

Graphs

Difficulty: Hard

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Graphs
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 2

Time allowed: 135 minutes

Score: /117

Percentage: /100

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

Question 1

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

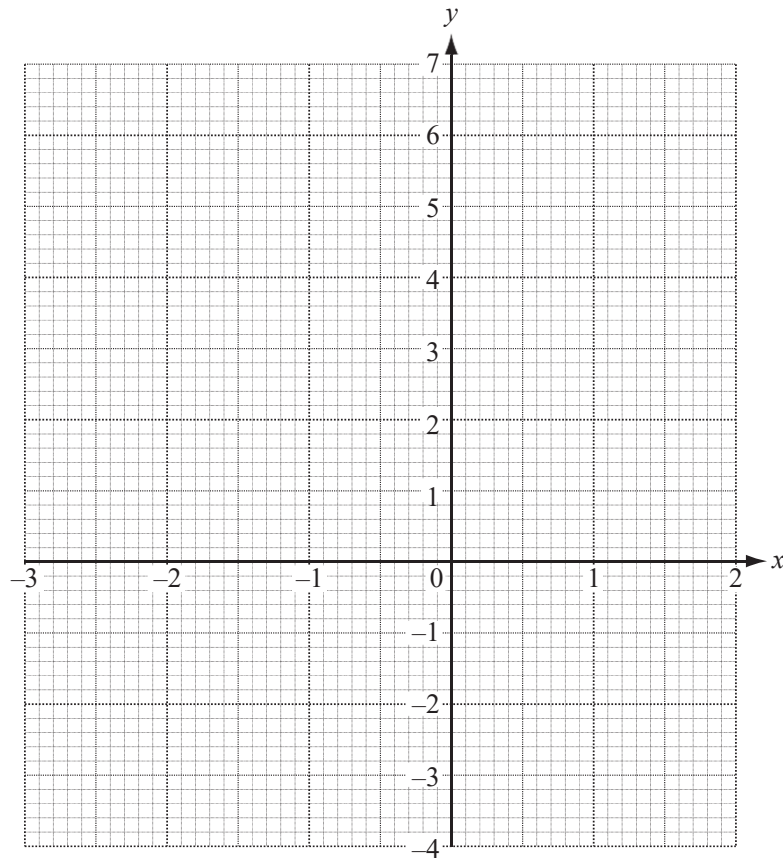
(a) Complete the table of values for $f(x)$.

[3]

x	-3	-2.5	-2	-1.5	-1	-0.5	0.4	0.5	1	1.5	2
$f(x)$	6.1	5.2	4.3	3.4		5	5.5			-2.6	-3.8

(b) On the grid, draw the graph of $y = f(x)$ for $-3 \leq x \leq -0.5$ and $0.4 \leq x \leq 2$.

[5]



(c) Solve the equation $f(x) = 2$.

[1]

(d) Solve the equation $f(x) = 2x + 3$.

[3]

(e) (i) Draw the tangent to the graph of $y = f(x)$ at the point where $x = -1.5$.

[1]

(ii) Use the tangent to estimate the gradient of the graph of $y = f(x)$ where $x = -1.5$.

[2]

