

Level 3 Algebra - Graphs - Drawing and Using

June 2013 - Question 12

Jan 2014 - Question 19

Jan 2015 - Question 12

June 2015 - Question 9

Jan 2016 - Question 13

June 2016 - Question 15

Jan 2017 - Question 7

June 2017 - Question 9

Jan 2018 - Question 10

June 2018 - Question 13

Jan 2019 - Question 13

June 2019 - Question 4

Jan 2021 - Question 3

Jan 2021 - Question 7

Jan 2022 - Question 12

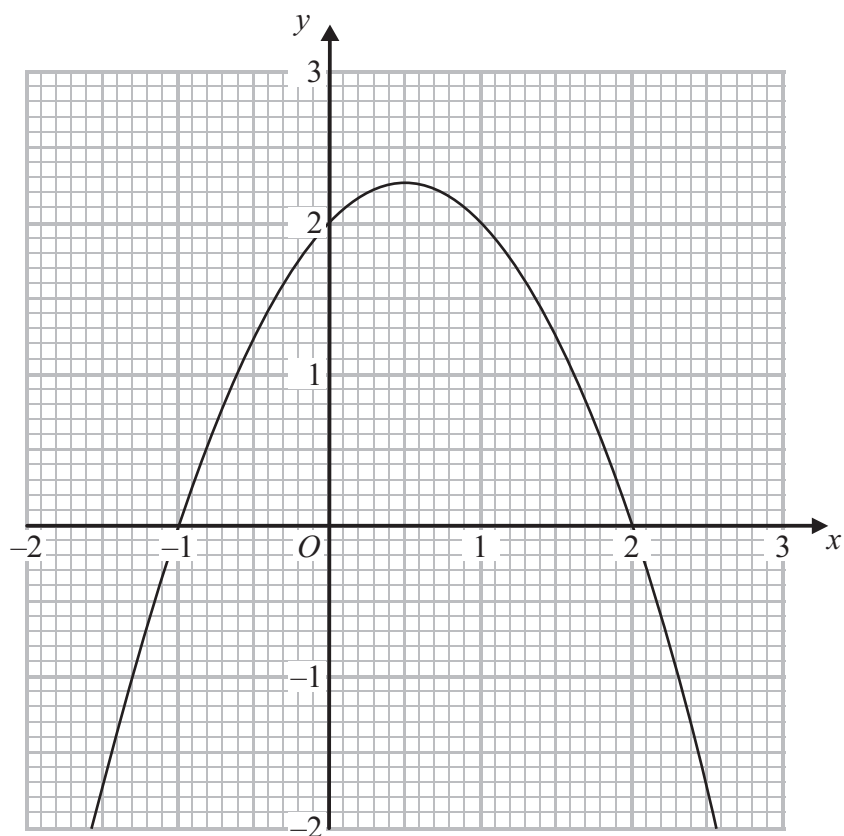
June 2022 - Question 19

Jan 2023 - Question 11

June 2023 - Question 10

Jan 2024 - Question 19

12 Here is a graph of $y = 2 + x - x^2$

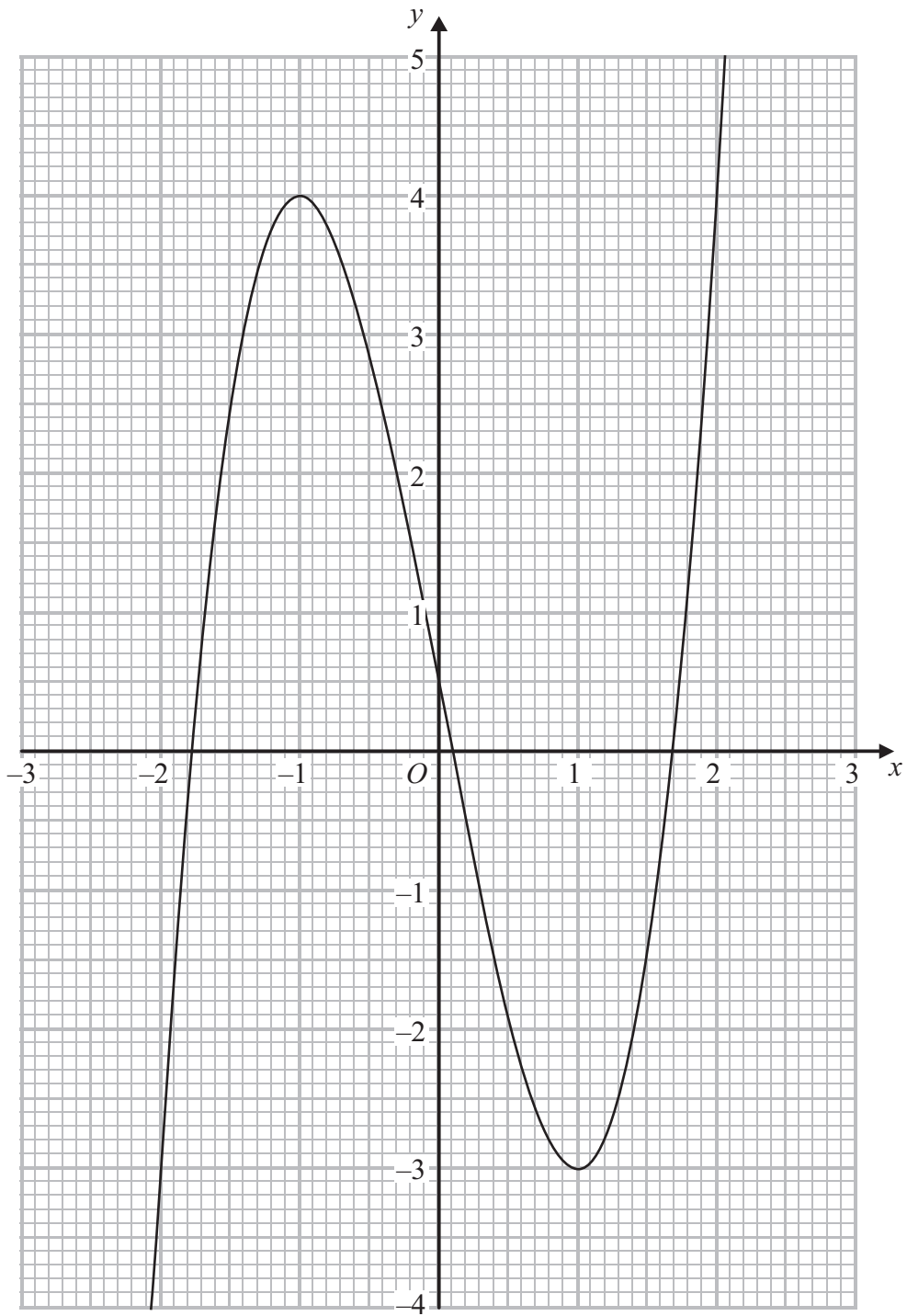


- (a) (i) On the grid, draw the tangent to the curve at the point where $x = 1$
- (ii) Use the graph to find estimates for the solutions of $1 + x - x^2 = 0$

.....
(3)



Here is a cubic graph.



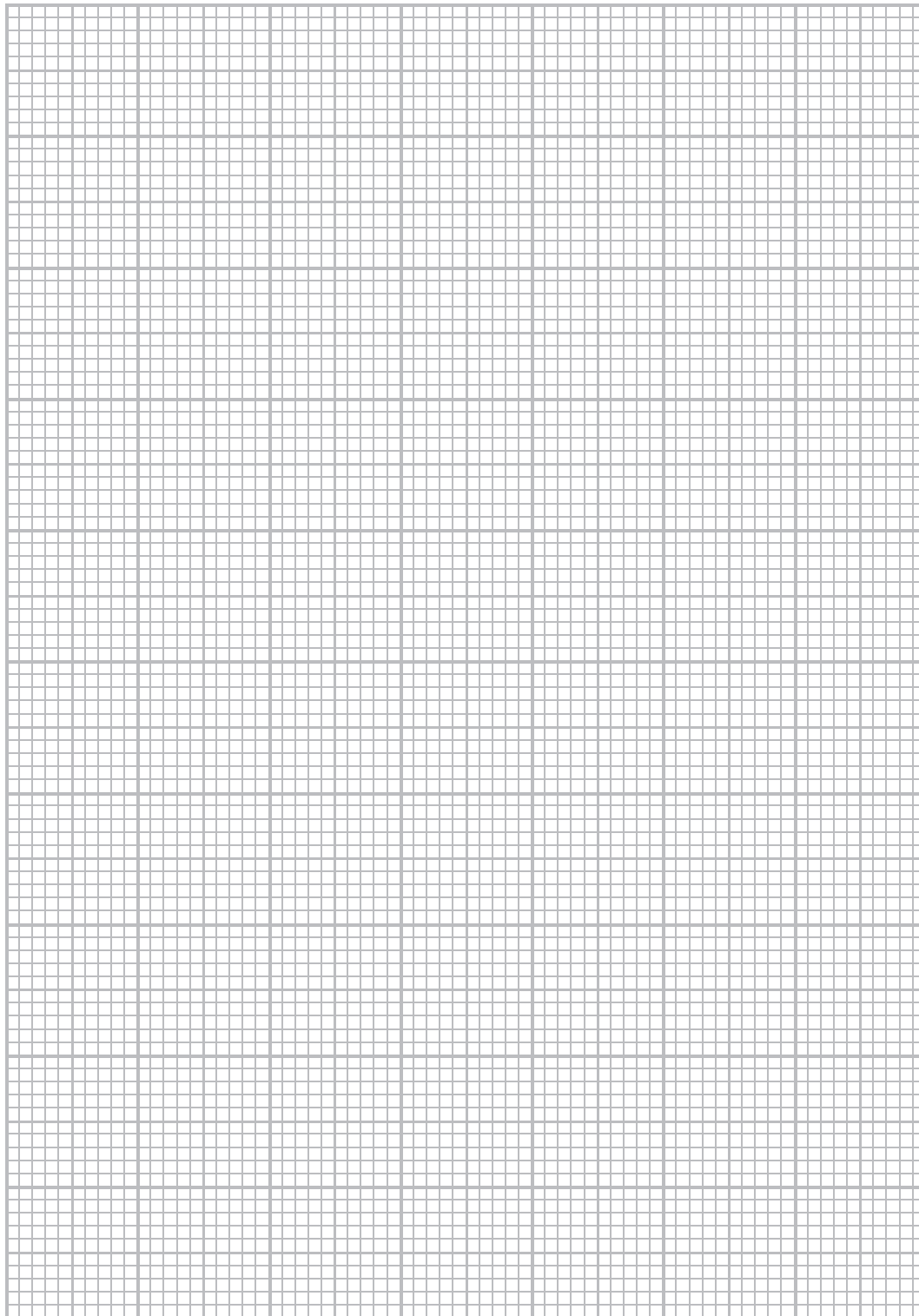
(b) On the graph, mark with a cross (\times) any turning points.

