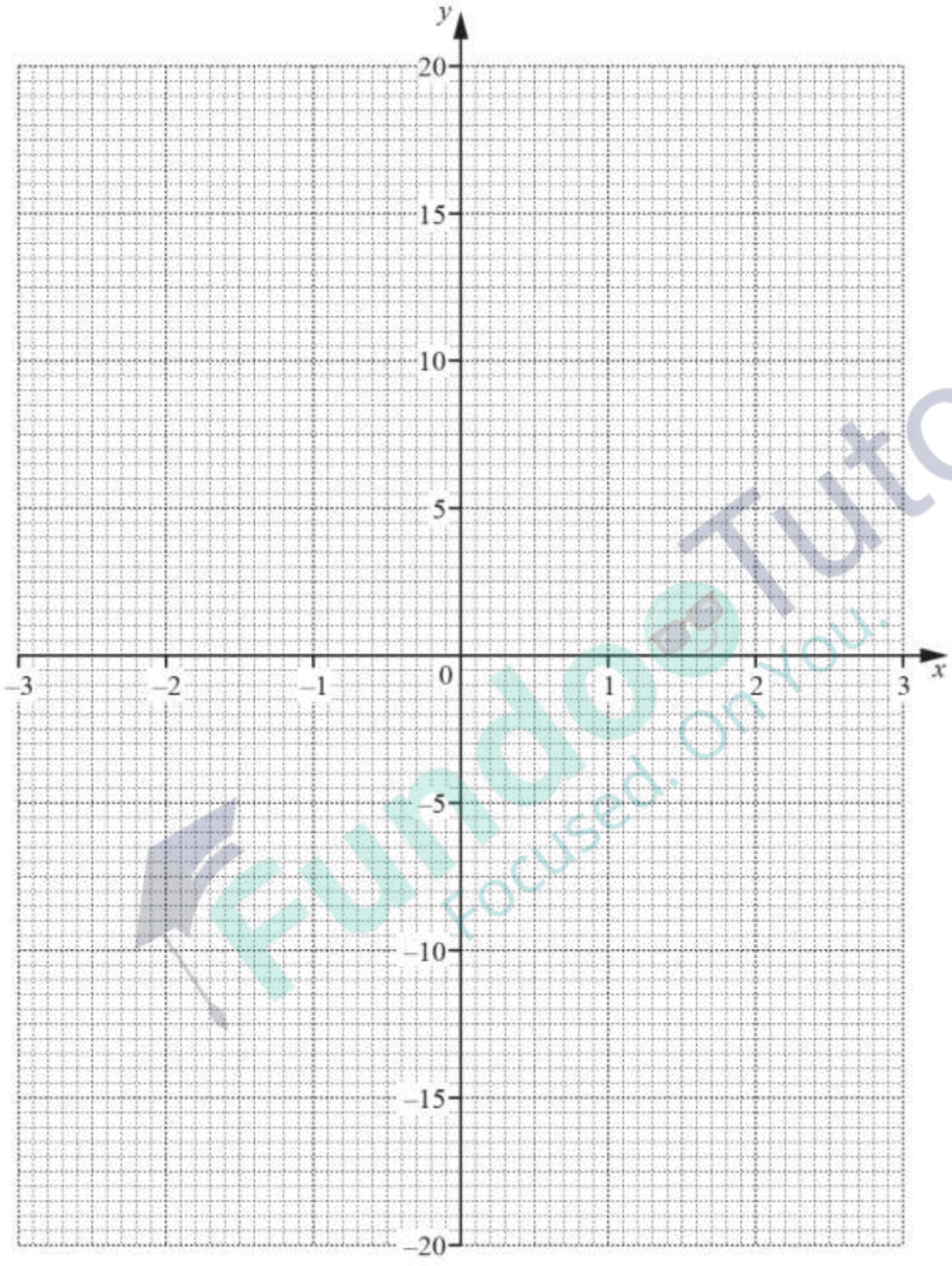
13. The table shows some values of $y = x^3 - 3x - 1$

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]

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(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 to 2.2, –1 to 2.5) (c)(iii) [y =] 9x – 17 final answer (d) y = 3x + 2 ruled correctly and –2.2 to –2.1 –0.6 to –0.4 , 2.6 to 2.8

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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 ≤ x ≤-0.5 is drawn on the grid.
On the same grid, draw the graph of y = f(x) for 0.5 ≤ x ≤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