Question 2

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

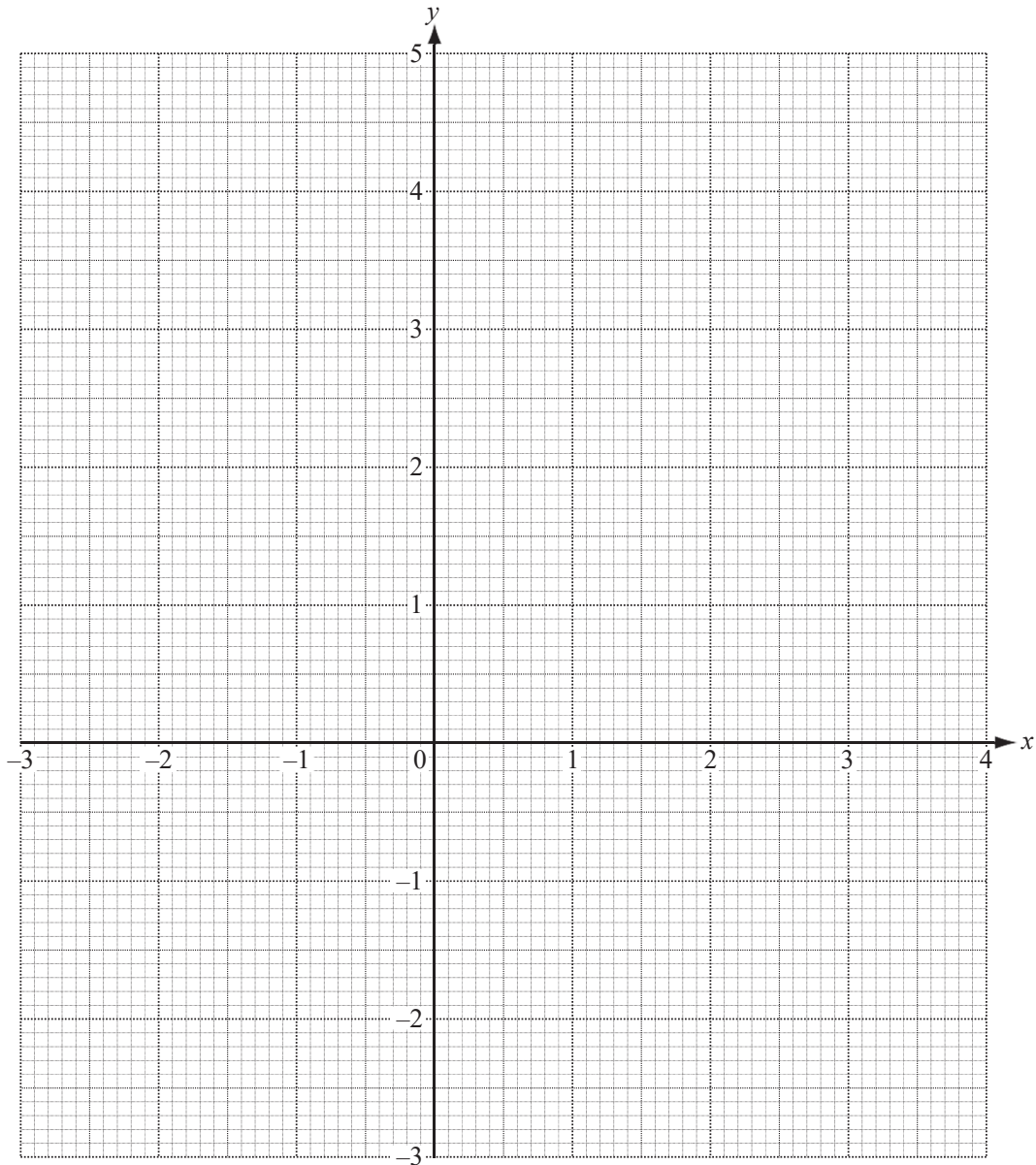
[3]

x	-3	-2	-1	-0.5	0.5	1	2	3	4
y	-2.89	-1.75		3.5		2	2.25		4.06

(a) Complete the table of values.

(b) On the grid, draw the graph of $y = \frac{1}{x^2} + x$ for $-3 \leq x \leq -0.5$ and $0.5 \leq x \leq 4$.