(1)

(Total for Question 12 is 4 marks)



19 (a) On the grid below, draw the graph of $y = x(6 - x^2)$ for values of x from -3 to $+3$



(4)



(b) Use your graph to find estimates for the solutions of $x(6 - x^2) = 1$

.....
(1)

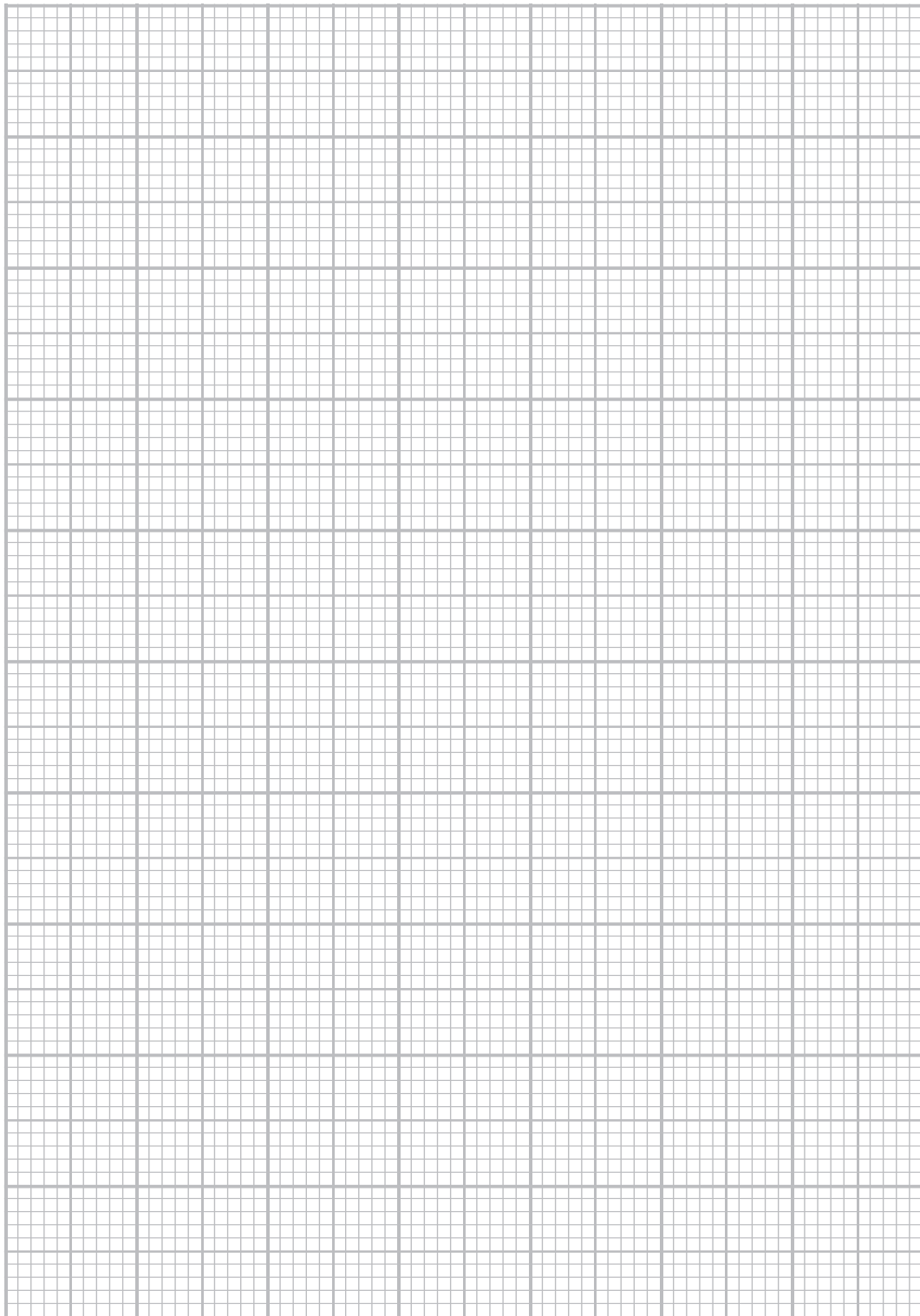
(c) Use your graph to find estimates for the solutions of $x^3 - 4x + 2 = 0$

.....
(2)

(Total for Question 19 is 7 marks)



12 (a) On the grid, draw the graph of $y = 1 + 3x - x^3$ for values of x from -3 to 3



(4)



(b) Use your graph to find estimates for the solutions of $3x - x^3 = 0$
 Give your estimates correct to one decimal place.

.....
 (2)

(Total for Question 12 is 6 marks)

13 The table shows five quadratic equations.

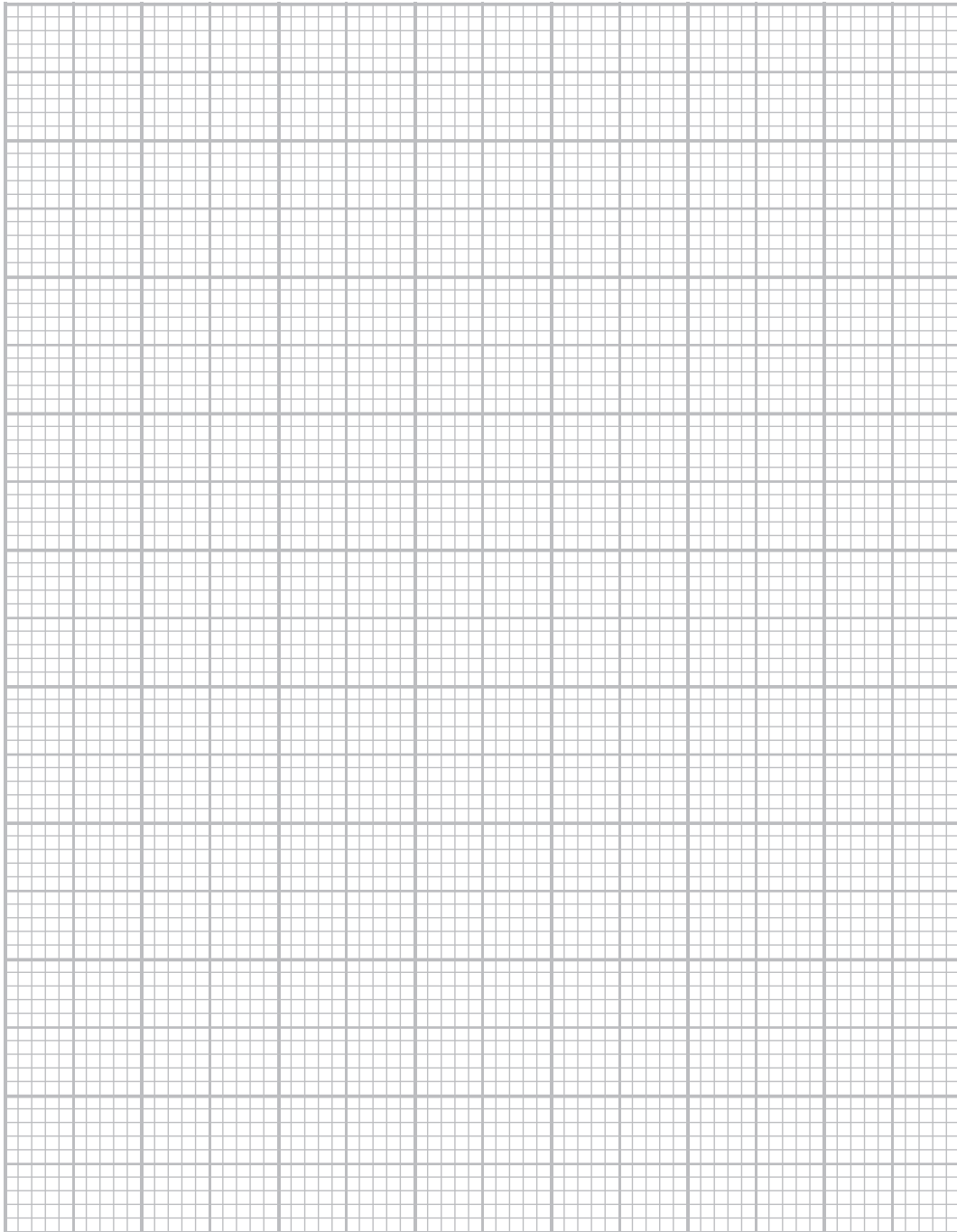
Equation	2 real and different roots	2 real and equal roots	no real roots
$x^2 + 4x + 1 = 0$			
$2x^2 + 3x + 2 = 0$			
$x^2 - 22 = 0$			
$9x^2 - 12x + 4 = 0$			
$25x^2 - 10x - 1 = 0$			

Place one tick in each row to show whether the equation has **2 real and different roots**, **2 real and equal roots** or **no real roots**.