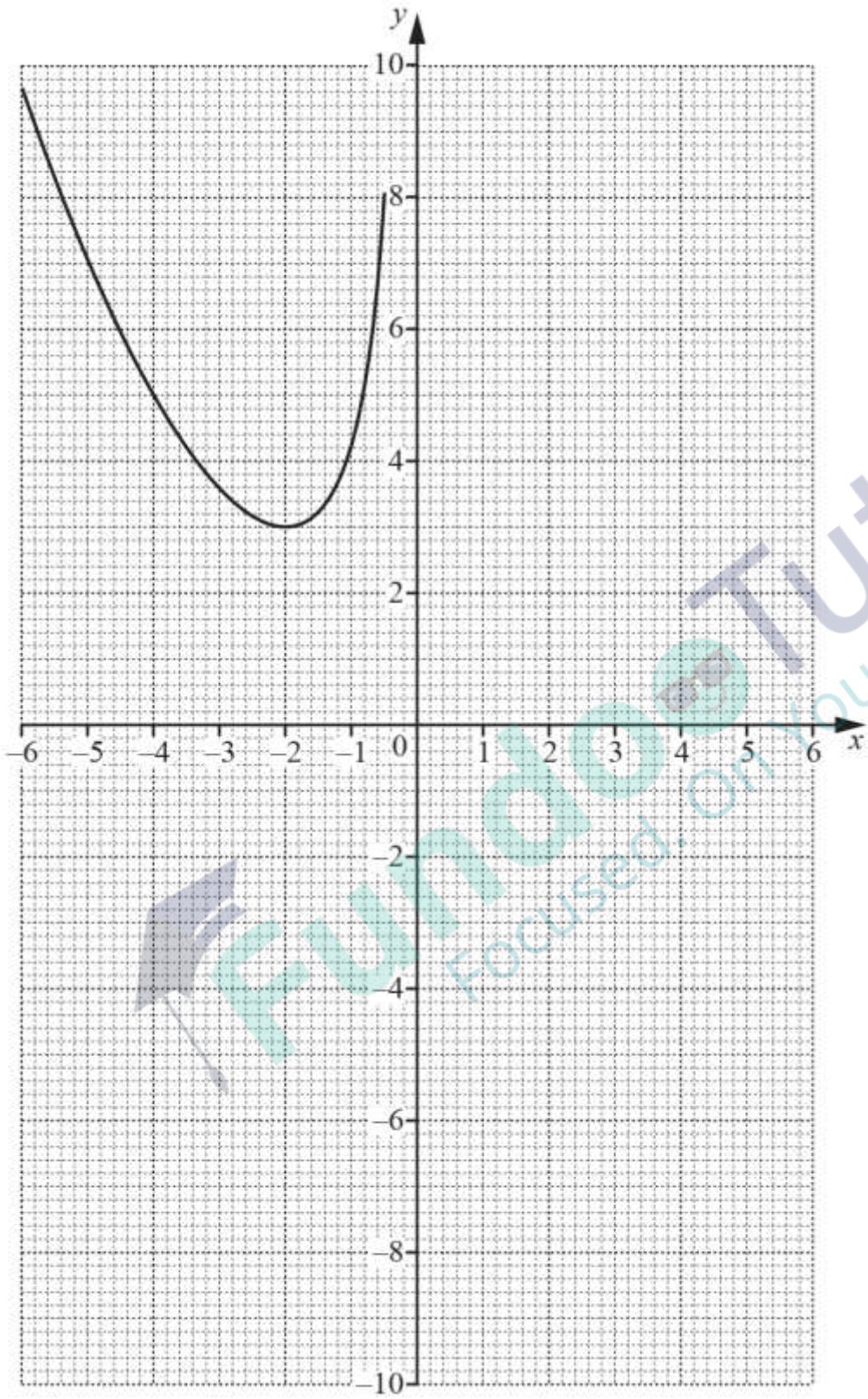
(e) On the same grid, draw the graph of y = g(x) for -4 ≤ x ≤ -1 and 1 ≤ x ≤ 4 [4]

(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]

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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 > their (f)(i) (g)$\frac{x^2}{4} = \frac{9}{x} + \frac{4}{x}$ or $\frac{x^3}{4} - 4 = 9$, 52

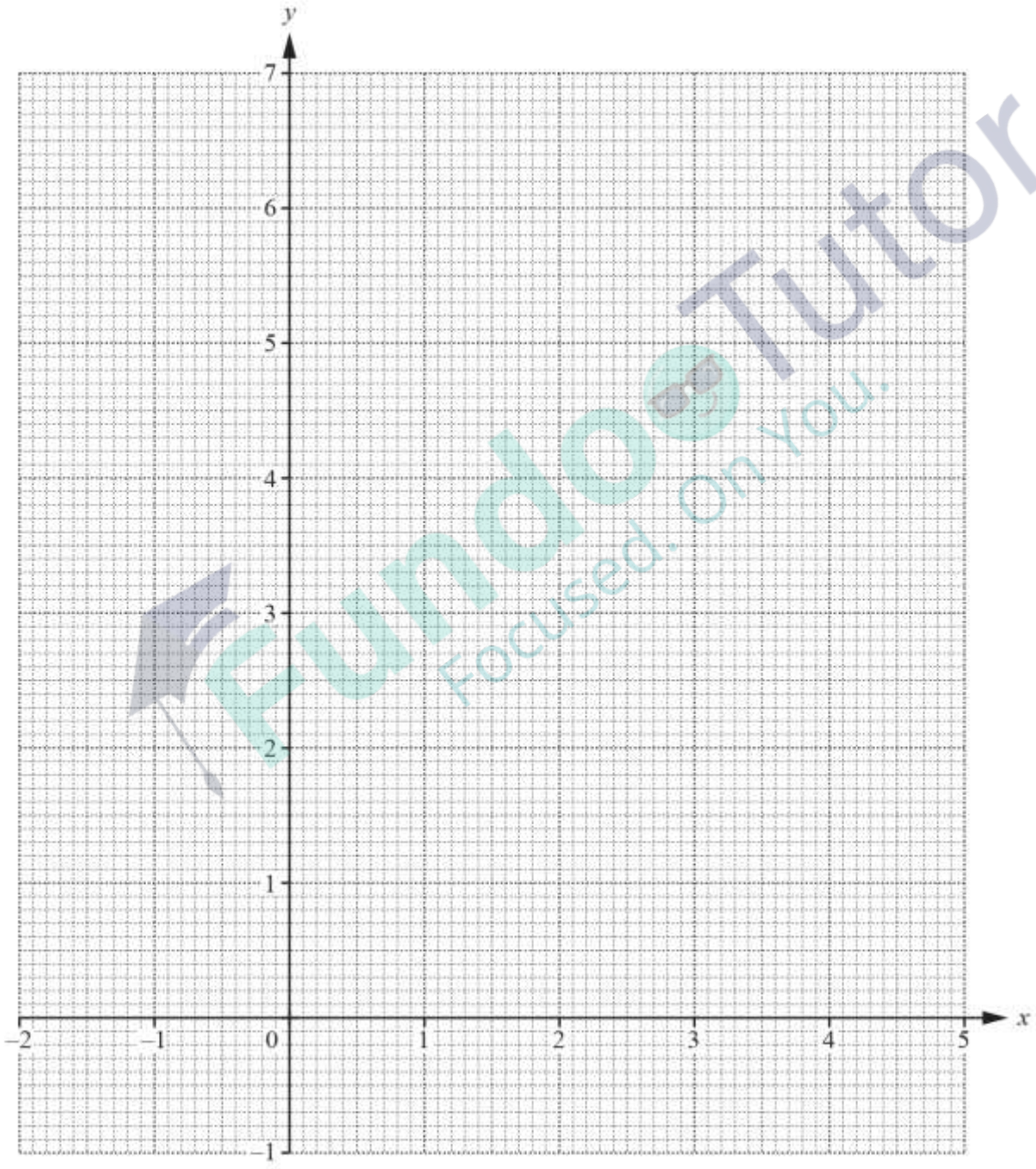
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15. The table shows some values for $y = 1.5^x - 1$

