

Surname	
Other Names	
Candidate's Signature	

## GCSE 9 - 1 Questions

### Cubic and Reciprocal Graphs 2

## Calculator Allowed

#### INSTRUCTIONS TO CANDIDATES

- Write your name in the space provided.
- Write your answers in the spaces provided in this question paper.
- Answer ALL questions.
- Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
- You should have a ruler, compass and protractor where required.

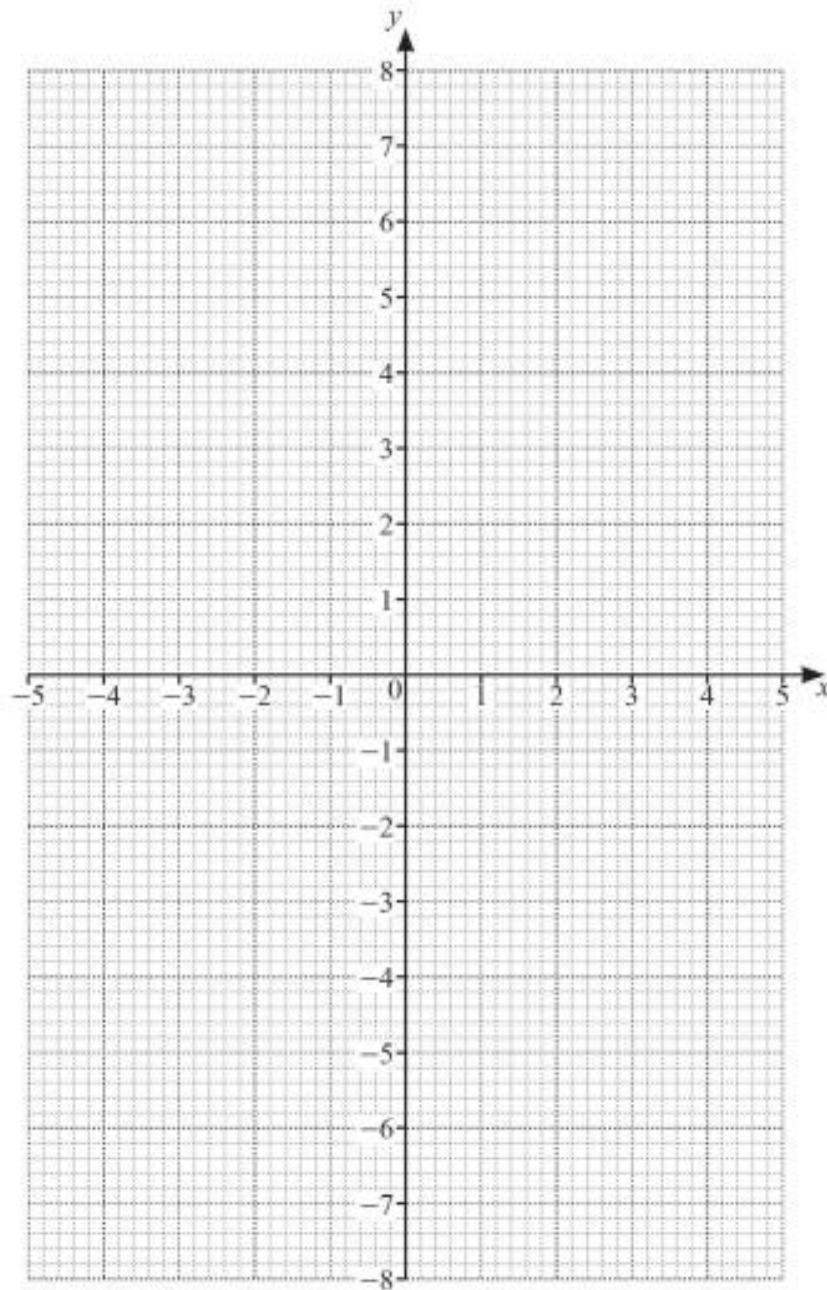
**Total Marks :**

1) (a) Complete the table of values for  $y = \frac{8}{x}$

x	-5	-4	-3	-2	-1		1	2	3	4	5
y		-2	-2.7	-4	-8		8	4	2.7		

[2]

(b) On the grid, draw the graph of  $y = \frac{8}{x}$  for  $-5 \leq x \leq -1$  and  $1 \leq x \leq 5$ .



[4]

2) The graph of  $y = 3 - x^3$  is shown below

a) For the line with equation  $y = x - 2$  :

