

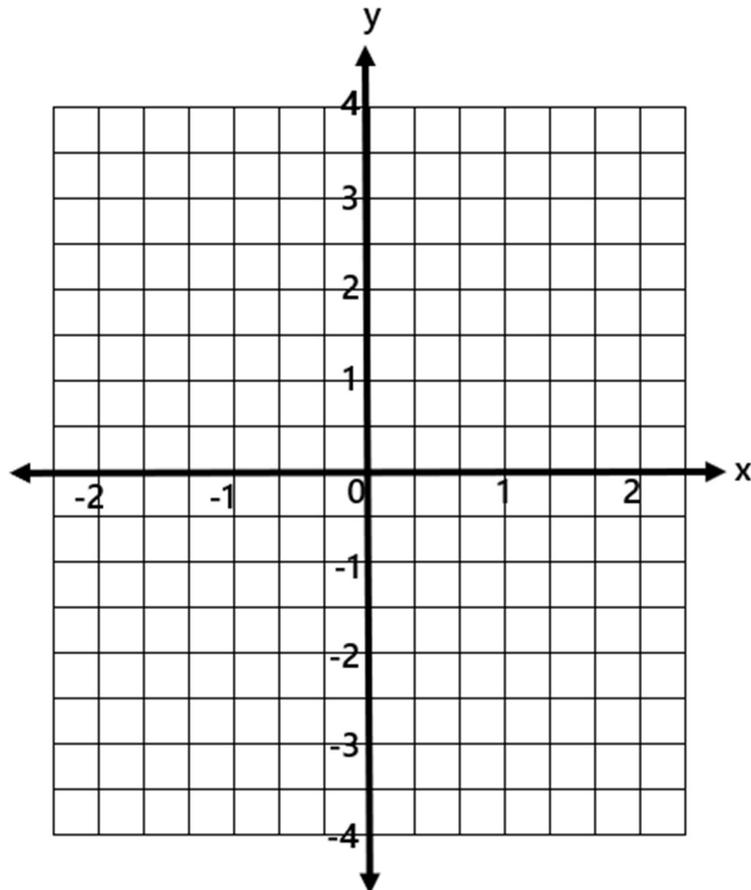
# CUBIC AND RECIPROCAL GRAPHS

## Task 1

1) Complete the table of values for  $y = x^3 - 2x$

$x$	-2	-1	0	1	2
$y$					

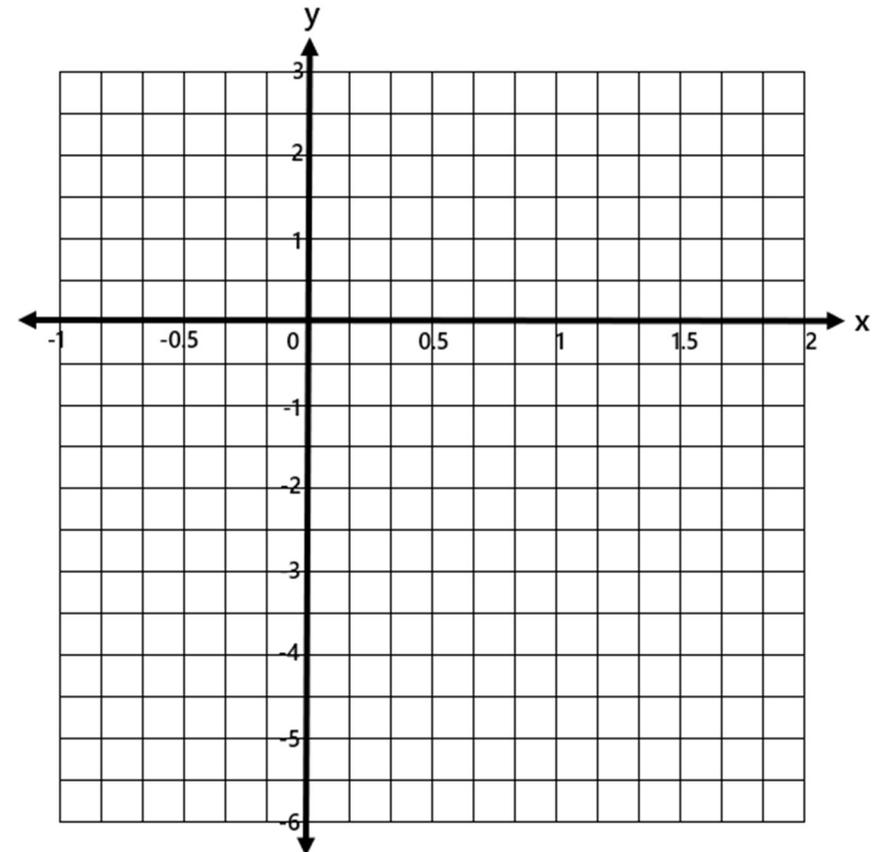
Draw the graph of  $y = x^3 - 2x$  on the grid below.