(Total for Question 13 is 3 marks)



9 (a) On the grid below, draw the graph of $y = x^3 - 3x + 1$ for values of x from -2 to 3



(4)



(b) Use your graph to find an estimate for one of the solutions of $x^3 - 3x - 1 = 0$

.....
(2)

(Total for Question 9 is 6 marks)

10 (a) Expand and simplify $(2x - 3)(x + 4)$

.....
(2)

(b) Simplify $(x^{-3})^3$

.....
(1)

(c) Simplify $(4y^4)^{\frac{1}{2}}$

.....
(1)

(d) Write $\frac{x}{x-3} + \frac{x-2}{x+3}$ as a single fraction.

Give your answer in its simplest form.

.....
(3)

(Total for Question 10 is 7 marks)



13 (a) Complete the table of values for $y = x(x^2 + 1)$

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y		-4.875			0	0.625		4.875	

(2)

(b) On the grid opposite, draw the graph of $y = x(x^2 + 1)$ for values of x from -2 to 2

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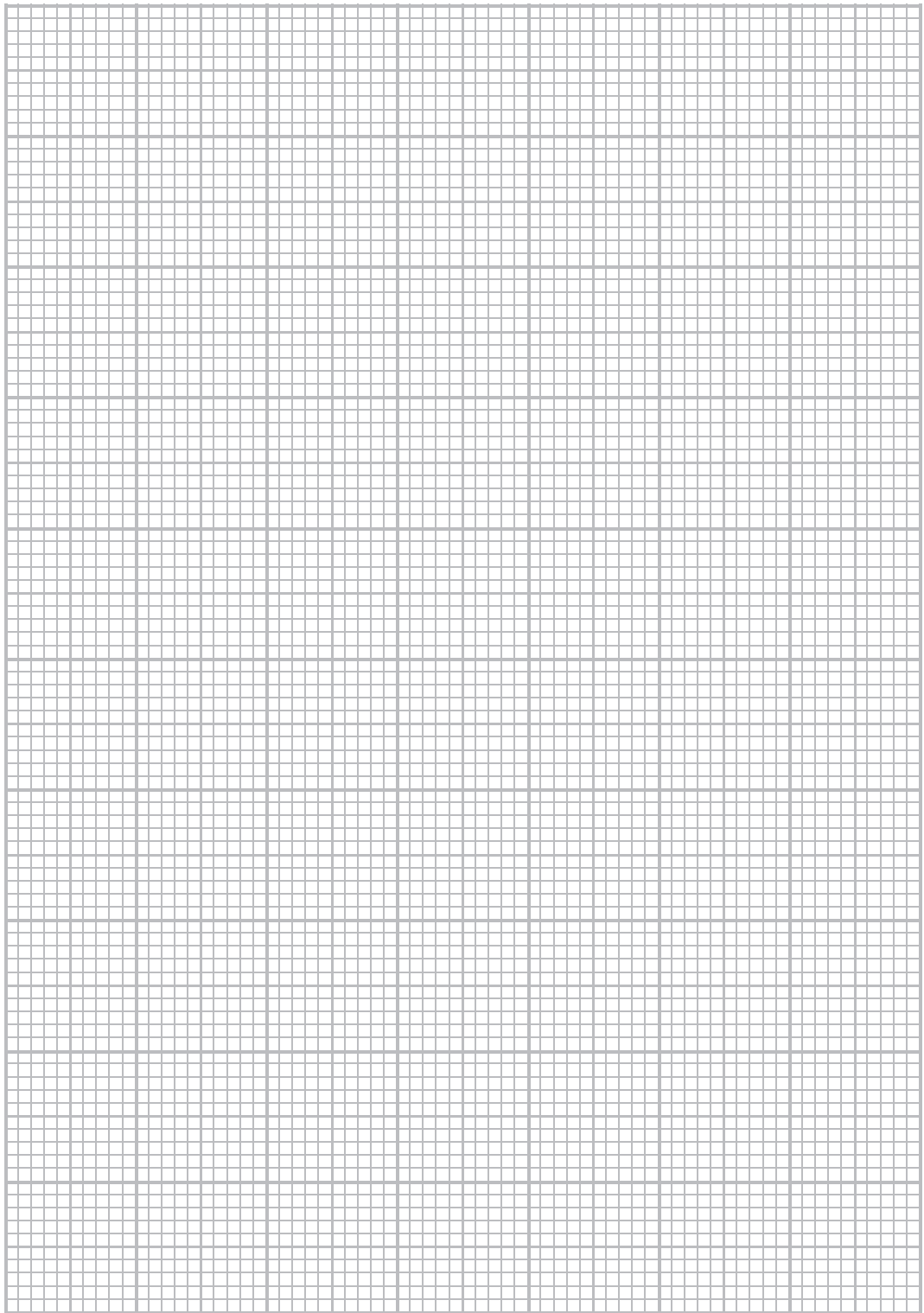
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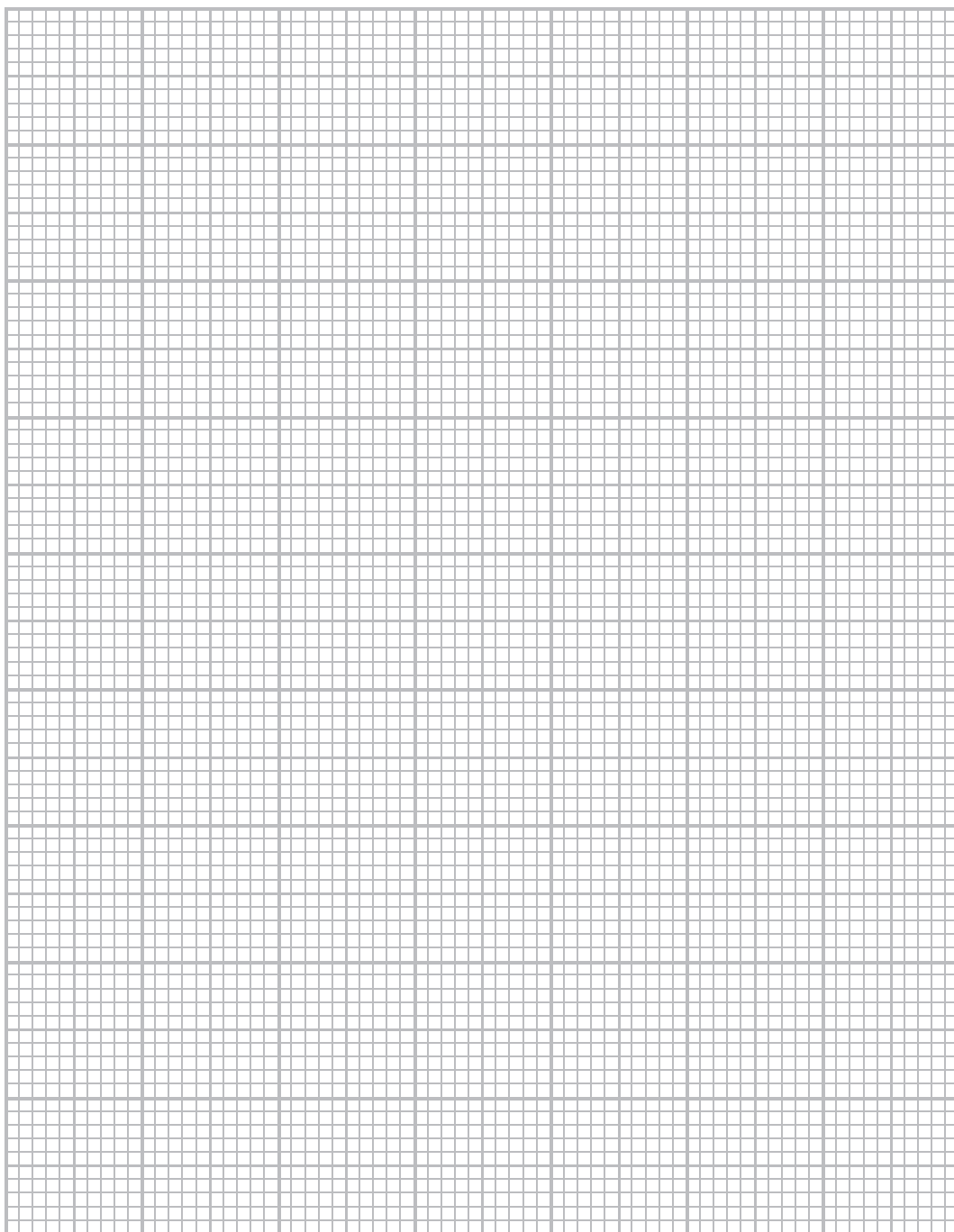
(c) Use your graph to find an estimate, to one decimal place, for the solution of $x^3 + x - 3 = 0$

.....
(2)

(Total for Question 13 is 6 marks)



15 (a) On the grid below, draw the graph of $y = 2^{x+1}$ for values of x from -4 to 3



(4)

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- (b) Use your graph to find an estimate for the solution of $2^{x+1} = 12$
Give your answer to 1 decimal place.