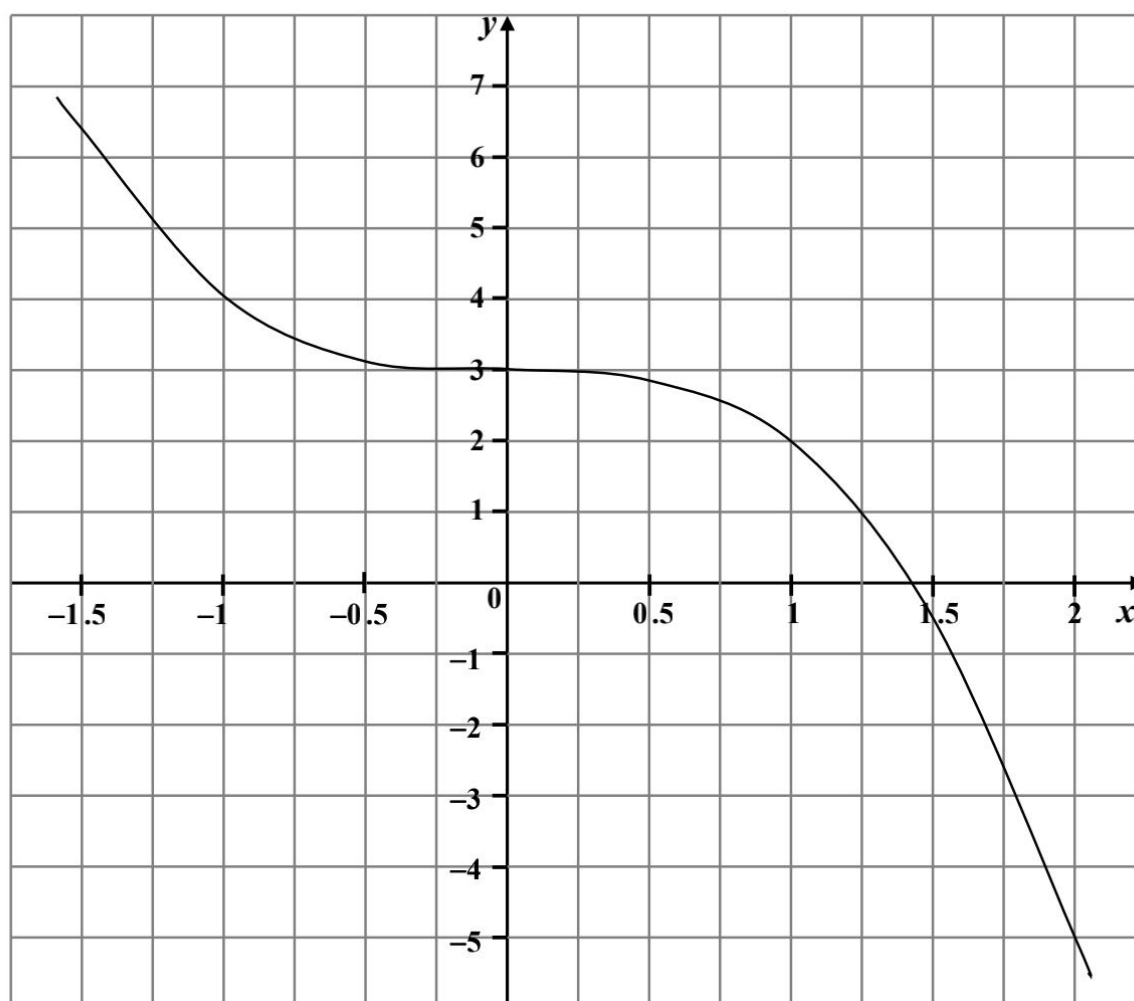
(i) Write down the value of  $y$  when  $x = 0$  **and** the value of  $x$  when  $y = 0$ .

when  $x = 0$ ,  $y = \underline{\hspace{2cm}}$  **and**  $x = \underline{\hspace{2cm}}$ , when  $y = 0$

(ii) Hence or otherwise draw, on the same axes, the graph of  $y = x - 2$ .

b) Write down an estimate, correct to **one decimal place**, for the value of  $x$  at the **point of intersection** of the two graphs.

