

2003

Question 6

Q6. (a) Solve  $3(x-2)+1=19$  and verify your answer.

(b) (i) Solve the simultaneous equations

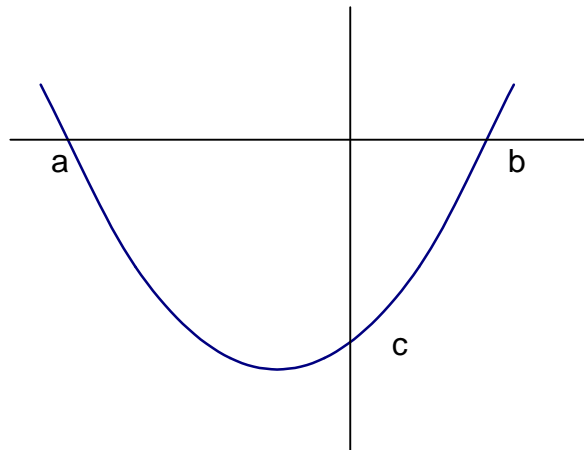
$$3x + 4y = -1$$

$$2x + 9 = -6y.$$

(ii) By graphing the two lines on a single co-ordinate diagram, check your answer to part (i).

(c) The diagram shows part of the graph of a function

$$f : x \rightarrow x^2 + 2x - 8, \text{ where } x \in R.$$



(i) The graph intersects the x-axis at a and b and the y-axis at c. Find the co-ordinates of a, b and c.

(ii) Hence, write down the range of values of x for which  $x^2 + 2x - 8 \leq 0$

## Solution

Q6. (a) Solve  $3(x-2)+1=19$  and verify your answer.

$$3(x-2)+1=19$$

$$3x-6+1=19$$

$$3x-5=19$$

$$3x=24$$

$$x=8$$

Sub in  $x=8$  into  $3(x-2)+1=19$

$$3(8-2)+1=19$$

$$3(6)+1=19$$

$$18+1=19$$

$$19=19$$

(b) (i) Solve the simultaneous equations

$$3x + 4y = -1$$

$$2x + 9 = -6y.$$

(ii) By graphing the two lines on a single co-ordinate diagram, check your answer to part (i).

$$3x + 4y = -1$$

$$2x + 9 = -6y$$

$$3x + 4y = -1$$

$$2x + 6y = -9$$

$$9x + 12y = -3$$

$$\underline{4x + 12y = -18}$$

$$5x = 15$$

$$x = 3$$

Sub  $x = 3$  into  $3x + 4y = -1$

$$3(3) + 4y = -1$$

$$9 + 4y = -1$$

$$4y = -10$$

$$y = -2.5$$

We have to draw  $3x + 4y = -1$

Find where it cuts  $x$  - axis so sub in  $y = 0$

$$3x = -1$$

$$x = -\frac{1}{3}$$

One point is  $\left(-\frac{1}{3}, 0\right)$

Find where it cuts  $y$  - axis so sub in  $x = 0$

$$4y = -1$$

$$y = -\frac{1}{4}$$

Second point is  $\left(0, -\frac{1}{4}\right)$

Draw the line  $2x + 6y = -9$

Find where it cuts  $x$  - axis so sub in  $y = 0$

$$2x = -9$$

$$x = -\frac{9}{2}$$

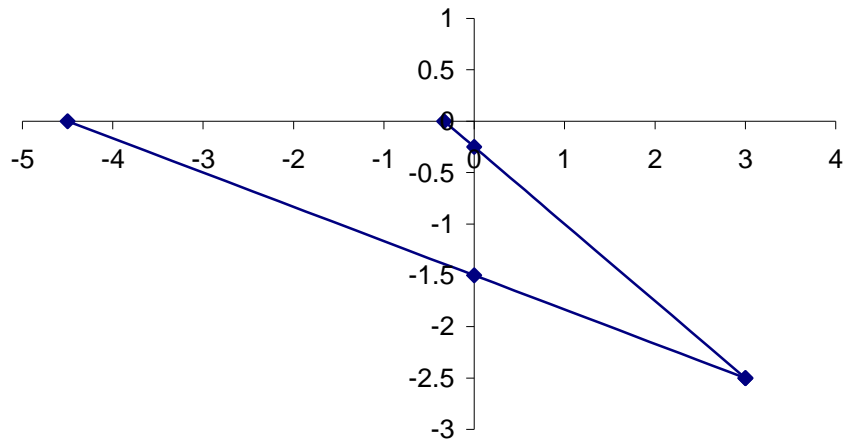
One point is  $\left(-4\frac{1}{2}, 0\right)$

Find where it cuts  $y$  - axis so sub in  $x = 0$

$$6y = -9$$

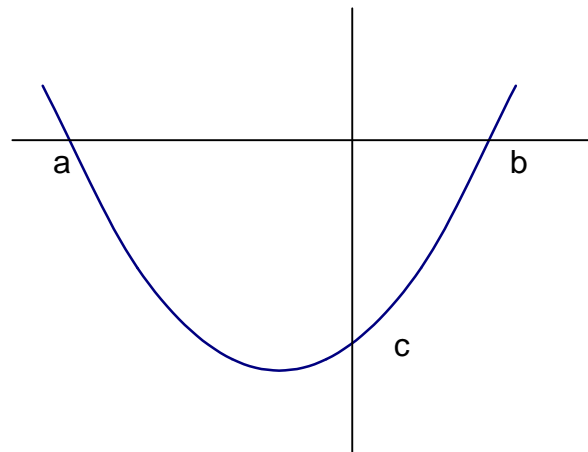
$$y = -\frac{9}{6} = -1\frac{1}{2}$$

Second point is  $\left(0, -1\frac{1}{2}\right)$



(c) The diagram shows part of the graph of a function

$$f : x \rightarrow x^2 + 2x - 8, \text{ where } x \in \mathbb{R}.$$



- (i) The graph intersects the x-axis at a and b and the y-axis at c. Find the co-ordinates of a, b and c.

$$f : x \rightarrow x^2 + 2x - 8$$

$$y = x^2 + 2x - 8$$

$$\text{x-axis then } y = 0$$

$$x^2 + 2x - 8 = 0$$

$$(x + 4)(x - 2) = 0$$

$$x = -4 \quad \text{or} \quad x = 2$$

$$a(-4,0) \text{ and } b(2,0)$$

y - axis so sub in  $x = 0$

$$y = x^2 + 2x - 8$$

$$y = -8$$

$$c(0,-8)$$

- (ii) Hence, write down the range of values of  $x$  for which  $x^2 + 2x - 8 \leq 0$

$$\text{Answer } -4 \leq x \leq 2$$