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]

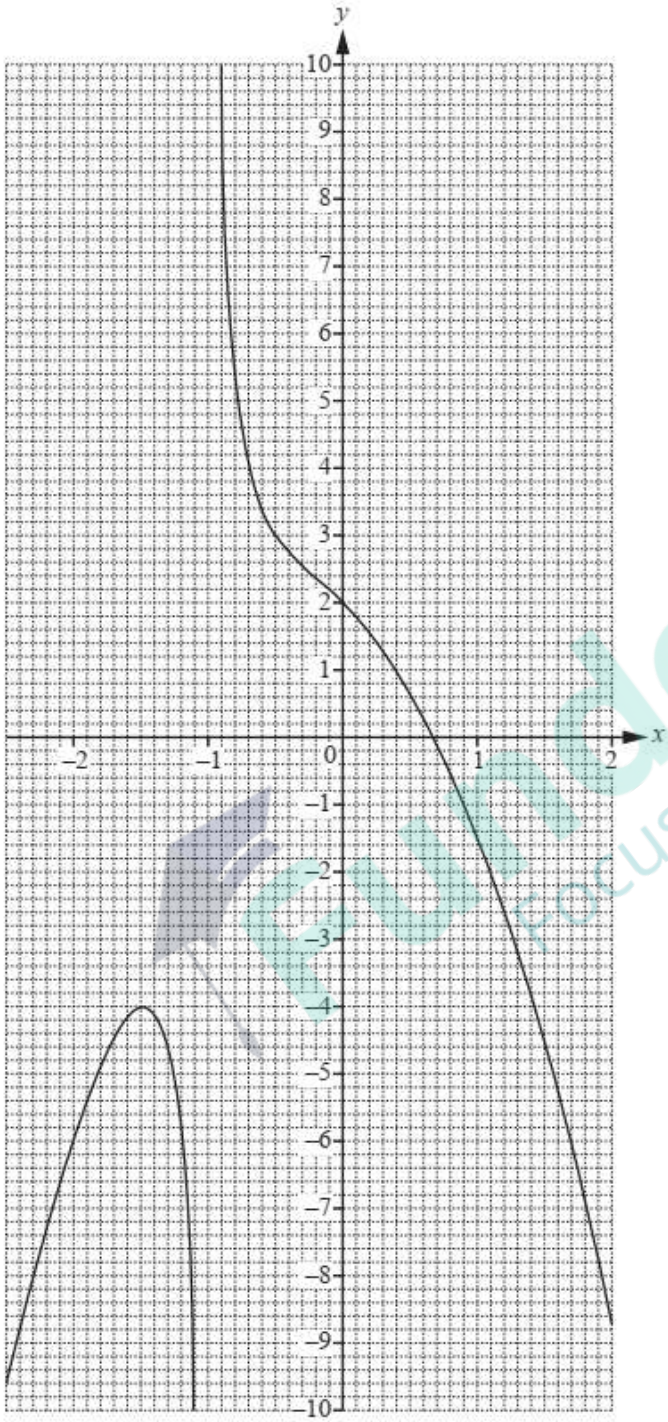
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(iii) Work out the gradient of this tangent. [2]

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]

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

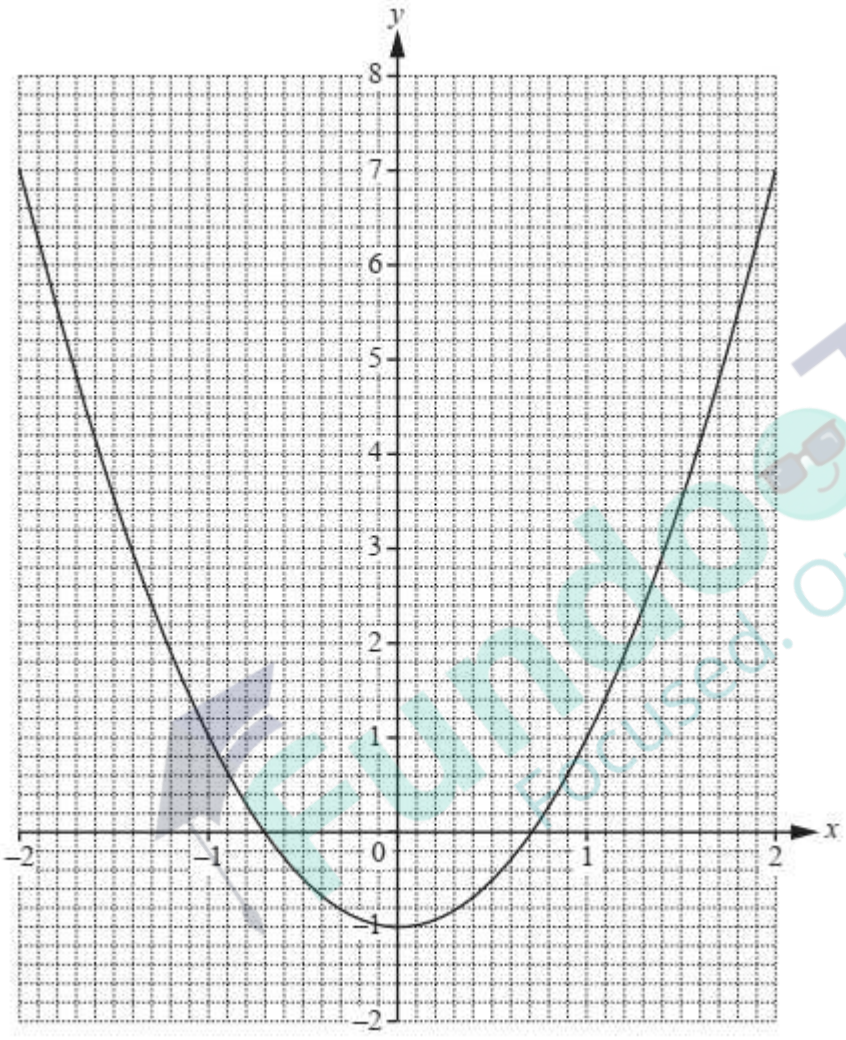
(e) Draw a tangent to the graph of y = f(x) at the point where x = 1.