[5]



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

(d) Use your graph to solve the equation $\frac{1}{x^2} + x = 1 - x$. [3]

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

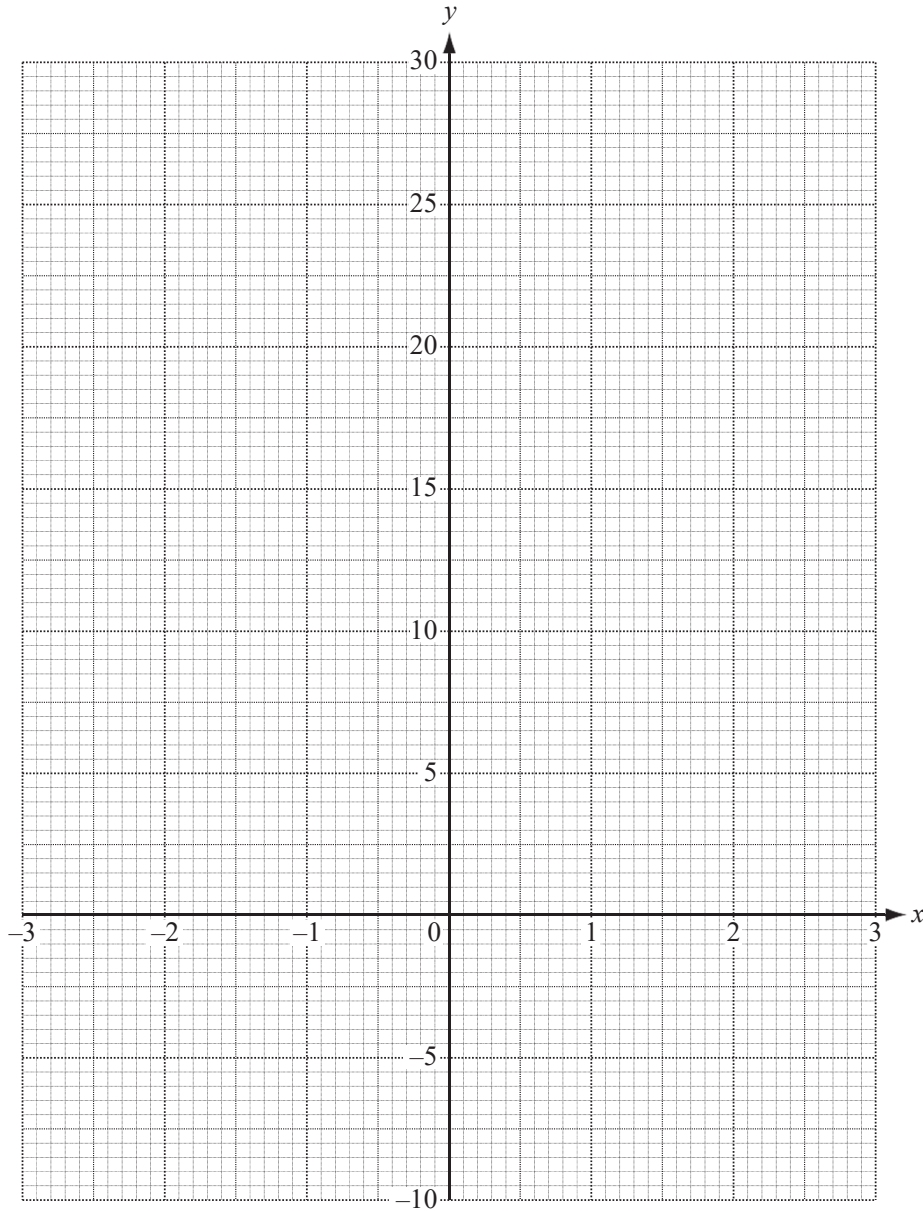
(f) Using algebra, show that you can use the graph at $y = 0$ to find $\sqrt[3]{-1}$. [3]

Question 3

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

x	-3	-2	-1	-0.5	-0.3		0.3	0.5	1	2	3
y	9.6		6		26.5		18.0		-2	-6	-9.1

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



(c) Use your graph to solve these equations.