2) Complete the table of values for  $y = 2x^3 - 3x^2 - 1$

$x$	-1	-0.5	0	0.5	1	1.5	2
$y$							

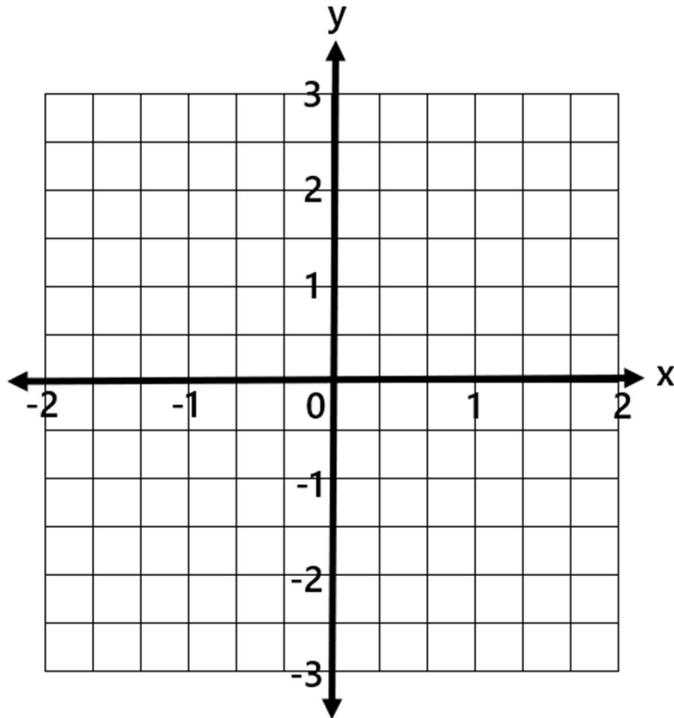
Draw the graph of  $y = 2x^3 - 3x^2 - 1$  on the grid below.



3) Complete the table of values for  $y = 4x - x^3$

$x$	-2	-1	0	1	2
$y$					

Draw the graph of  $y = 4x - x^3$  on the grid below.



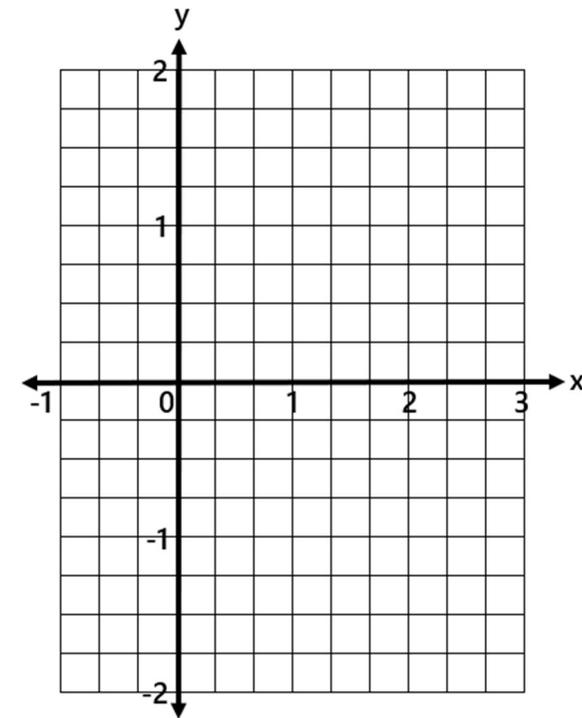
Use the same grid to plot the equation of the line  $y = 0.5$

How many positive solutions are there to the equation  $4x - x^3 = 0.5$ ?  
Give a reason for your answer.