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 ≤ x ≤ 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 ≤ x ≤ 2. [3]

(d) Use your graphs to solve

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(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) = ... g (-5) = ... g (-10) = ... [1]

(ii) Complete the statement.

As x decreases, g(x) approaches the value ..... [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 to –0.8)< x < their(1.1 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.

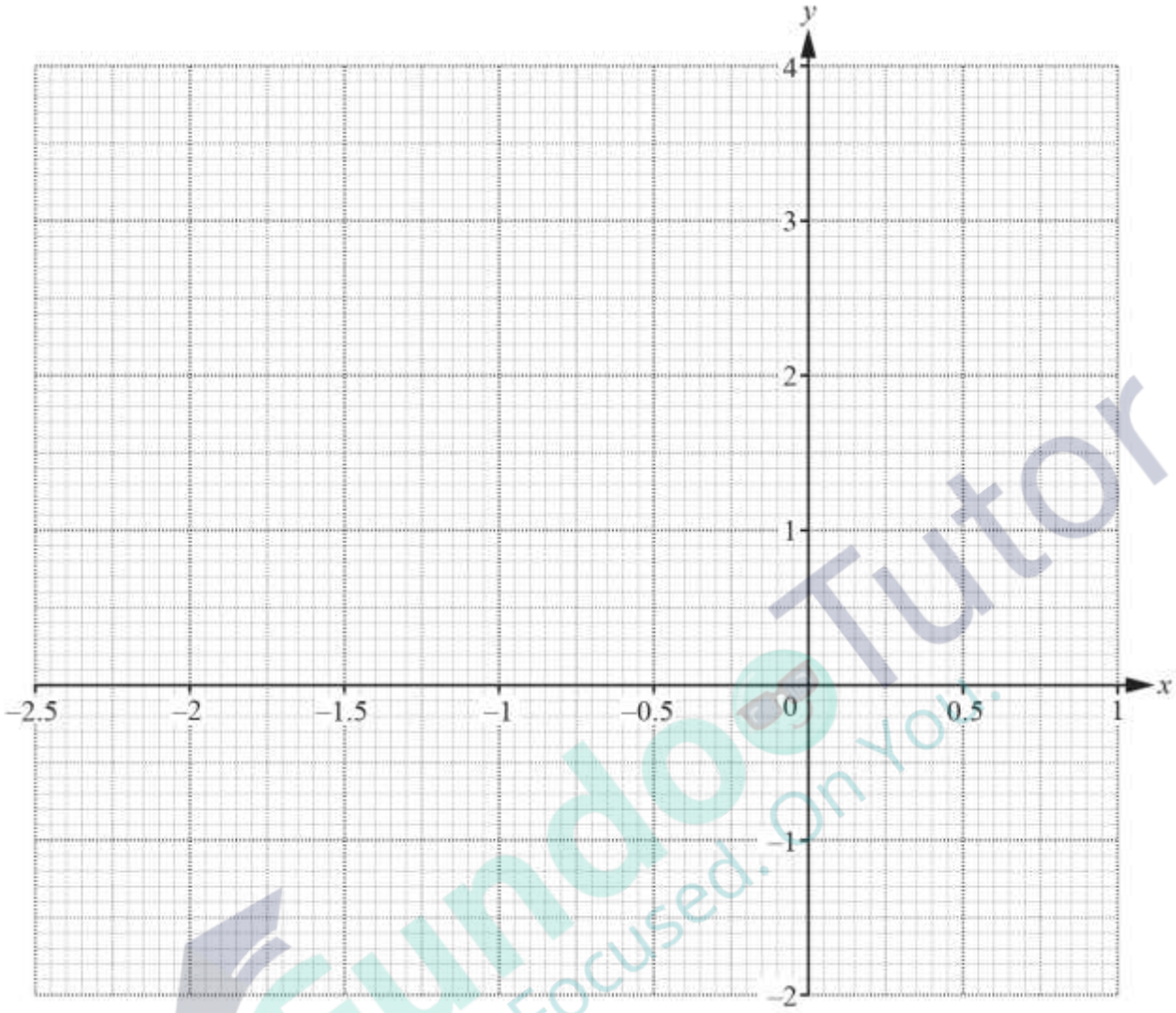
Write down the equation of this straight line. [1]

(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]

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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)