$x = \underline{\hspace{2cm}}$

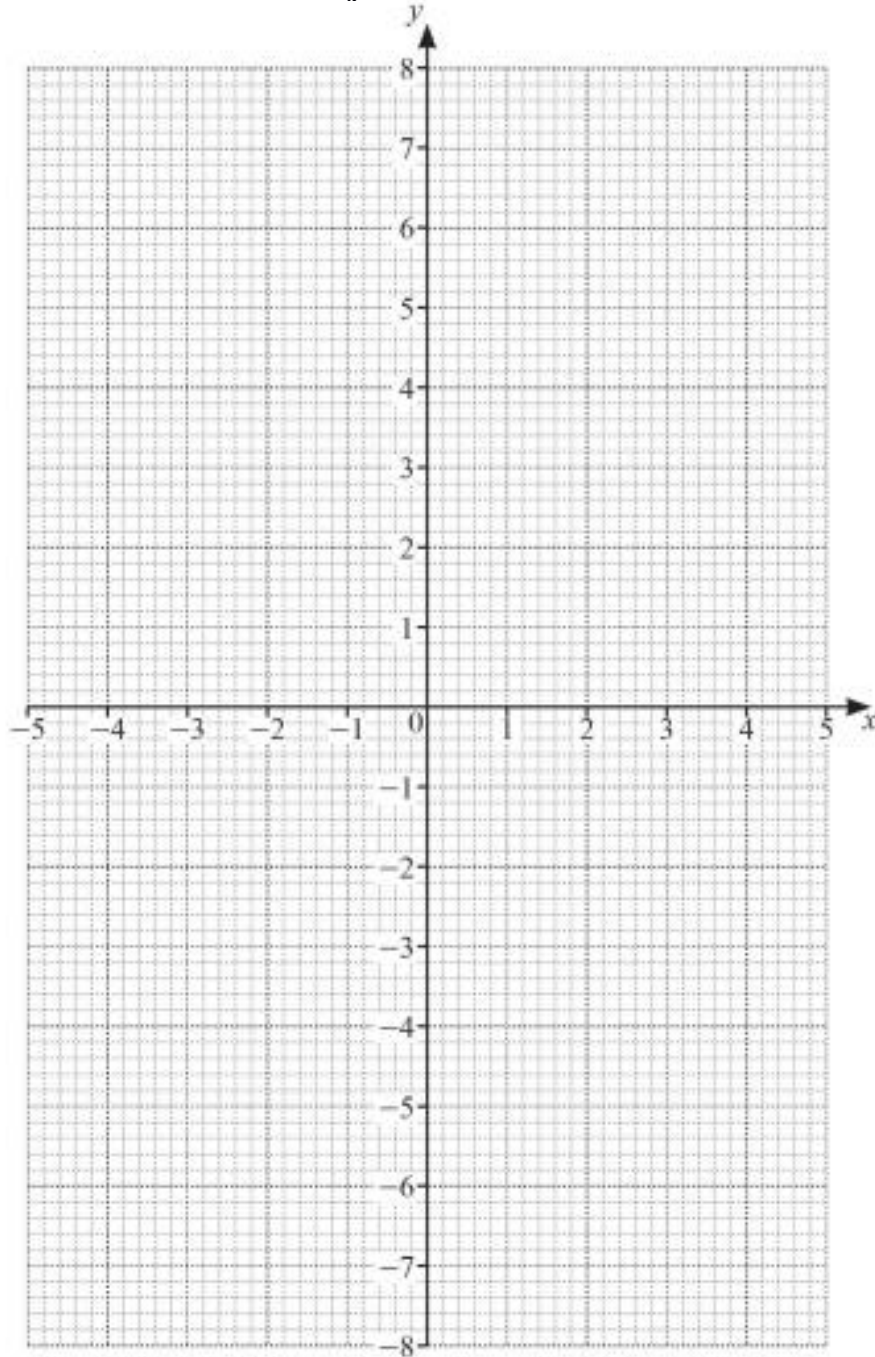


3) (a) Complete the table for the values for  $y = \frac{-3}{x}$

x		-4	-3	-2	-1		1	2	3	4
y		0.75	1		3		-3		-1	-0.75

[2]

(b) On the grid below, draw the graph of  $y = \frac{-3}{x}$



(c) On the grid above draw the line  $y = 2 - x$

[2]

(d) Write down the coordinates where the two lines cross.

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

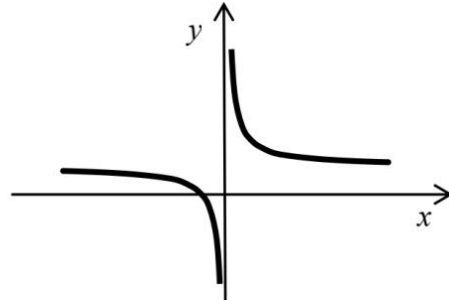
4)

Underline a possible equation for this sketch.

A)  $y = x^3 - 2x^2$

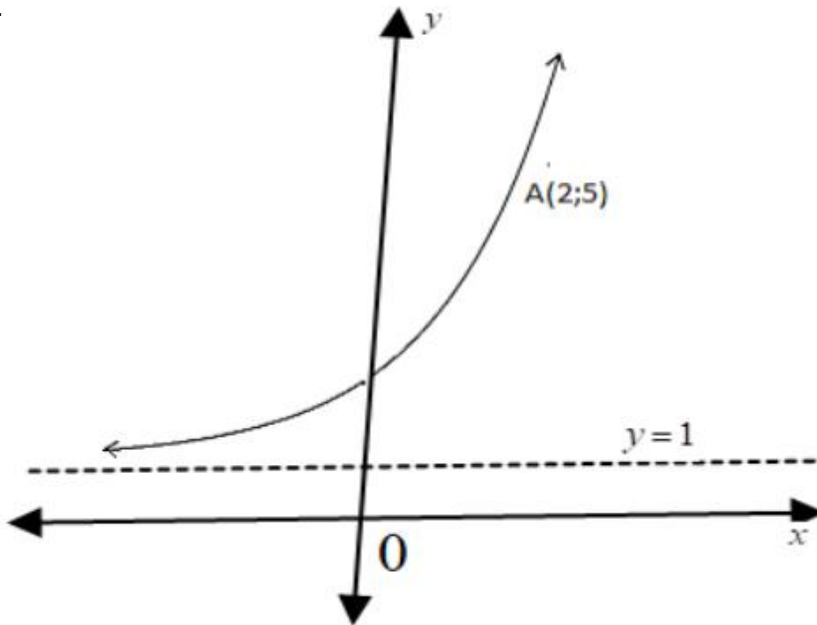
B)  $y = \frac{1}{x} + 2$

C)  $2x + 3y = 2$



[1]

5) The sketch below shows the equation of the graph  $y = p^x + q$ . The point A at (2,5) lies on this equation.



Calculate the values of p and q

p = .....

q = .....[4]

6) a) Complete the table for the equation  $y = x^3 - 4x^2 + x + 2$

$x$	-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5	4
$y$	-4	0.375	2	1.625	0	-2.125	-4	-4.875	-4		6

b) Use the graph paper on the opposite page to plot the graph of  $y = x^3 - 4x^2 + x + 2$ .

c) From your graph, read the  $x$  value of the points where the graph cuts the  $x$ -axis.

Ans:  $x =$  \_\_\_\_\_;  $x =$  \_\_\_\_\_;  $x =$  \_\_\_\_\_.