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

(ii) $\frac{2}{x^2} - \frac{1}{x} - 3x - 7.5 = 0$ [3]

(d) (i) By drawing a suitable straight line on the graph, solve the equation $\frac{2}{x^2} - \frac{1}{x} - 3x = 10 - 3x$. [4]

(ii) The equation $\frac{2}{x^2} - \frac{1}{x} - 3x = 10 - 3x$ can be written in the form $ax^2 + bx + c = 0$ where a , b and c are integers.

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

Question 4

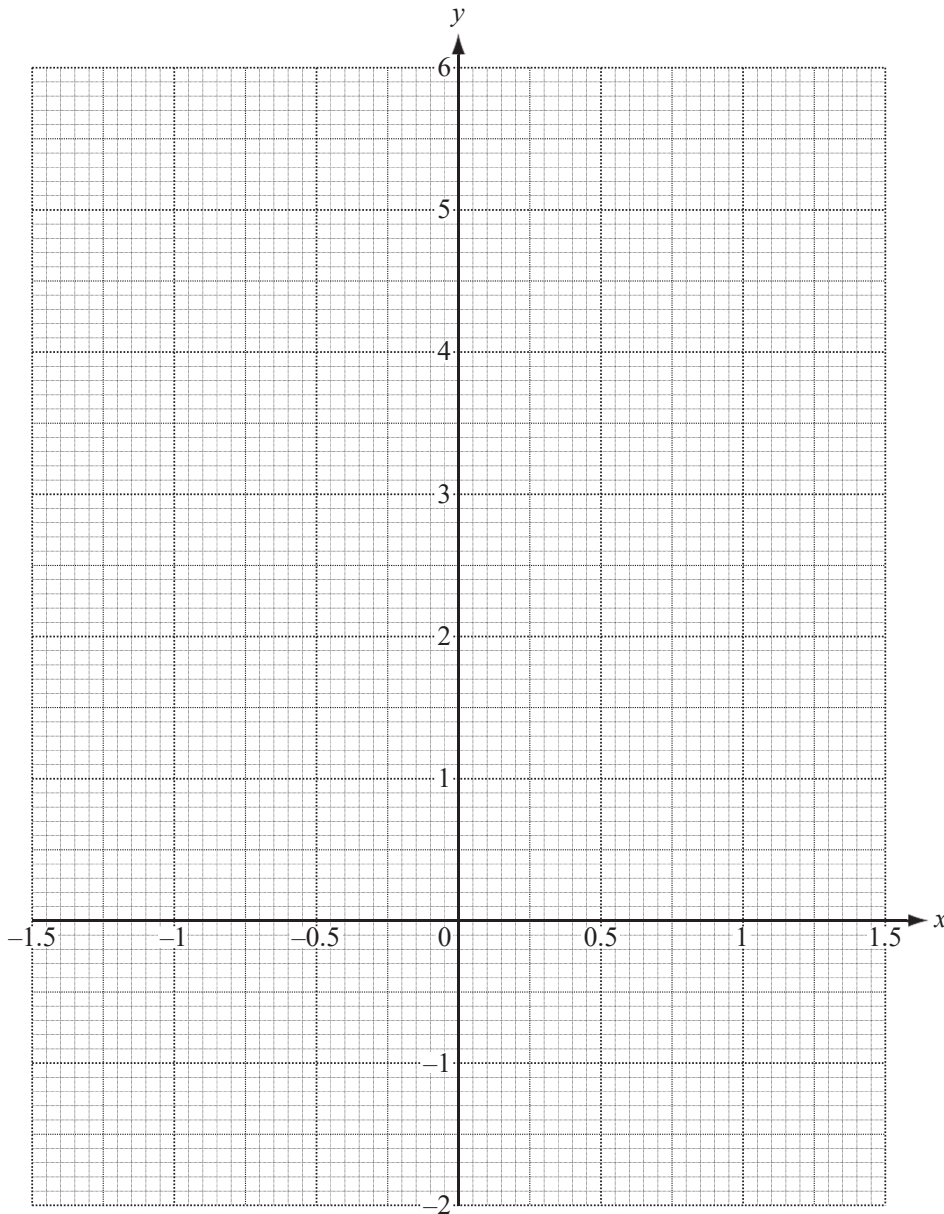
$$f(x) = 3 - x - x^2 \qquad g(x) = 3^x$$