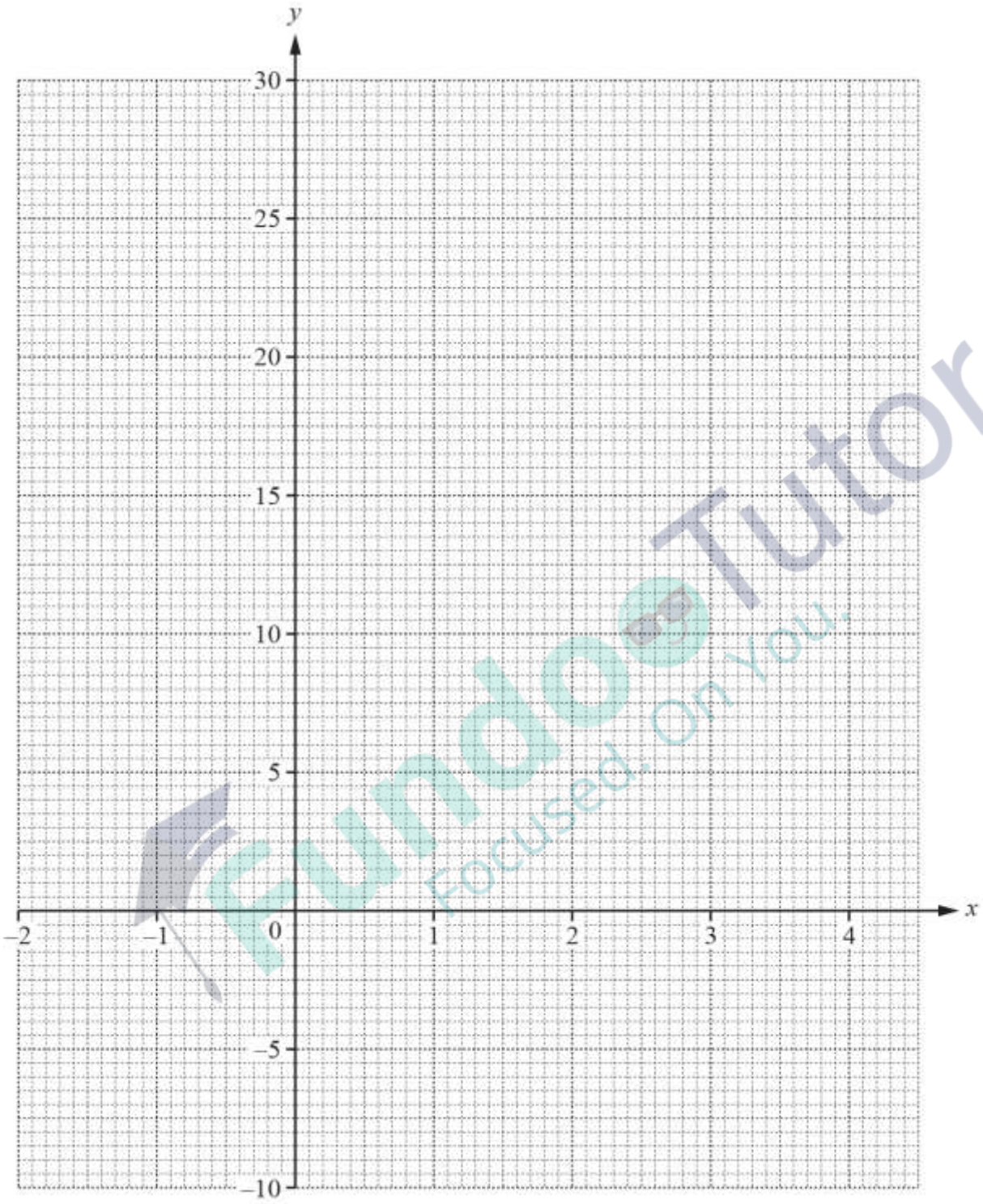
19. f(x) = $x^3 - 4x^2 + 15$

(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 $-2 \le x \le 4.5$. [4]

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

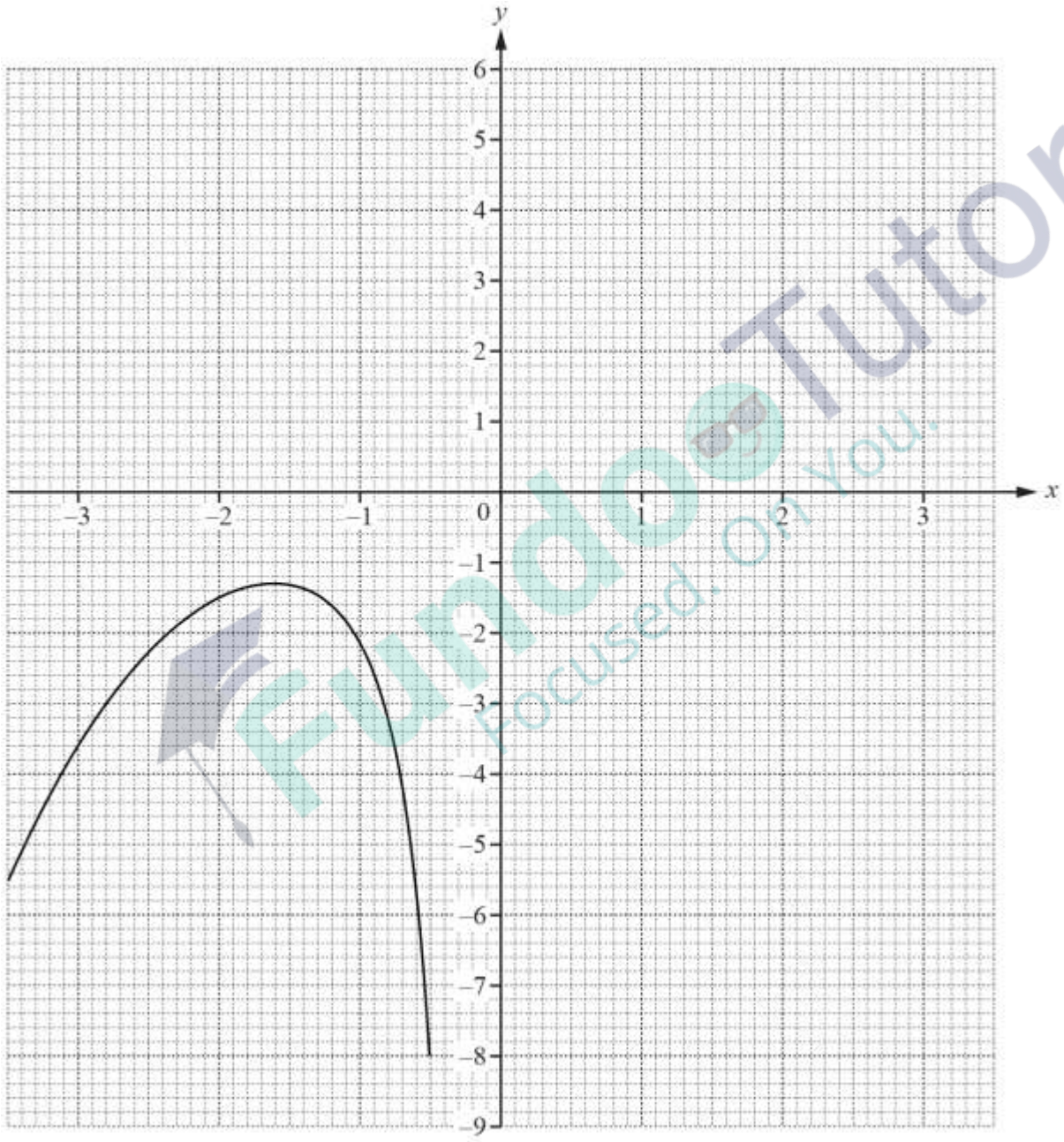
(a) Complete the table of values. [2]