4) Complete the table of values for  $y = -x^3 + 3x^2 - 2$

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

Draw the graph of  $y = -x^3 + 3x^2 - 2$  on the grid below.



Use the same grid to plot the equation  $y = x$ .

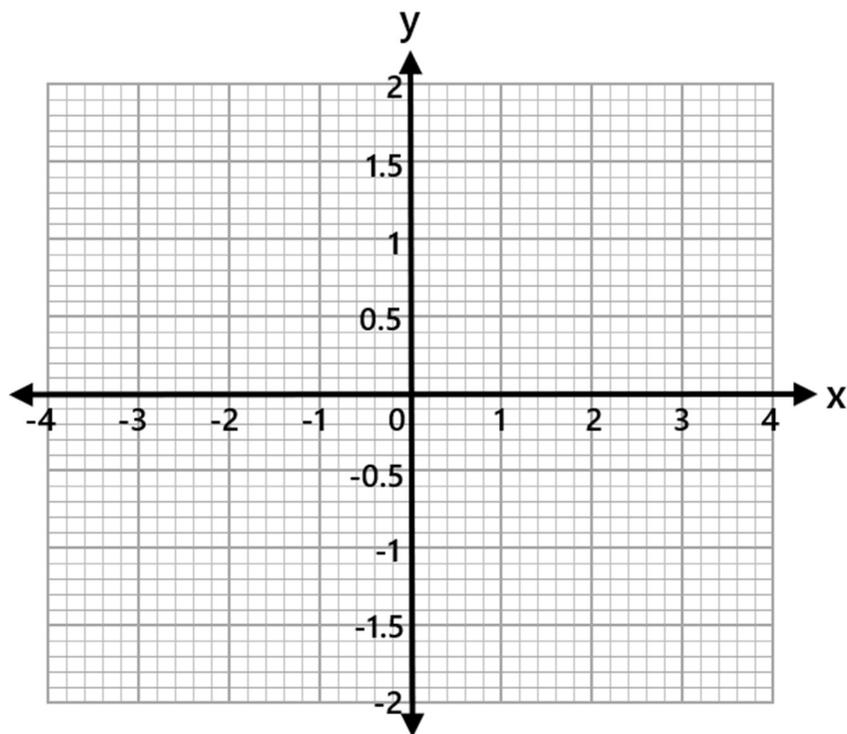
State the number of solutions to the equation  $-x^3 + 3x^2 - 2 = x$ .  
Give a reason for your answer.

Task 2

5) Complete the table of values for  $y = -\frac{2}{x}$

$x$	-4	-3	-2	-1	1	2	3	4
$y$								

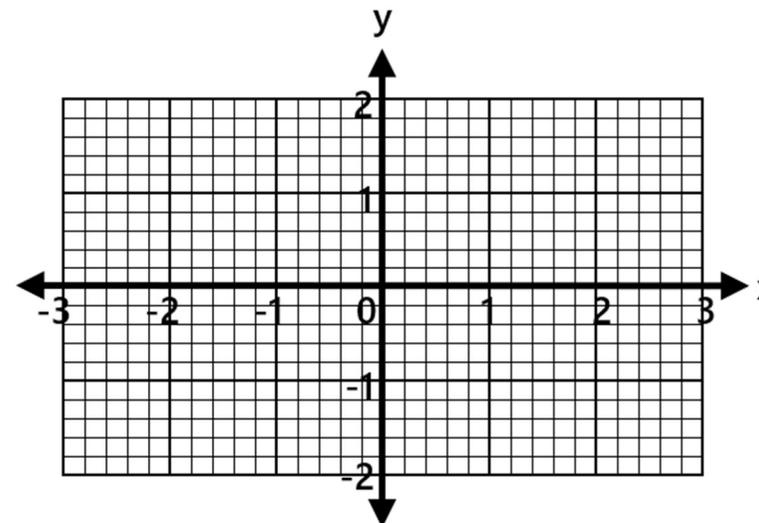
Draw the graph of  $y = -\frac{2}{x}$  on the grid below.