(a) Complete the tables of values for $f(x)$ and $g(x)$. [3]

x	-1.5	-1	-0.5	0	0.5	1	1.5
$f(x)$	2.25	3	3.25		2.25	1	-0.75

x	-1.5	-1	-0.5	0	0.5	1	1.5
$g(x)$	0.19		0.58		1.73	3	5.20

(b) On the grid, draw the graphs of $y = f(x)$ and $y = g(x)$ for $-1.5 \leq x \leq 1.5$. [6]



(c) For $-1.5 \leq x \leq 1.5$, use your graphs to solve

(i) $f(x) = 0$, [1]

(ii) $g(x) = 4$, [1]

(iii) $f(x) = g(x)$. [1]

(d) By drawing a suitable tangent, find an estimate of the gradient of the graph of $y = f(x)$ when $x = 0.5$.

[3]

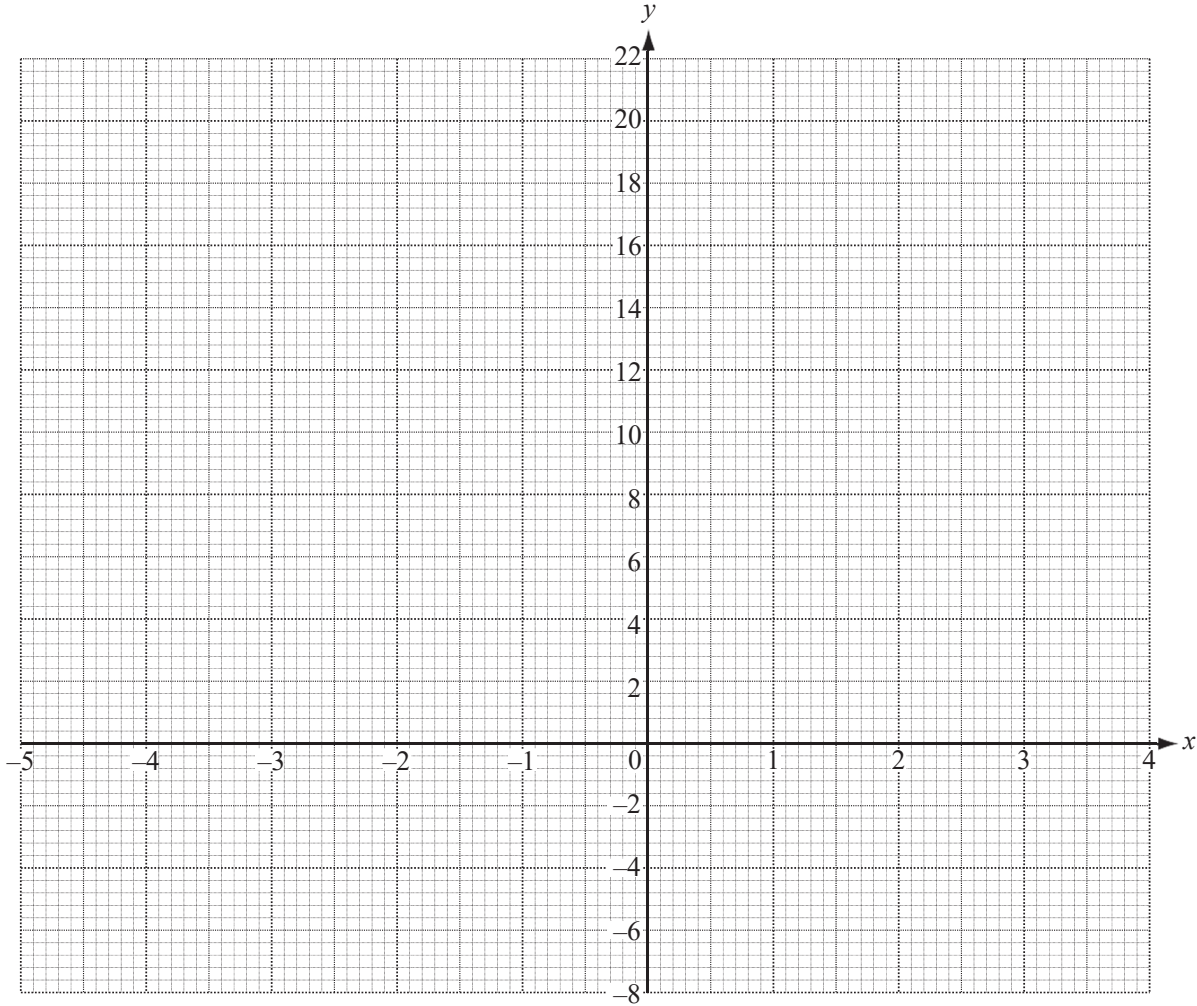
Question 5

(a) (i) Complete the table of values for $y = \frac{1}{2}x^3 + x^2 - 7x$.

x	-5	-4	-3	-2	-1	0	1	2	3	4
y	-2.5	12	16.5		7.5	0		-6	1.5	

[3]

(ii) On the grid, draw the graph of $y = \frac{1}{2}x^3 + x^2 - 7x$ for $-5 \leq x \leq 4$.



[4]

(b) Use your graph to solve the equation $\frac{1}{2}x^3 + x^2 - 7x = 2$.

[3]

(c) By drawing a suitable tangent, calculate an estimate of the gradient of the graph where $x = 0.4$. [3]

(d) (i) On the grid draw the line $y = 10 - 5x$ for $-2 \leq x \leq 3$. [3]

1
2

(ii) Use your graphs to solve the equation $-x^3 + x^2 - 7x = 10 - 5x$. [1]