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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]

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(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 ⩾ −1 (d)(ii) Any integer k < –1 (e) 2.5 to 4 (f)(i) $y = 6 - x$, $2.85 \leqslant x \leqslant 3$
(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]

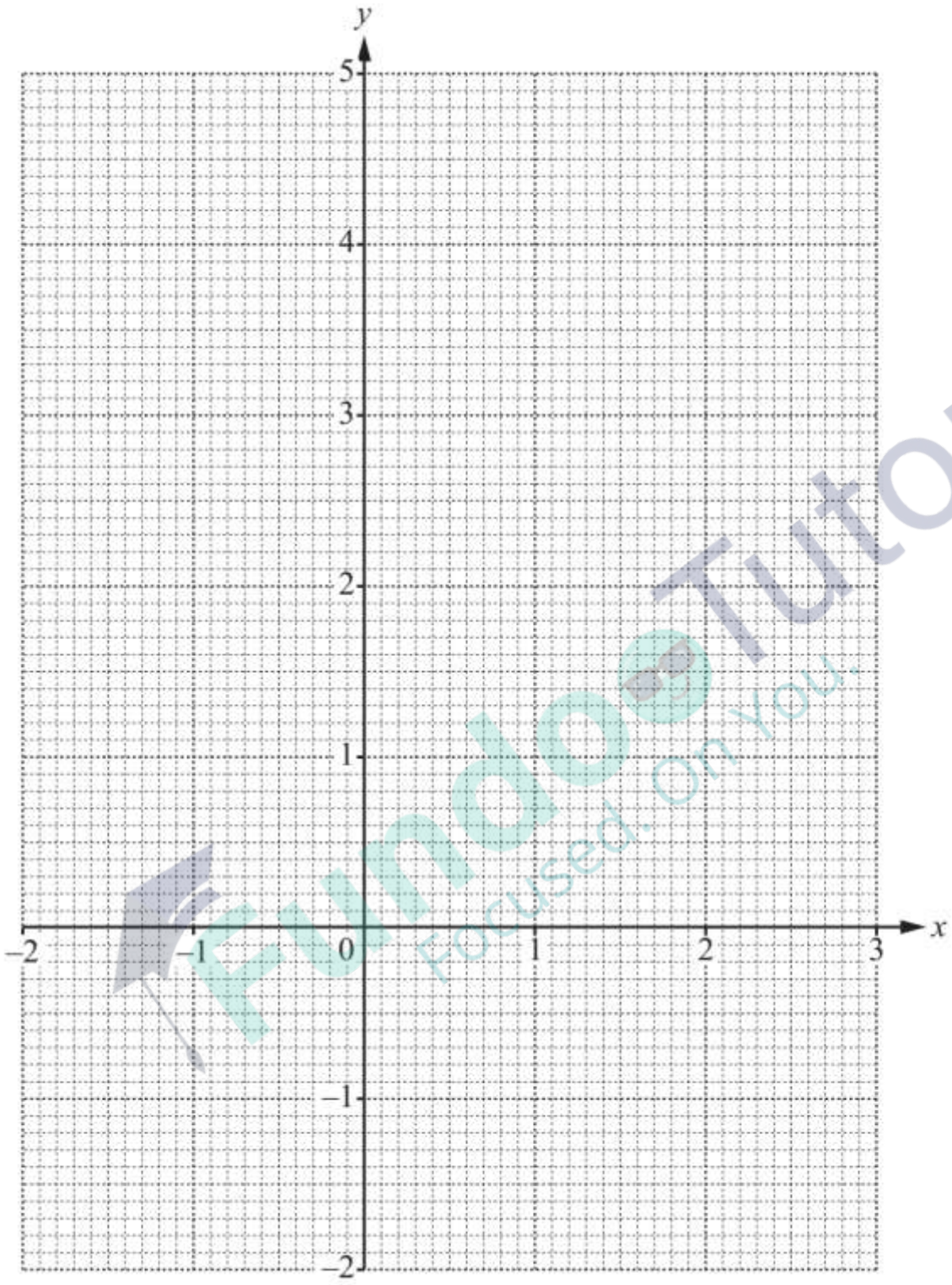
(d) The line $y = ax + b$ can be drawn on the grid to solve the equation $\frac{1}{x^2} = 2.5 - 2x$

(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]

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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