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

$x$	-3	-2	-1	-0.5	0.5	1	2	3
$y$								

Draw the graph of  $y = \frac{1}{x}$  on the grid below.

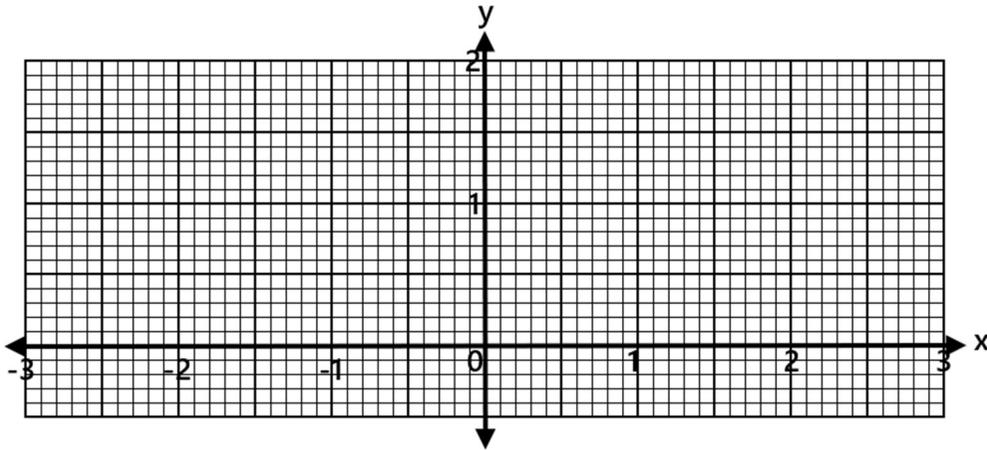


Use the same grid to plot the equation of the line  $y = 0$

Explain why the equations  $y = \frac{1}{x}$  and  $y = 0$  have no solutions.

7) Complete the table of values for  $y = \frac{2}{x^2}$

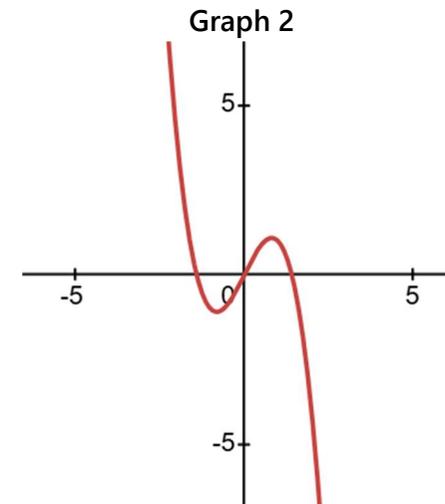
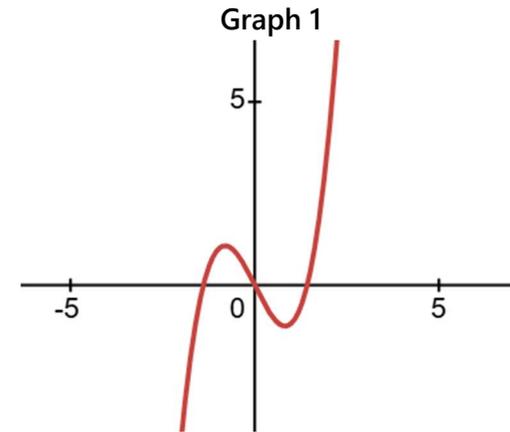
$x$	-3	-2	-1	1	2	3
$y$						



Explain why  $\frac{2}{x^2} > 0$  for all values of  $x$ , where  $x \neq 0$ .