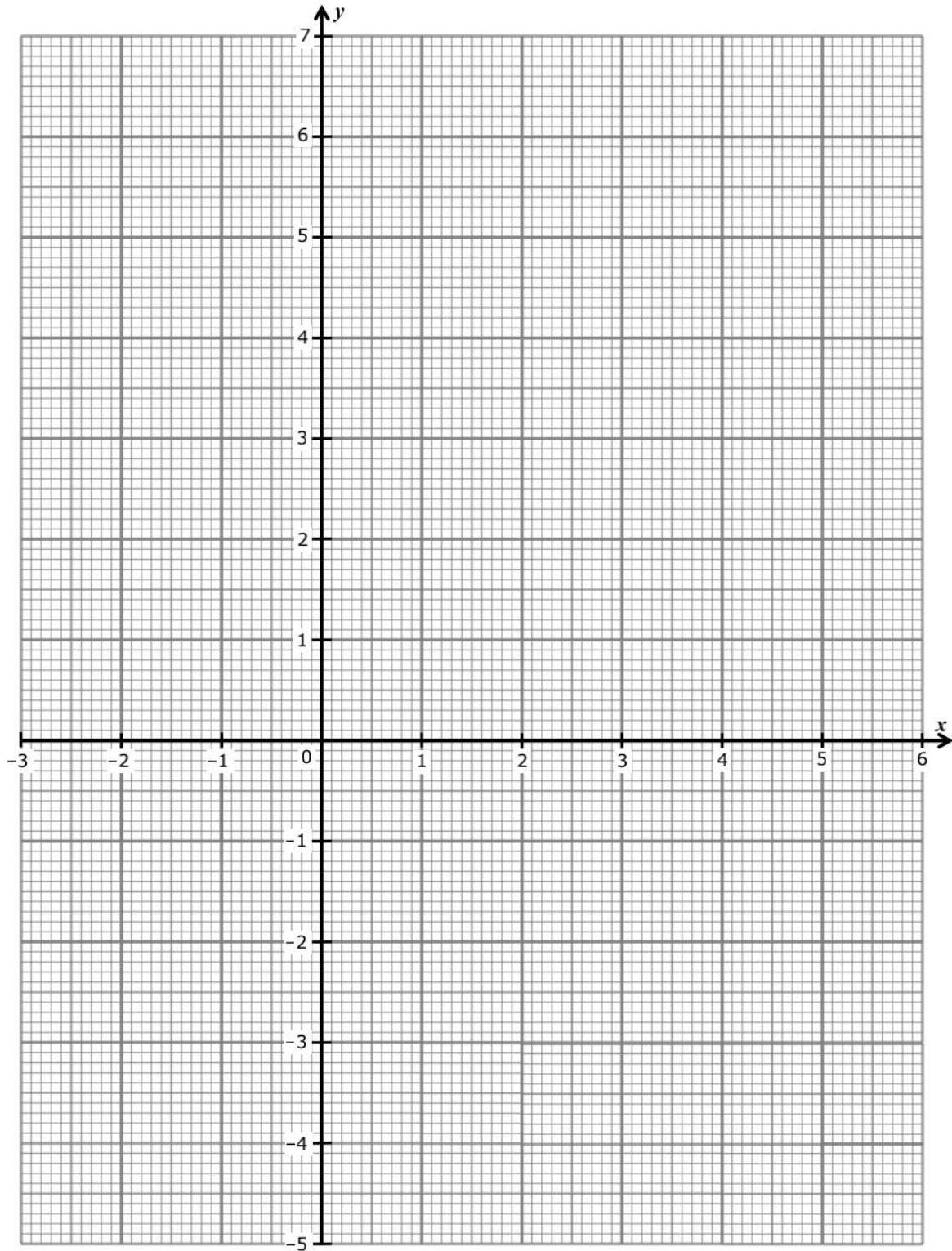
d) i) On the same axes, plot a straight line graph such that both graphs can be used to solve the equation below.

$$x^3 - 4x^2 + x + 2 = \frac{1}{2}x$$

ii) Solve the equation  $x^3 - 4x^2 + x + 2 = \frac{1}{2}x$  by using both graphs.

Ans:  $x =$  \_\_\_\_\_;  $x =$  \_\_\_\_\_;  $x =$  \_\_\_\_\_.





(13 marks)

7) (a) Fill in the table below for the graph with equation  $y = x(15 - 2x)$ .

$x$	0	1	2	3	3.5	4	5	6	7	7.5
$15 - 2x$		13		9		7			1	
$y$	0	13		27		28			7	0

(b) On the graph paper provided on page 9, plot the graph of  $y = x(15 - 2x)$

(c) i) For what value of  $x$  is  $y$  maximum?

Ans:  $x =$  \_\_\_\_\_

ii) Find the **maximum** value of  $y$ , giving your answer correct to **one decimal place**.

Ans: \_\_\_\_\_

(d) On the same graph paper **plot** the graph of  $y = \frac{50}{x}$

$x$	0	1	2	3	3.5	4	5	6	7	7.5
$\frac{50}{x}$										

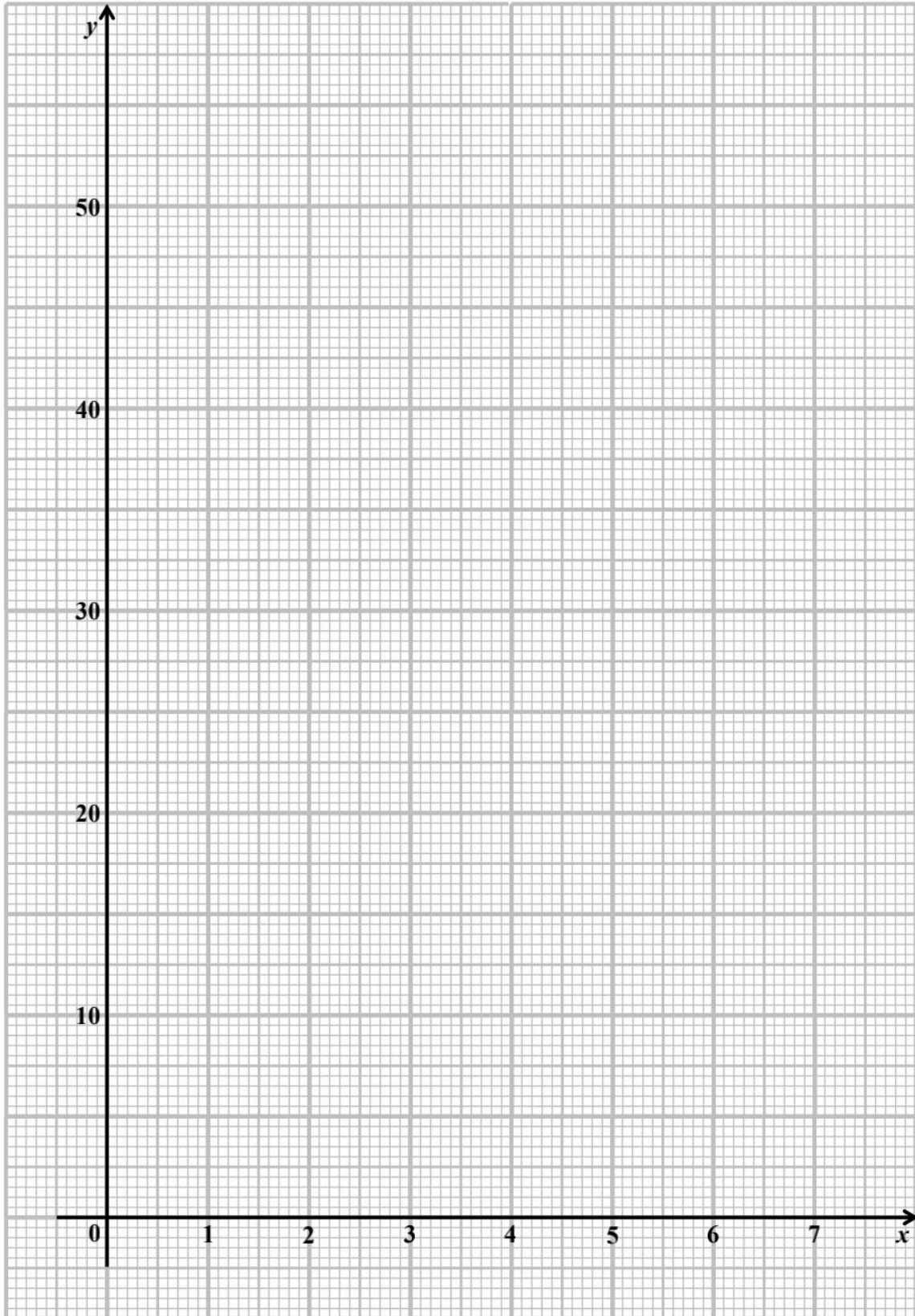
(e) Use the graphs to solve the equation  $x(15 - 2x) = \frac{50}{x}$