.....
(1)

(Total for Question 15 is 5 marks)

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7 (a) Complete the table of values for $y = 2^{-x}$

x	-3	-2	-1	0	1	2	3
y							

(2)

(b) On the grid opposite, draw the graph of $y = 2^{-x}$ for values of x from -3 to 3

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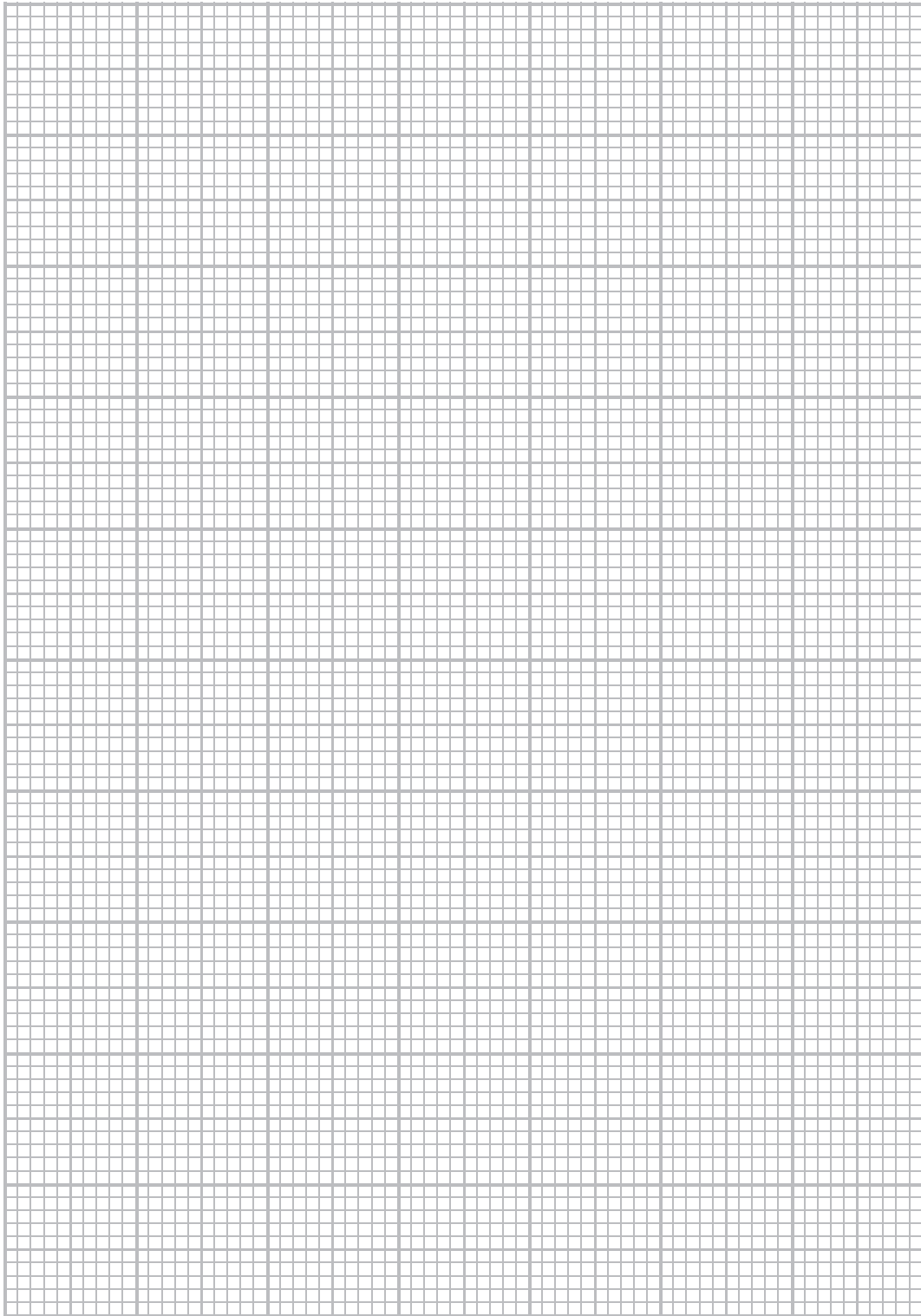
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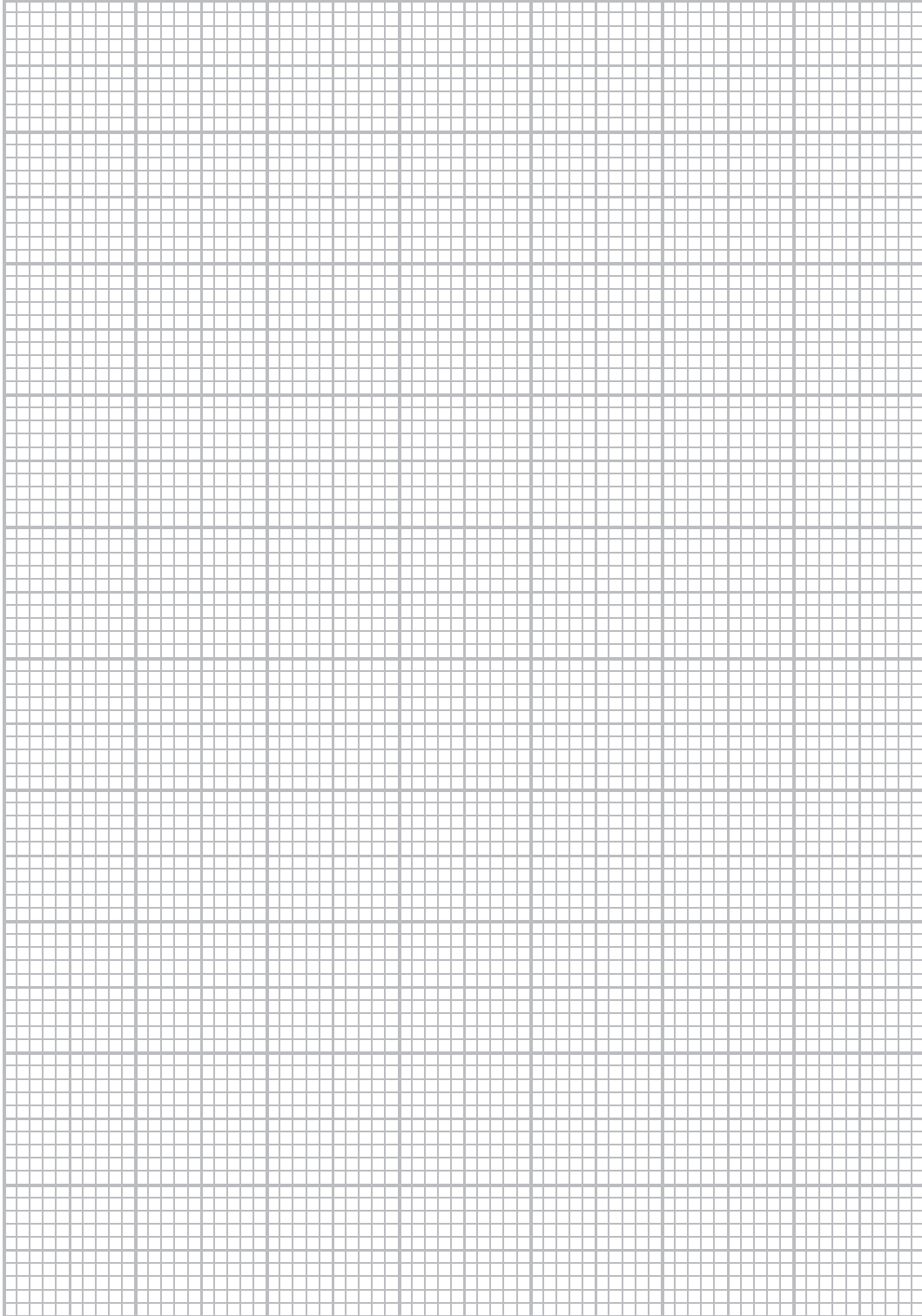
(c) Use your graph to find an estimate, to one decimal place, for the solution of $2^{-x} - 5 = 0$

.....
(2)

(Total for Question 7 is 6 marks)



9 (a) On the grid below, draw the graph of $y = x^3 - 3x^2 + 2$ for values of x from -2 to 4



(4)

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(b) Use your graph to find an estimate for one of the solutions of $x^3 - 3x^2 + 1 = 0$

.....
(2)

(Total for Question 9 is 6 marks)

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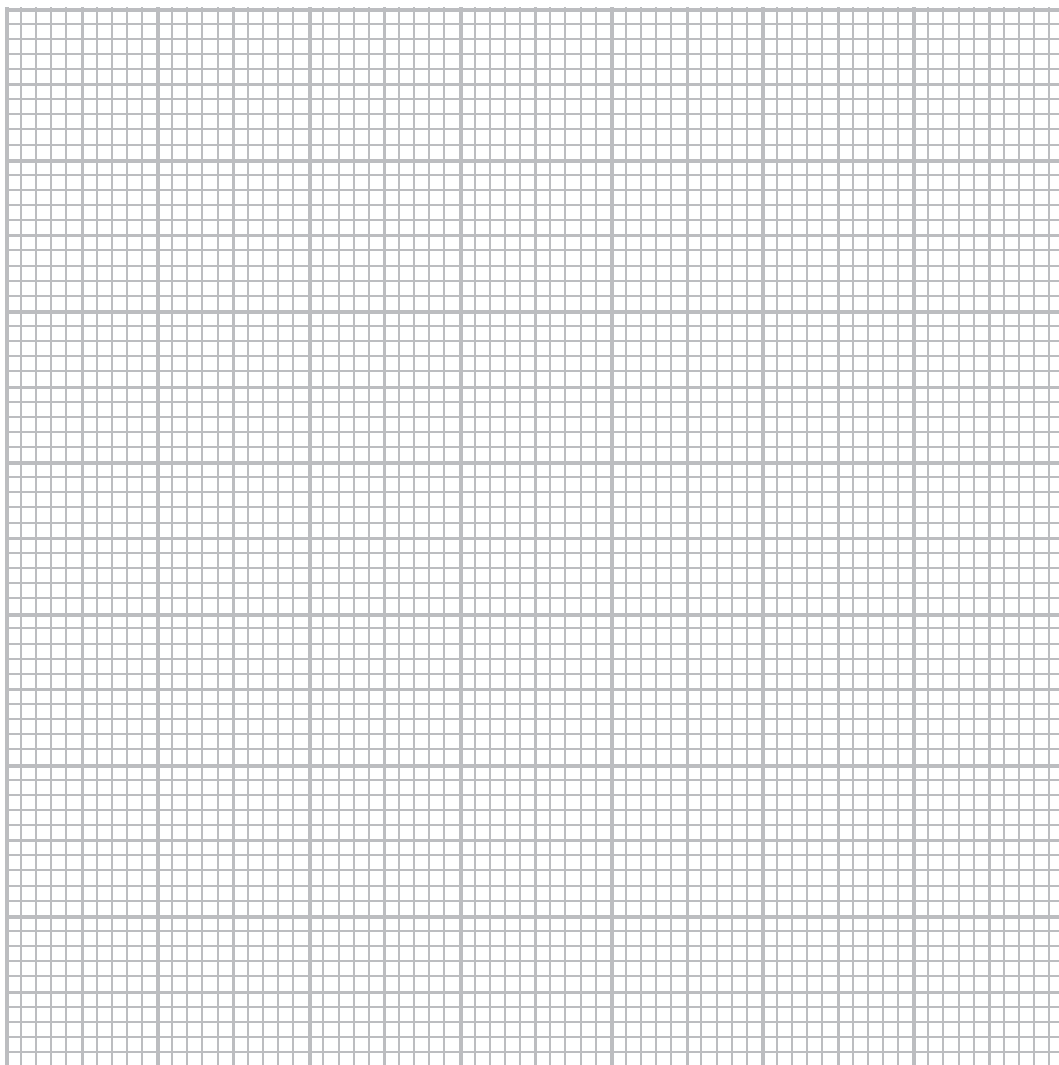
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P 4 8 3 7 5 A 0 1 1 2 4