Question 6

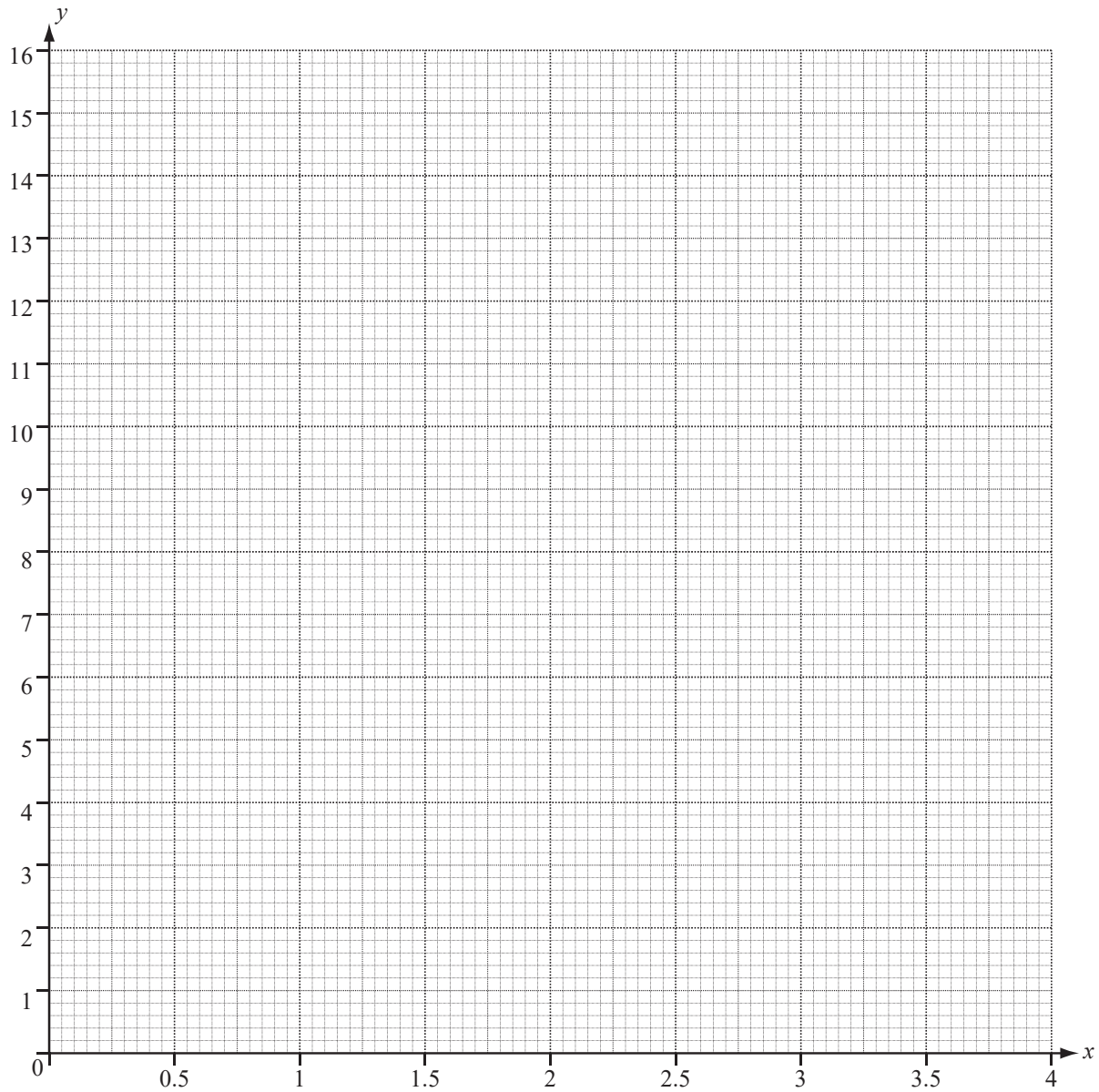
$$f(x) = 2^x$$

(a) Complete the table.

x	0	0.5	1	1.5	2	2.5	3	3.5	4
$f(x)$		1.4	2	2.8	4	5.7	8		

[3]

(b) Draw the graph of $y = f(x)$ for $0 \leq x \leq 4$.



[4]

(c) Use your graph to solve the equation $2^x = 5$. [1]

(d) Draw a suitable straight line and use it to solve the equation $2^x = 3x$. [3]