Give your answers correct to **one decimal place**

(..... , ..... ) and (..... , .....)

( 8 marks)



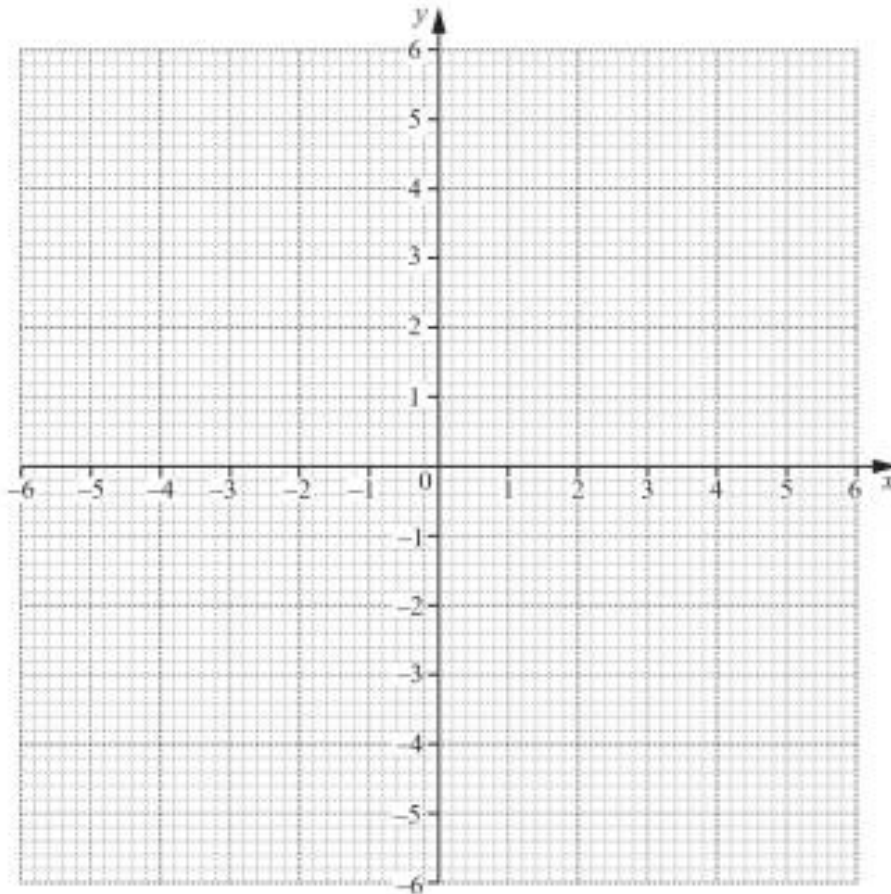


8) (a) Complete the table for the values for  $y = \frac{6}{x}$

x	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6
y	-1			-2	-3	-6		6	3	2		1.2	1

[2]

(b) On the grid below, draw the graph of  $y = \frac{6}{x}$



[4]

(c) Use your graph to solve the equation  $\frac{6}{x} = 4.5$

.....[1]

(d) On your graph, draw the line  $y = x$

[1]