10 (a) On the grid below, draw the graph of $y = x^3 + x^2 - x - 5$ for values of x from -3 to 3



(4)

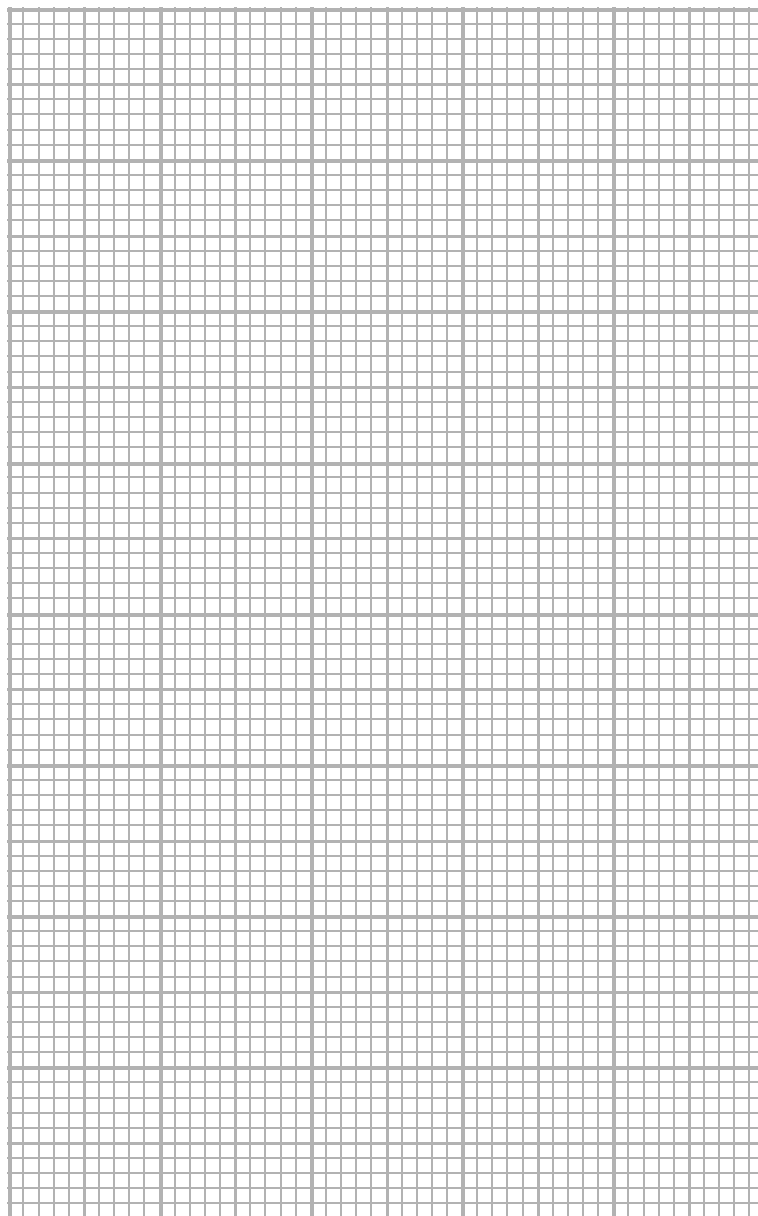
(b) Use your graph to find an estimate for the solution of $x^3 + x^2 - x - 1 = 4$

.....
(2)

(Total for Question 10 is 6 marks)



- 13 (a) On the grid below, draw the graph of $y = \frac{1}{x} + 3$ for values of x from -4 to 4 , $x \neq 0$
Show clearly any asymptotes.



(4)

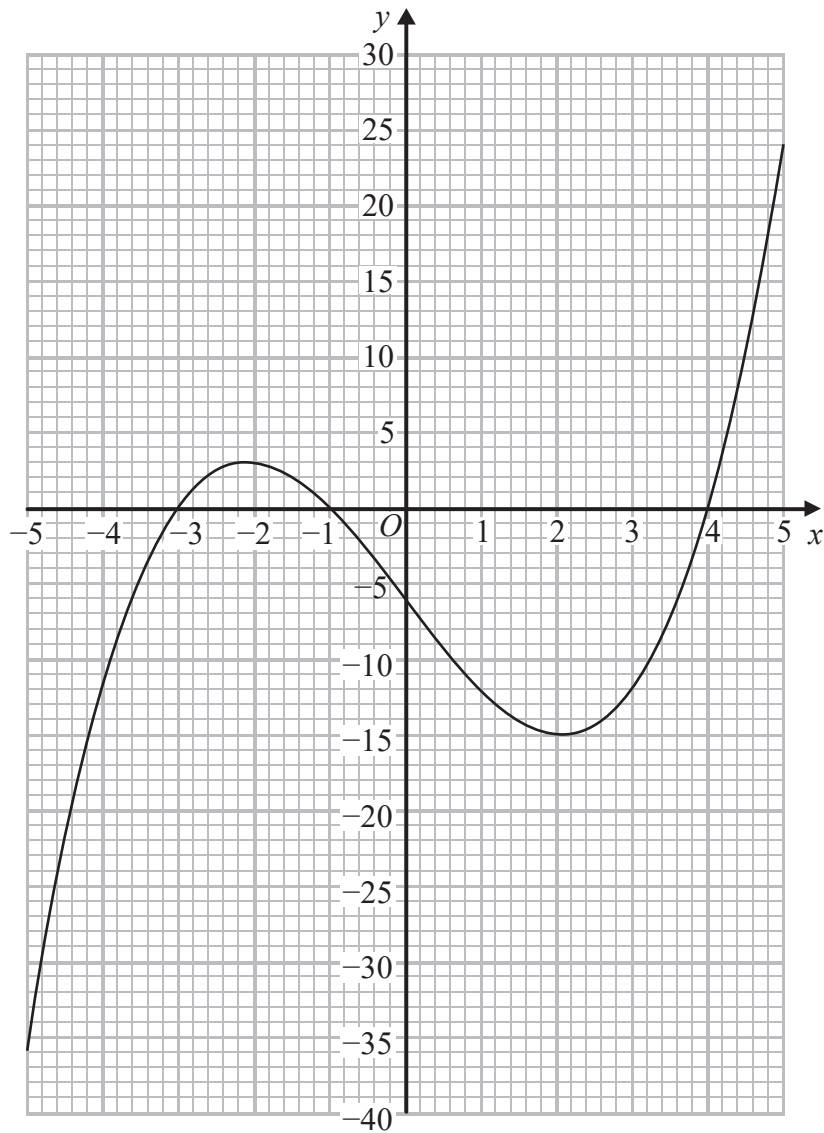
- (b) Use your graph to find an estimate for the solution of $3.6 - \frac{1}{x} = 3$

(1)

(Total for Question 13 is 5 marks)



13 Here is the graph of $y = 0.5x^3 - 6.5x - 6$ for $-5 \leq x \leq 5$



(a) Use the graph to solve the equation $0.5x^3 - 6.5x - 6 = 0$

.....
(2)

(b) Use the graph to find an estimate for the solution of $x^3 - 13x = 32$
Give your answer to 1 decimal place.