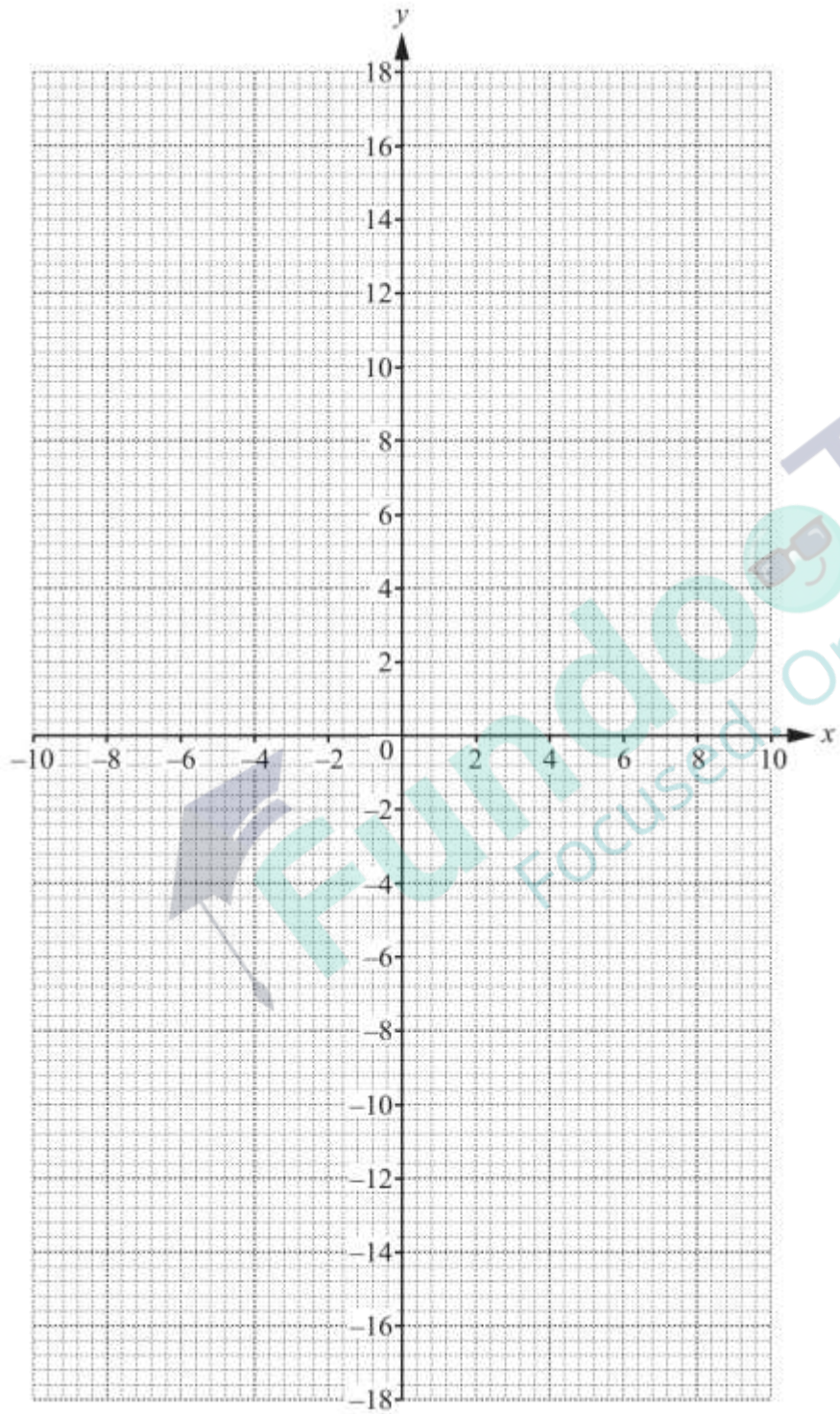
22. f(x) = $\frac{20}{x} + x$

(a) Complete the table. [2]

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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 ≤ x ≤ -1.6 and 1.6 ≤ x ≤ 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.

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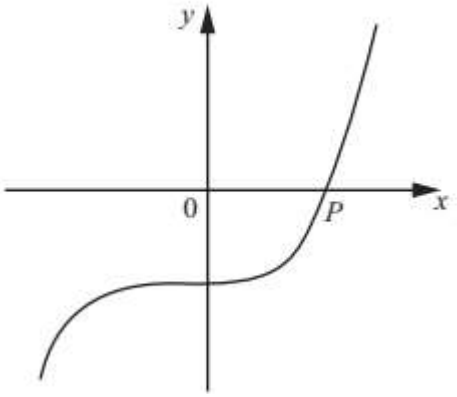
Write down the co-ordinates of the other point on the graph of y = f(x) where the gradient is -4. [1]

(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 ≤ x ≤ 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 ≤ x ≤ -0.1 and 0.2 ≤ x ≤ 1 [5]

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

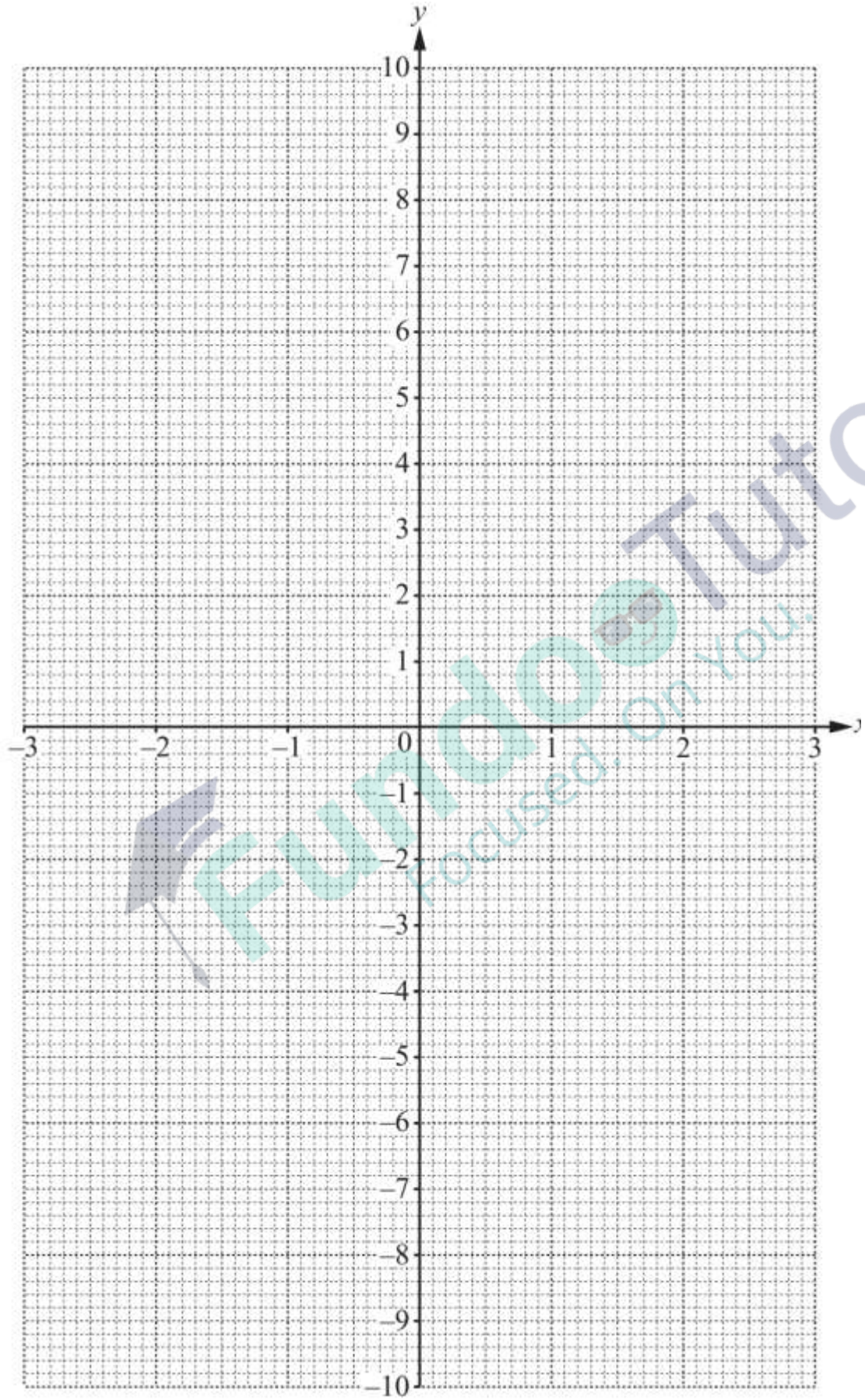
(c) Find an integer k, for which f(x) = k has one solution [1]