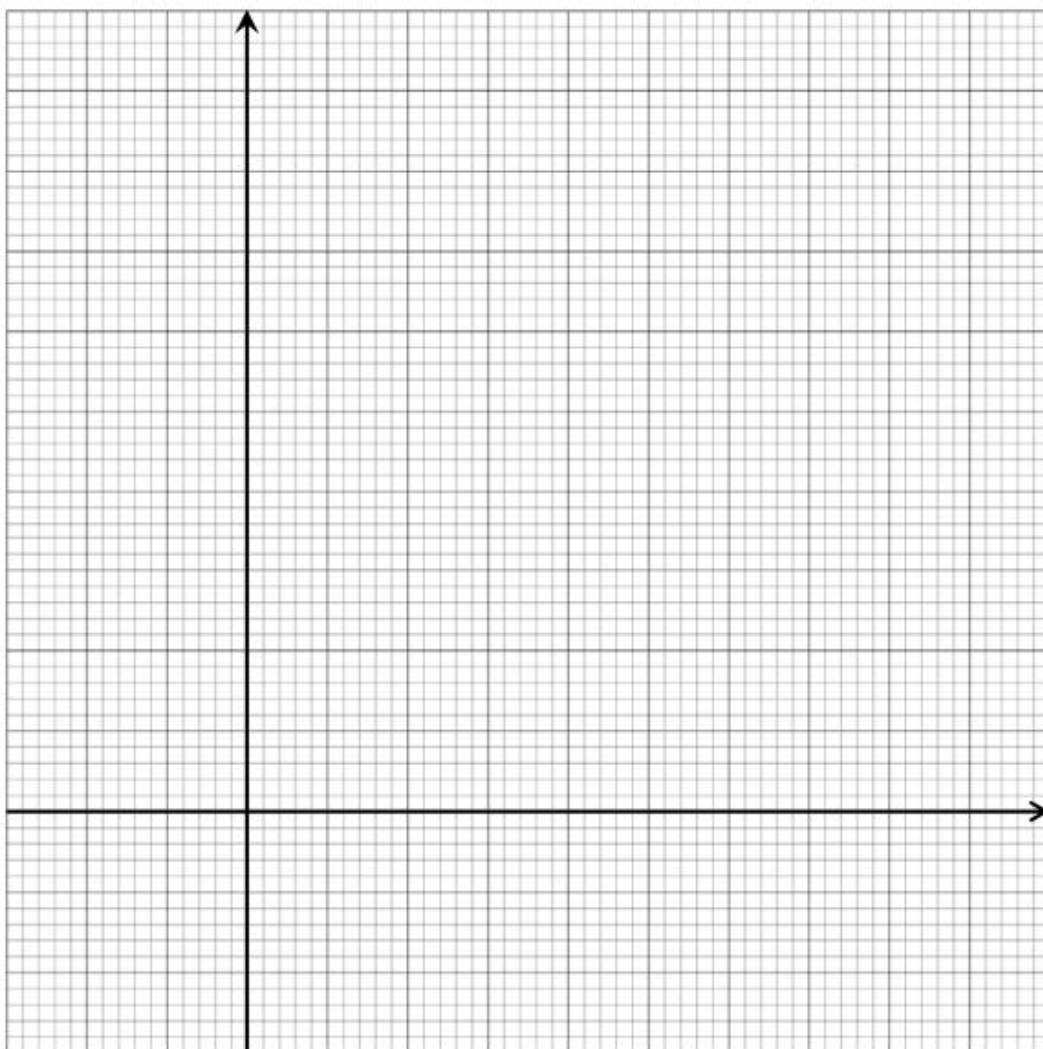
(e) Write down the coordinates of the points of intersection of the two equations

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

- 9) (a) Complete the following table for  $y = x^3 - 2x^2$ .

$x$	-1	-0.5	0	1	2	2.5	3
$x^3$			0	1	8		27
$-2x^2$			0	-2	-8		-18
$y$			0	-1	0		9

- (b) Use this table to draw the graph of  $y = x^3 - 2x^2$  for values of  $x$  from -1 to 3.



- (c) Using the same scale and axes draw the graph of  $y = 2x - 1$ .
- (d) Write the values of  $x$  at the **points of intersection** of the two graphs.

$x =$  \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

- 10) The table shows values of

$$x \text{ and } y \text{ for } y = \frac{12}{x}.$$

The values of  $x$  and  $y$  have been used to draw the graph of  $y = \frac{12}{x}$  for values of  $x$  from  $-6$  to  $-0.75$ .

$x$	-6	-4	-3	-2	-1.5	-1	-0.75	0
$y$	-2	-3	-4	-6	-8	-12	-16	not defined

- (a) On the same axes draw the

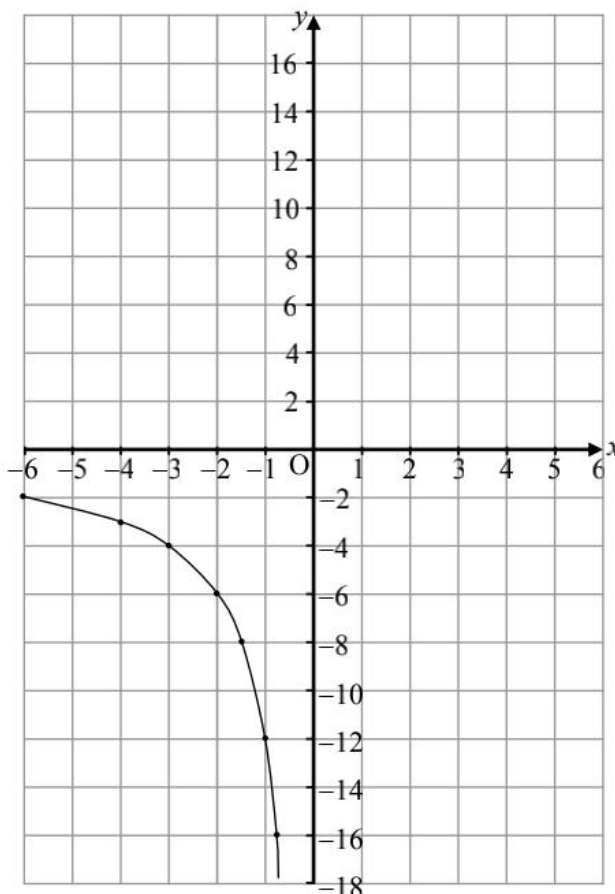
graph of  $y = \frac{12}{x}$  for values of  $x$  from  $0.75$  to  $6$ .

- (b) On the same axes draw the

graph of  $y = x^2$  for values of  $x$  from  $-4$  to  $4$ .

- (c) **Explain how** you can use **your graphs** to find an **estimate** for the cube root of 12.