.....
(2)

(Total for Question 13 is 4 marks)

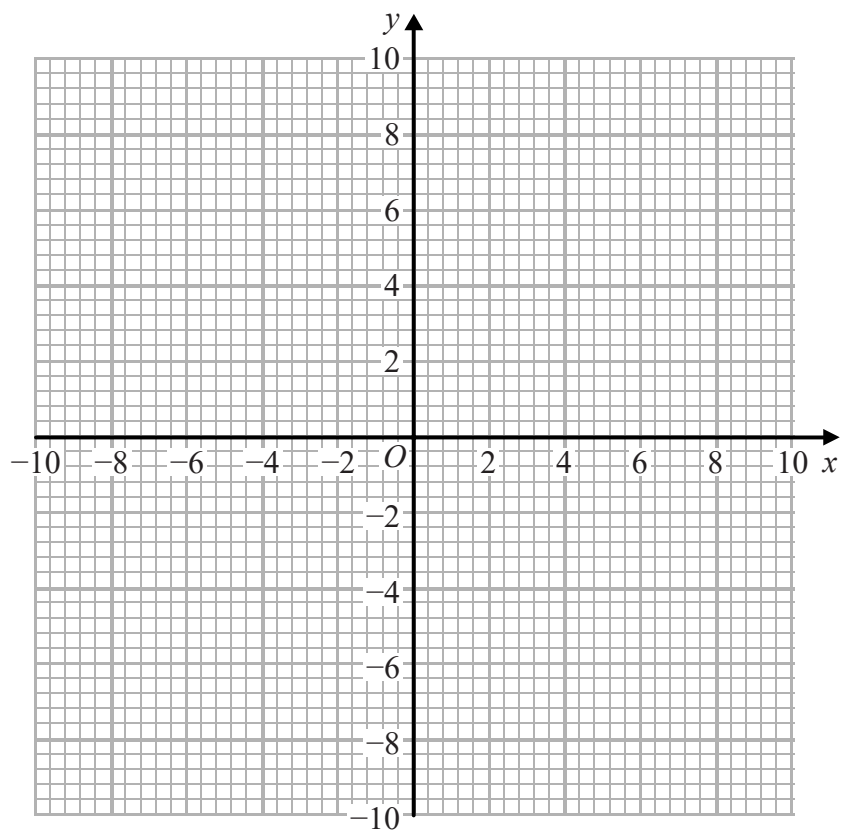


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4 (a) On the grid, construct the graph of $2x^2 + 2y^2 = 72$



(2)

(b) (i) On the grid, draw the graph of $y = 2x - 4$ for $-2 \leq x \leq 6$

(1)

(ii) Use your graphs to find estimates for the solutions of the simultaneous equations

$$\begin{aligned} 2x^2 + 2y^2 &= 72 \\ y &= 2x - 4 \end{aligned}$$

(2)

(Total for Question 4 is 5 marks)



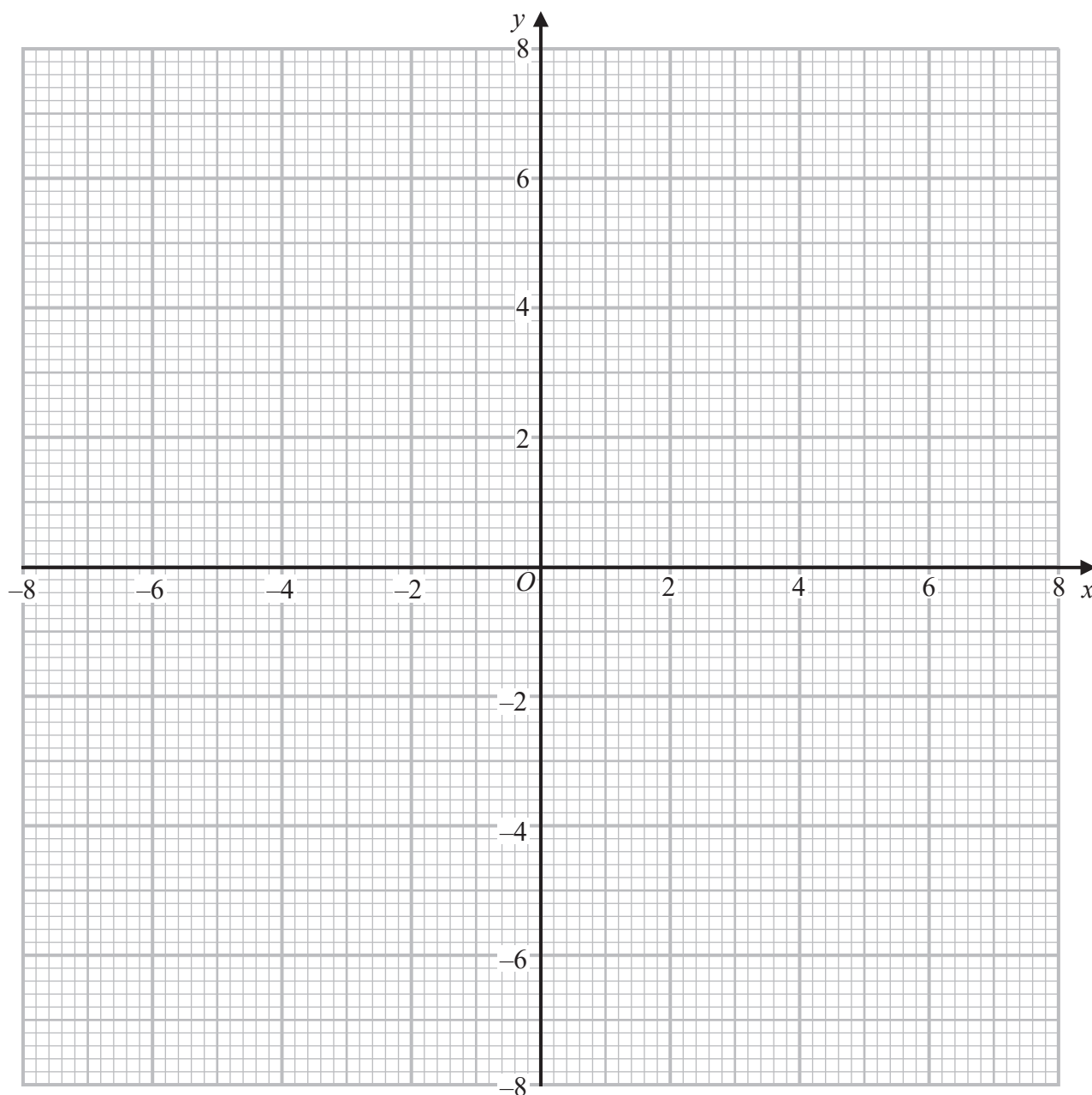
3 (a) On the grid,

(i) construct the graph of $x^2 + y^2 = 25$

(2)

(ii) draw the graph of $y = x^2 - 4$ for values of x from -3 to 3

(2)



(b) Use your graphs to find estimates for the solutions of the simultaneous equations

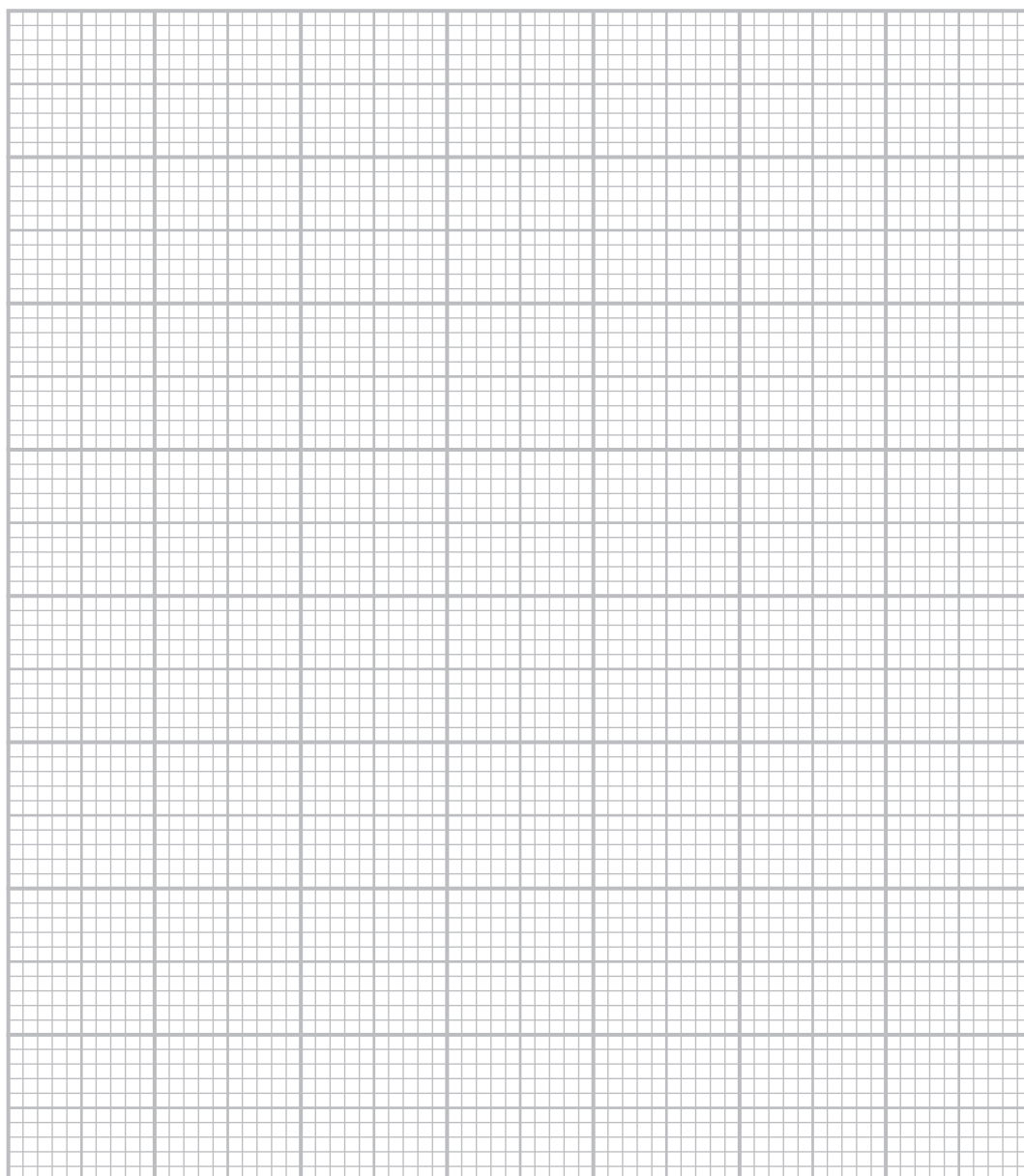
$$\begin{aligned} y &= x^2 - 4 \\ x^2 + y^2 &= 25 \end{aligned}$$