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

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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 $\leqslant$ – 3 (d) (i) Correct line $y = -5x - 2$ ruled and – 0.4 to – 0.2

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

24. The diagram shows the graph of y = f(x) for -3.5 ≤ x ≤ 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 ≤ x ≤-0.5 and 0.5 ≤ x ≤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

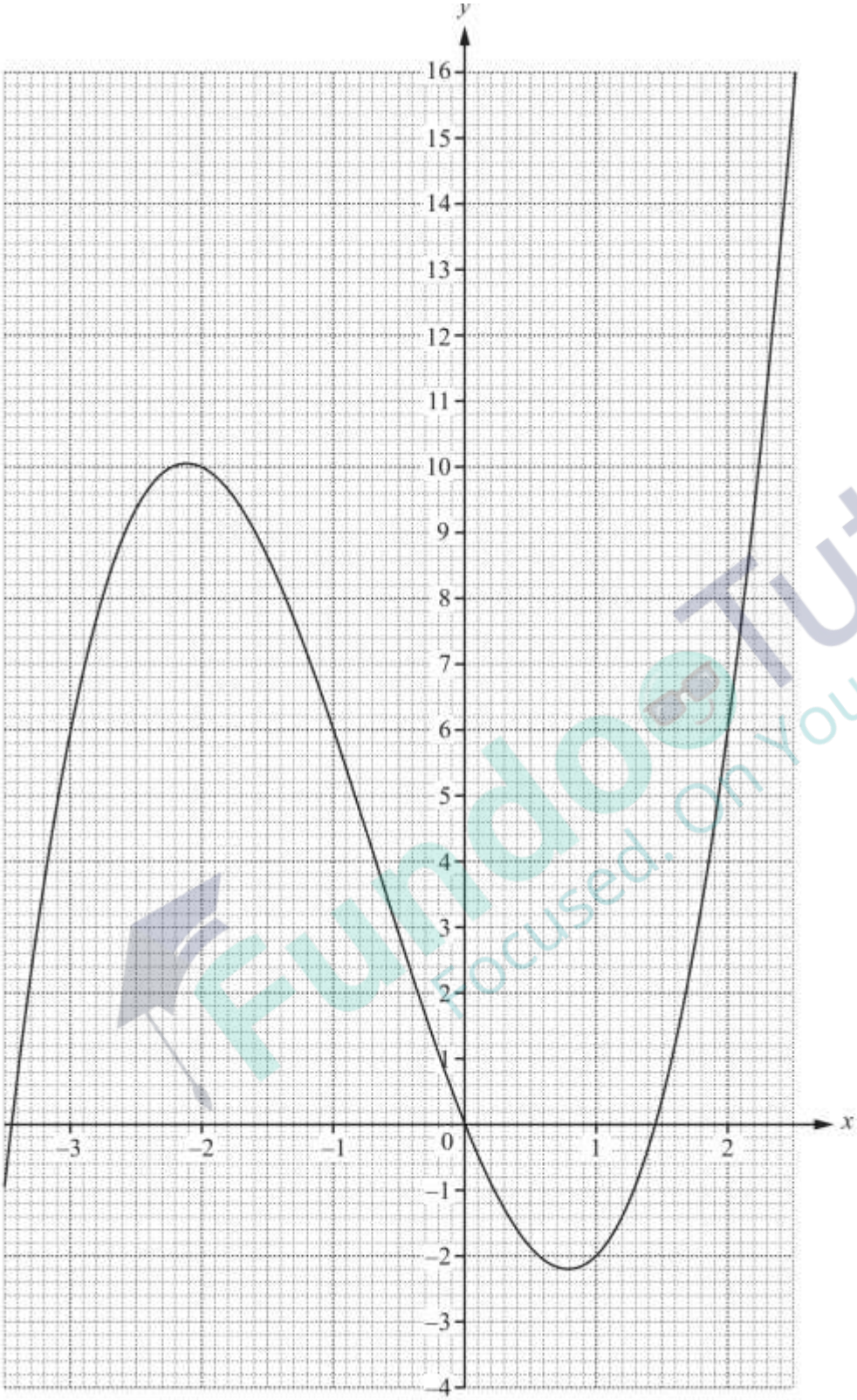
(ii) On the grid opposite, draw the graph of y = g(x). [4]

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

(c) Find gf(–2). [2]

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

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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 –2.1oe
y **= 10 to 10.1 oe (b) (i) 2, –1, 4 (iii) –3.4 to –3.2 and 1.8 to 1.9 (c) 3.2 (d) 1**

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