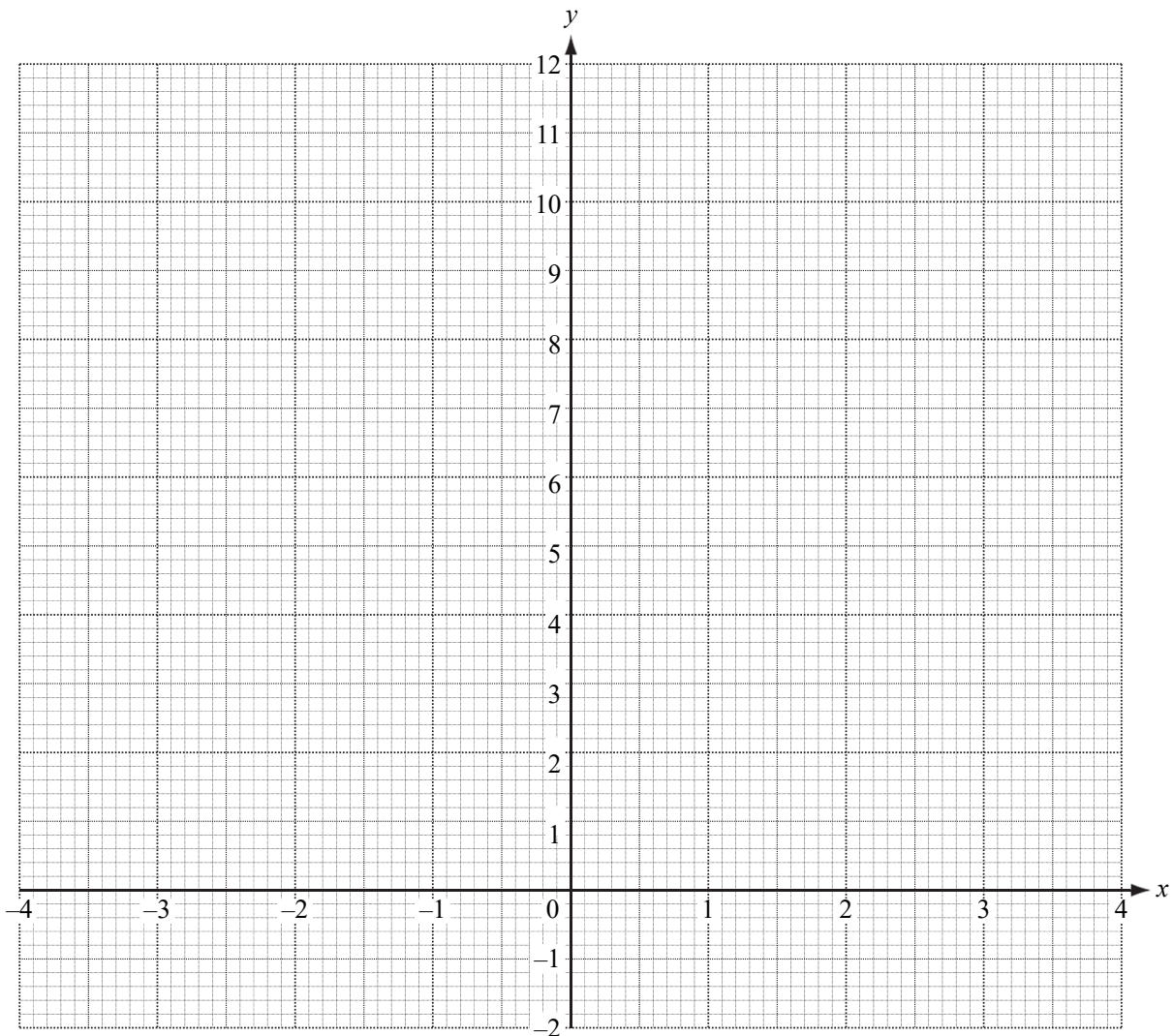
(e) Draw a suitable tangent and use it to find the co-ordinates of the point on the graph of $y = f(x)$ where the gradient of the graph is 3. [3]

Question 7

(a) Complete the table of values for the equation $y = \frac{4}{x^2}$, $x \neq 0$. [3]

x	- 4	- 3	- 2	- 1	- 0.6		0.6	1	2	3	4
y	0.25	0.44			11.11			4.00		0.44	

(b) On the grid, draw the graph of $y = \frac{4}{x^2}$ for $-4 \leq x \leq -0.6$ and $0.6 \leq x \leq 4$. [5]



(c) Use your graph to solve the equation $\frac{4}{x^2} = 6$. [2]

(d) By drawing a suitable tangent, estimate the gradient of the graph where $x = 1.5$. [3]

(e) (i) The equation $\frac{4}{x^2} - x + 2 = 0$ can be solved by finding the intersection of the graph of $y = \frac{4}{x^2}$ and a straight line.

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

(ii) On the grid, draw the straight line from your answer to part (e)(i). [2]

(iii) Use your graphs to solve the equation $\frac{4}{x^2} - x + 2 = 0$. [1]