.....
(2)

(Total for Question 3 is 6 marks)



7 (a) On the grid below, draw the graph of $y = (x - 1)(x + 1)(x - 3)$ for values of x from -2 to 4



(4)

(b) Use your graph to find estimates for the solutions of $(x - 1)(x + 1) = \frac{2}{x - 3}$

(3)

(Total for Question 7 is 7 marks)



12 (a) Complete the table of values for $y = \left(\frac{2-x}{2}\right)^3$

x	-2	-1	0	1	2	3	4
y		3.375					-1

(2)

(b) On the grid opposite, draw the graph of $y = \left(\frac{2-x}{2}\right)^3$ for values of x from -2 to 4

(3)

(c) (i) Use your graph to find an estimate for the solution of $\left(\frac{2-x}{2}\right)^3 = 2$

(1)

(ii) Use your graph to find an estimate for the solution of $(2-x)^3 = 48$

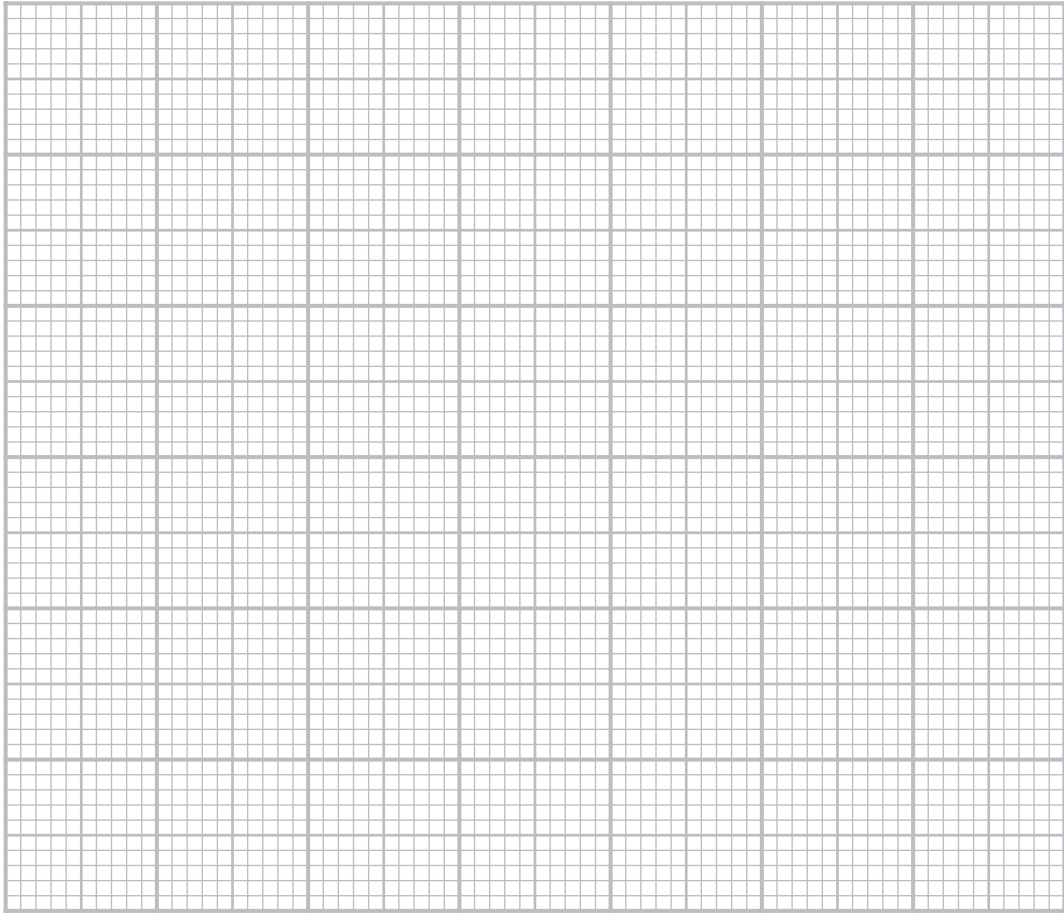
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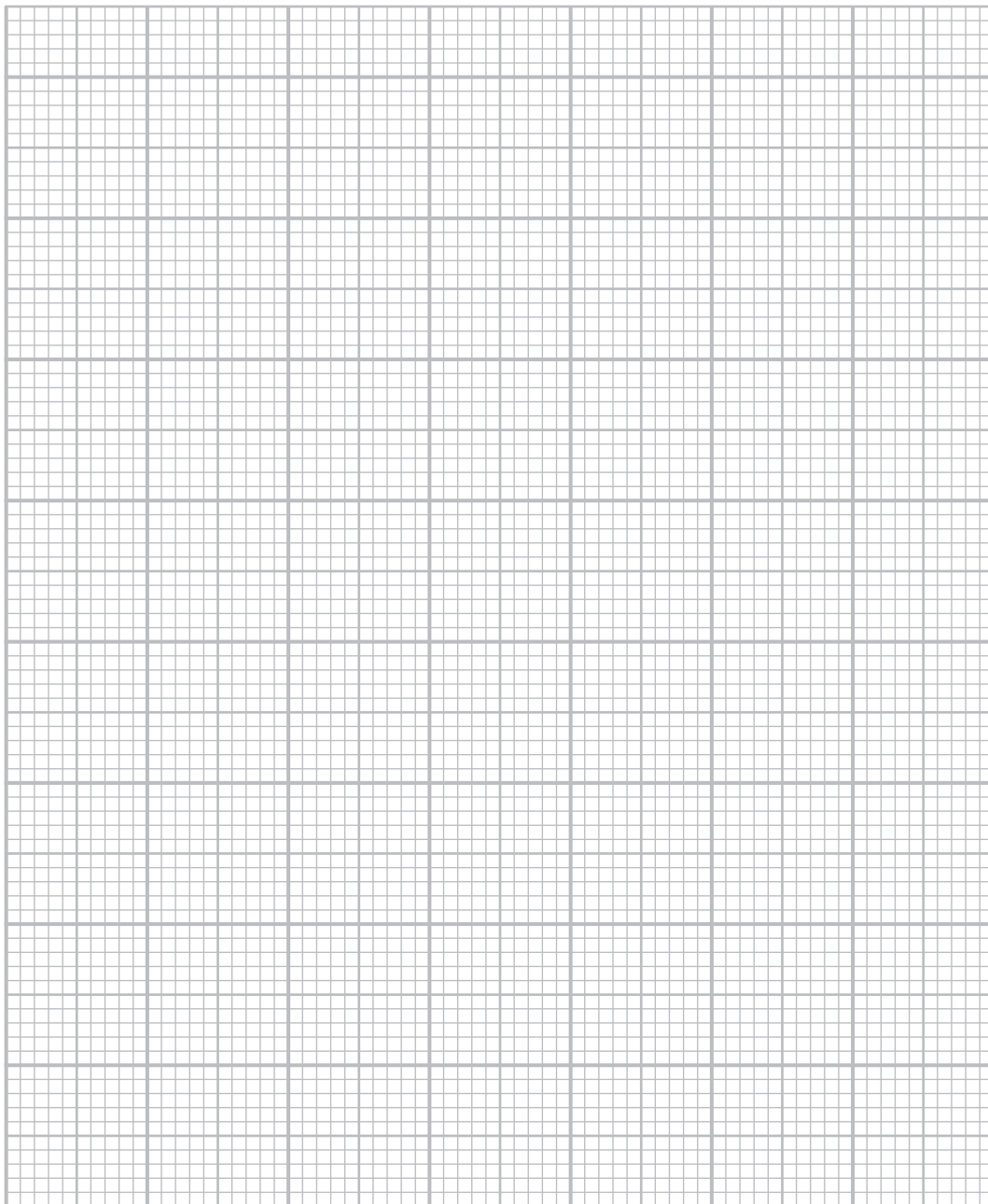
(Total for Question 12 is 8 marks)



19 The table shows the values of $y = 2^{x-1}$ for integer values of x from -2 to 4

x	-2	-1	0	1	2	3	4
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

(a) On the grid, draw the graph of $y = 2^{x-1}$ for values of x from -2 to 4



(2)

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(b) Use your graph to find an estimate, to one decimal place, for the solution of $2^x = 12$

.....
(2)

(c) Use the trapezium rule to find an estimate for the area of the region under the curve and between $x = 1$, $x = 4$ and the x -axis.
Use 3 strips of equal width.