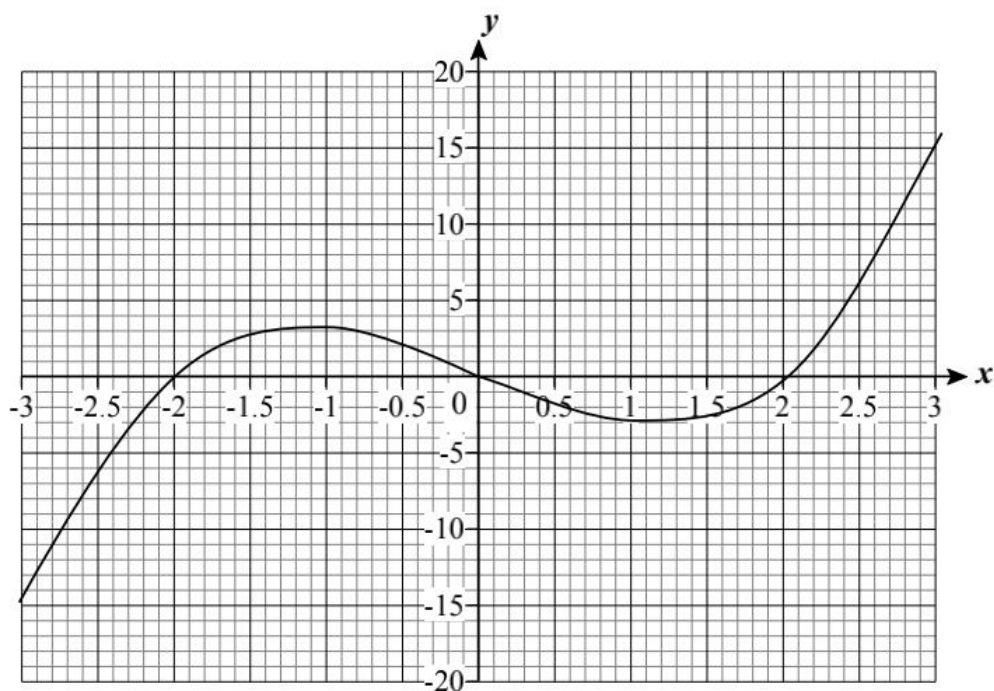
**All working must be shown.**



(8 marks)



- 11) Part of the graph of the equation  $y = x^3 - 4x$  is shown below.



- a) Use the graph to determine the solutions of the equation  $y = x^3 - 4x$ .

Ans: \_\_\_\_\_

- b) Find the equation of the straight line which needs to be drawn on the grid above to solve the equation:  $x^3 - 7x + 4 = 0$ .

Ans: \_\_\_\_\_

- c) Draw the line obtained in part b) on the grid above.

- d) Use the graphs to find the solutions of the equation  $x^3 - 7x + 4 = 0$

Ans: \_\_\_\_\_

(5 marks)

12) a) Complete the table below for the graph with equation  $y = x^3 - 5x + 4$

<b>x</b>	-3	-2.5	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
<b><math>x^3</math></b>	-27		-8	-3.4	-1		0		1		8		27
<b><math>-5x</math></b>	15		10	7.5	5		0		-5		-10		-15
<b>4</b>	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>y</b>	-8	0.9	6	8.1	8	6.4	4	1.6	0	-0.1	2	7.1	16

(b) On the graph paper provided on page 15, plot the graph for the equation  $y = x^3 - 5x + 4$

(c) Find the **values** of **x** for which  $x^3 - 5x + 4 = 0$ .