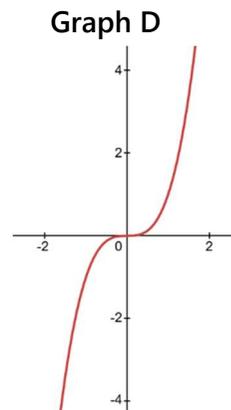
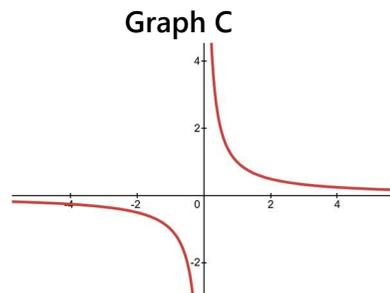
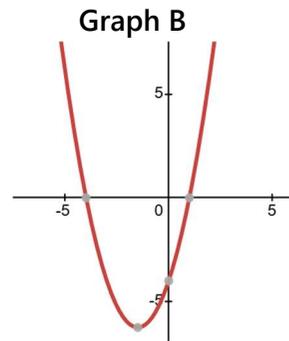
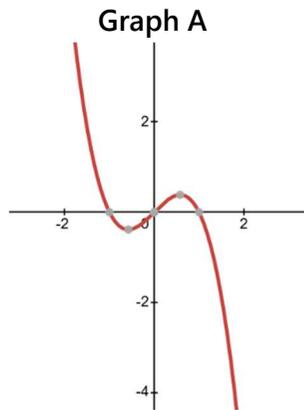
Task 3

8) Which of the following graphs could represent  $y = x^3 - 2x$ ? Explain your reasoning.



9) Match each of the following equations with a graph shown below.

<u>Graph</u>	<u>Letter</u>
$y = x^3$	
$y = \frac{1}{x}$	
$y = -x^3 + x$	



10) Which of the following equations represents a reciprocal equation?

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

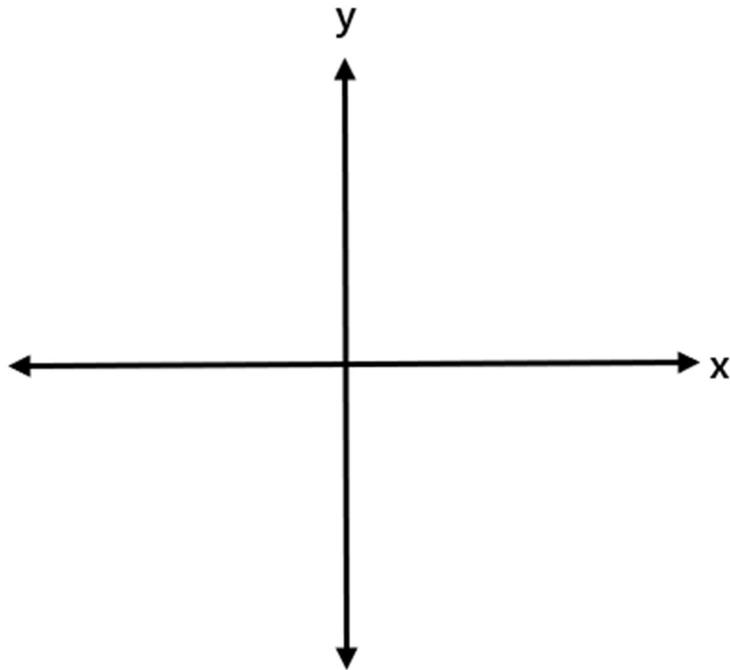
b)  $y = \frac{5}{x}$

c)  $y = x^2 - 4$

11) Use the space below to sketch the general shape of the graph of  $y = x^3$

### Challenge

- 12) A reciprocal equation is of the form  $y = \frac{a}{x+b} + c$ , where  $a < 0$ . Use the axes below to sketch the general shape of this graph, with a vertical asymptote at  $x = 2$  and a horizontal asymptote at  $y = -1$ .



- 13) A cubic function  $y = ax^3 + bx^2 + c$  passes through the points: (0, 2), (-1, 4), and (2, 22). Work out the values of  $a$ ,  $b$ , and  $c$ . You must demonstrate clear algebraic working. Do not use trial and error.

- 14) A reciprocal function is defined as  $y = \frac{k}{x+1} + 2$ . The graph passes through the point (1, -1). Work out the value of  $k$ .