.....
(2)

(Total for Question 19 is 6 marks)

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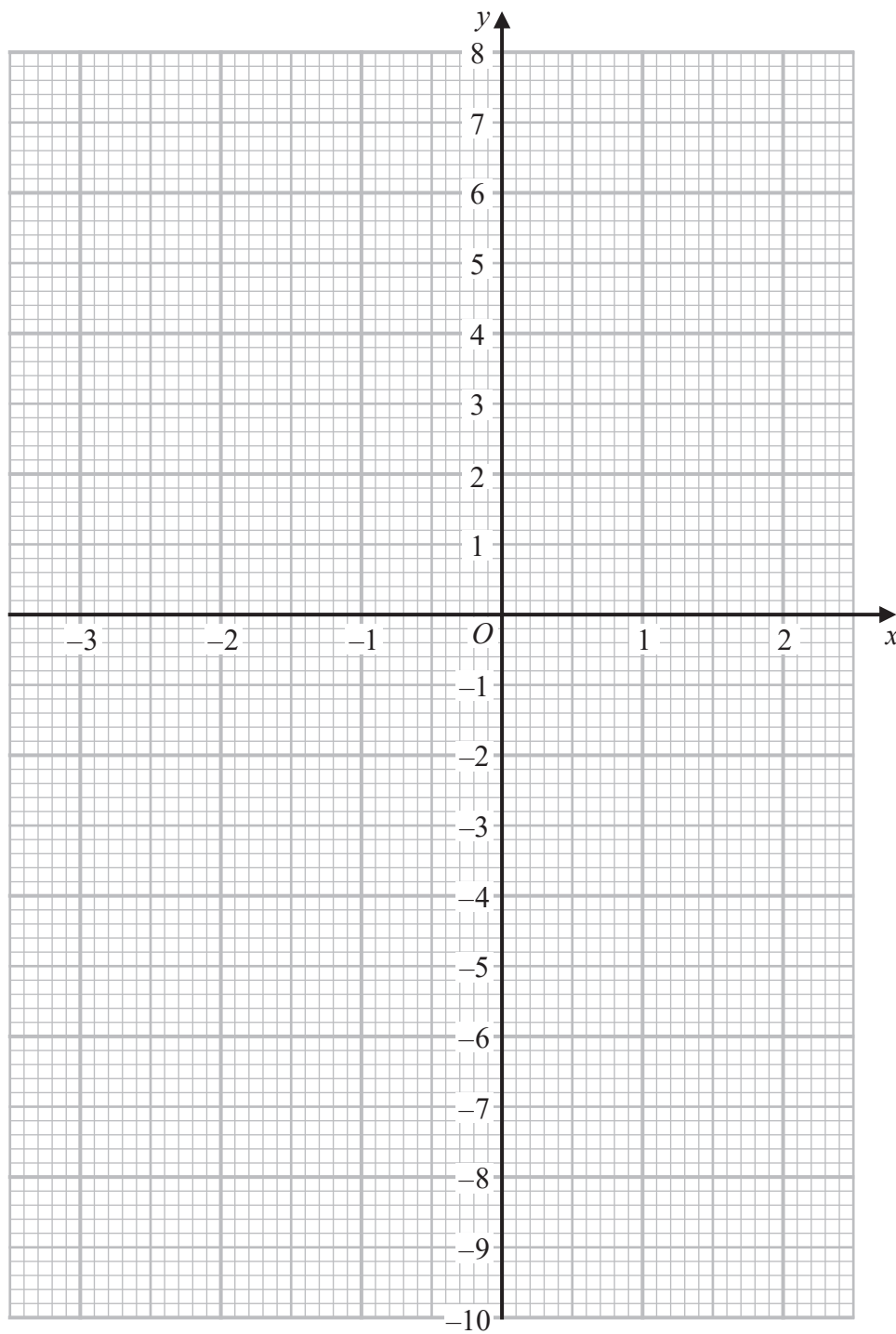
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11 (a) On the grid below, draw the graph of $y = x^3 - 5x + 3$ for values of x from -3 to 2



(4)

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(b) Use your graph to find an estimate for one of the solutions of $x^3 - 5x + 1 = 0$

.....
(2)

(Total for Question 11 is 6 marks)

12 Here is a formula $B = \frac{2w^2 - wt}{4t}$

(a) Find the value of B when $w = 5$ and $t = 2$

$B =$
(2)

(b) Make t the subject of the formula $B = \frac{2w^2 - wt}{4t}$

.....
(3)

(Total for Question 12 is 5 marks)

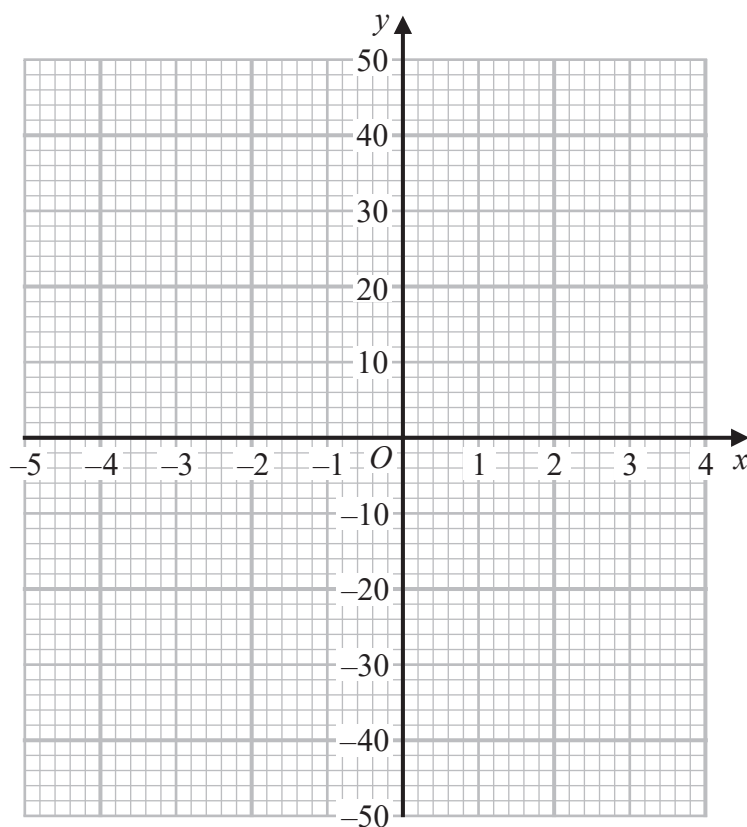


10 (a) Complete the table of values for $y = 2x^3 + 3x^2 - 21x$

x	-4	-3	-2	-1	0	1	2	3
y	4			22			-14	18

(2)

(b) On the grid, draw the graph of $y = 2x^3 + 3x^2 - 21x$ for values of x from -4 to 3



(2)

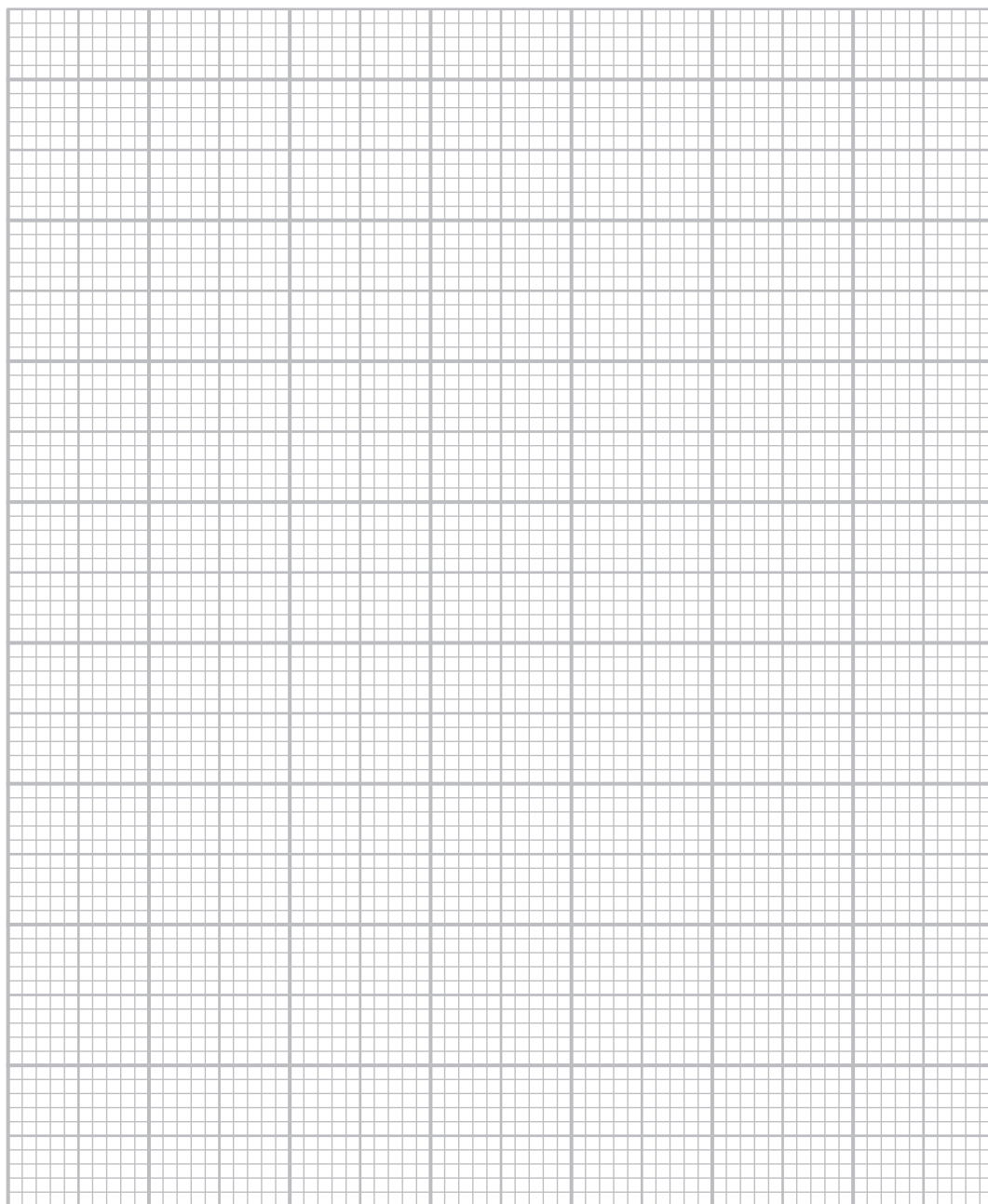
(Total for Question 10 is 4 marks)



19 The table shows the values of $y = 2^{1-x}$ for integer values of x from -2 to 4

x	-2	-1	0	1	2	3	4
y	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

(a) On the grid, draw the graph of $y = 2^{1-x}$ for values of x from -2 to 4



(2)



(b) Use your graph to find an estimate, to one decimal place, for the solution of $2^{-x} = 3$

.....
(2)

(c) Use the trapezium rule to find an estimate for the area of the region under the curve and between $x = -1$, $x = 2$ and the x -axis.
Use 3 strips of equal width.

.....
(2)

(Total for Question 19 is 6 marks)

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