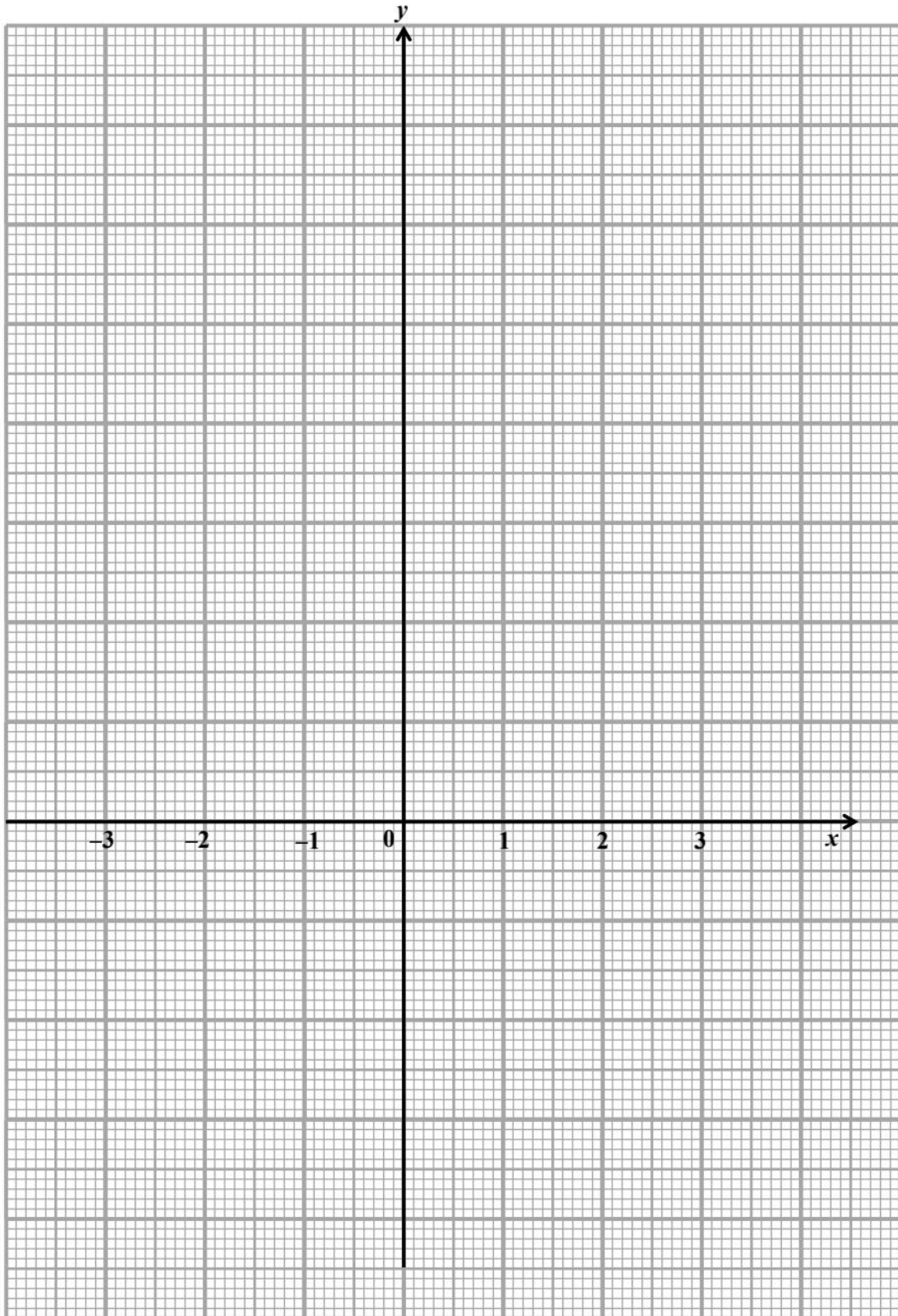
Ans: \_\_\_\_\_

(d) What is the **equation** of the straight line to be drawn to solve the equation  $x^3 - 7x = 0$ ?

Ans:  $y =$  \_\_\_\_\_

(e) **Draw** this straight line on your graph.

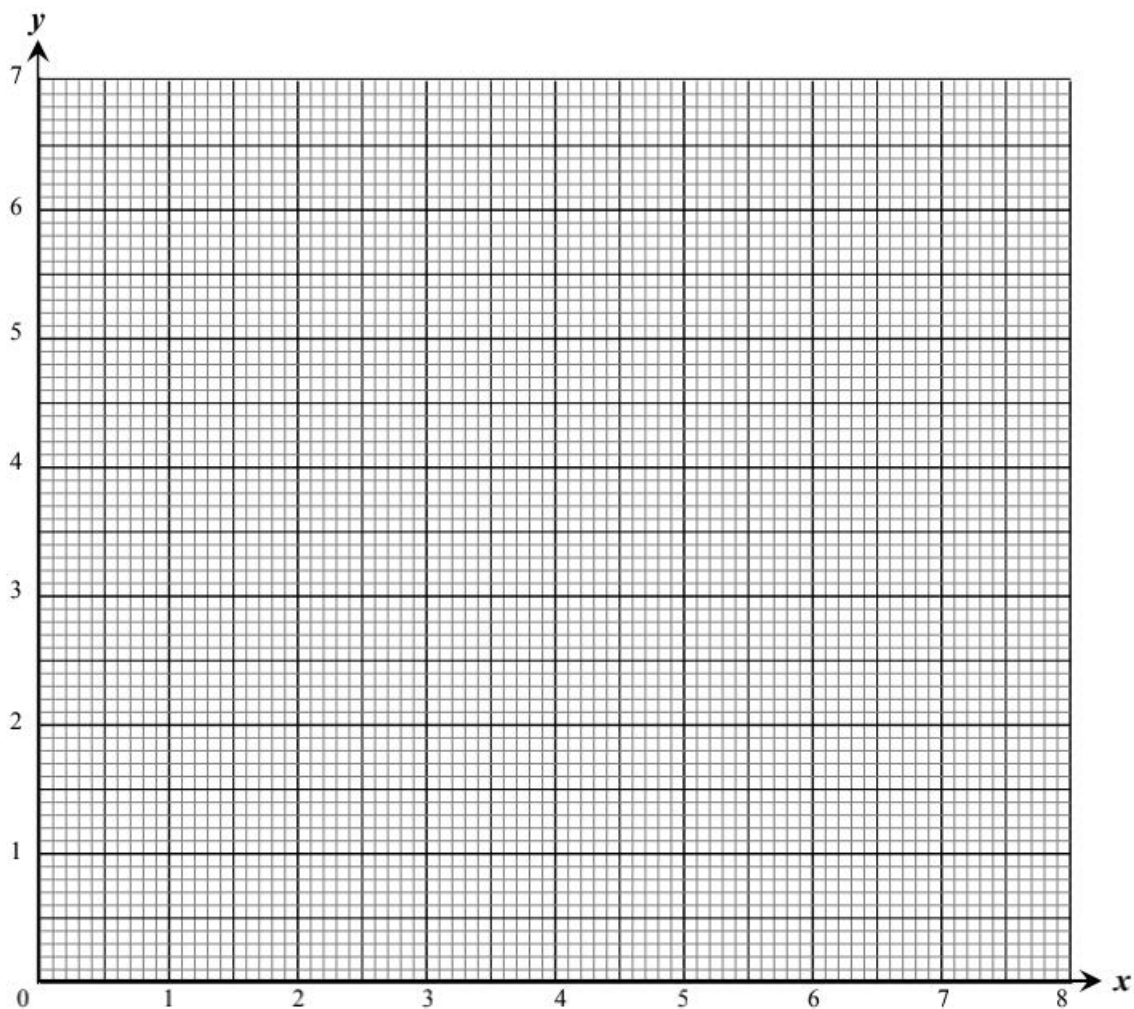




13) (i) Complete the table for  $y = \frac{12}{x} + x - 6$

$x$	<b>1</b>	<b>1.5</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
$y$	7		2	1					

(ii) On the graph paper (below) draw the graph of  $y = \frac{12}{x} + x - 6$  for values of  $x$  from 1 to 8.



(iii) Use the graph to

(a) find the minimum value of  $\frac{12}{x} + x - 6$

\_\_\_\_\_

(b) find the roots of the equation  $\frac{12}{x} + x - 8.5 = 0$

$x =$  \_\_\_\_\_