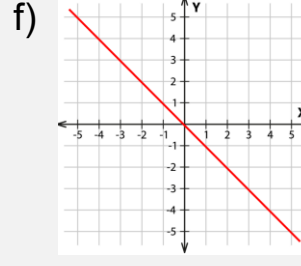
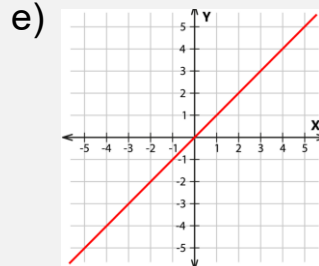
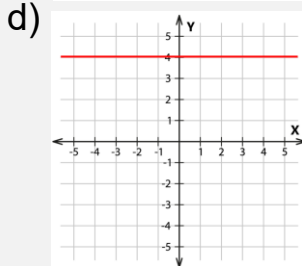
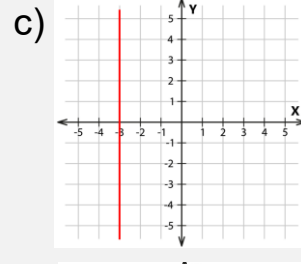
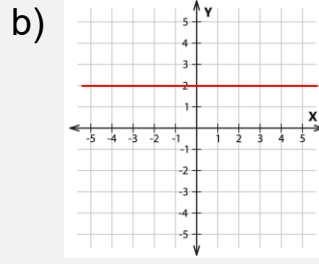
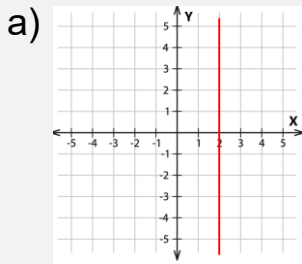


Lesson 11 – Lines with equation $y = x + a$, $x + y = b$, $y = b - x$

Starter

Write down the equation of each of these lines

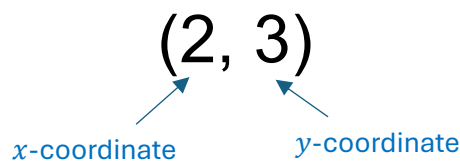


Starter Answers

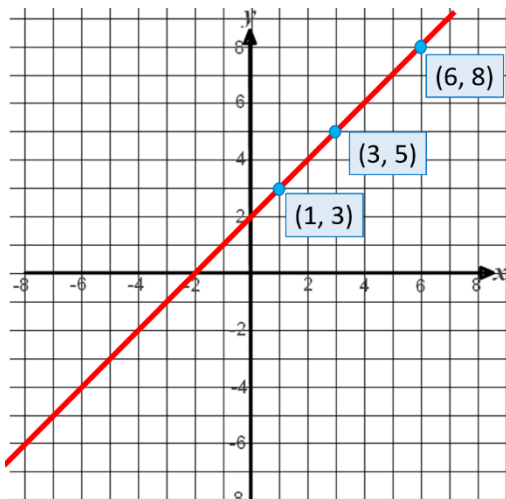
- 1) $x = 2$ 2) $y = 2$ 3) $x = -3$ 4) $y = 4$ 5) $y = x$ 6) $y = -x$

In this lesson we will look at some different **equations of straight lines**.

Remember that the equation of a line tells you information about the x and y coordinates of the points that are on the line.



Here is a straight line graph with some coordinates labelled on.



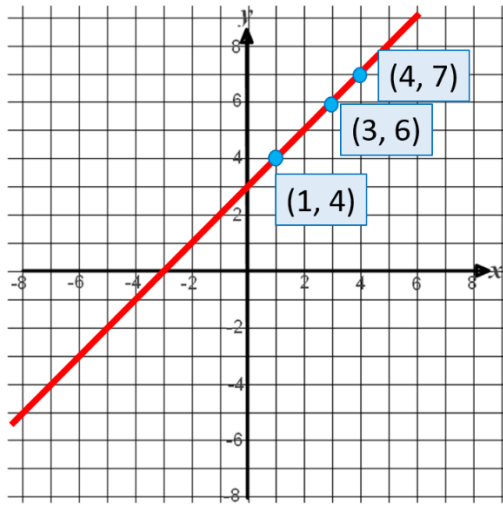
We can see that, for every point on the line, the y coordinate is 2 more than the x -coordinate.

So, we can describe this line using the equation:

$$y = x + 2$$

\swarrow \nwarrow

y -coordinate x -coordinate



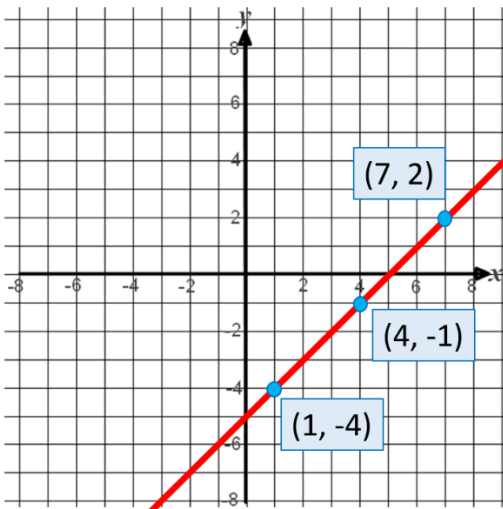
How are the x and y coordinates linked this time?

We can see that the y -coordinate is always 3 more than the x -coordinate.

So, we can describe this line using the equation:

$$y = x + 3$$

↑
↑
 y -coordinate x -coordinate



How are the x and y coordinates linked this time?

We can see that the y -coordinates are always 5 less than the x -coordinates.

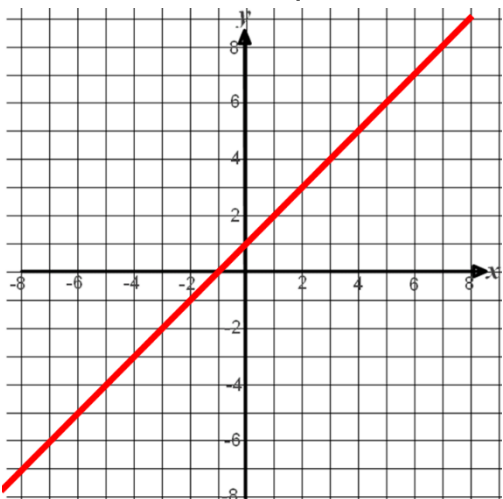
So, we can describe the line using the equation:

$$y = x - 5$$

↑
↑
 y -coordinate x -coordinate

Example 1

Write down the equation of this line.



First, find some coordinates of points on the line.

(1, 2), (2, 3) and (4, 5) are on the line

Now look at how the x and y coordinates are linked.

We can see the y -coordinate is always 1 more than the x -coordinate.

So, the equation is $y = x + 1$

Example 2

Write down three coordinates of points that would be on the line $y = x + 4$.

$y = x + 4$ means that you add 4 to the x -coordinate to get the y -coordinate for every point on the line.

So, choose some x -coordinates (you can choose anything you like):

(1,), (2,), (3,)

Then to find the y -coordinates, you add 4 to each of the x -coordinates

(1, 5), (2, 6), (3, 7)

Example 3

Which set of points below would lie on the line $y = x - 6$?

Set A

(1, 7), (2, 8), (3, 9)

Set B

(6, 4), (6, 2), (6, 5)

Set C

(1, -5), (2, -4), (3, -3)

$y = x - 6$ means you subtract 6 from the x -coordinate to get the y -coordinate.

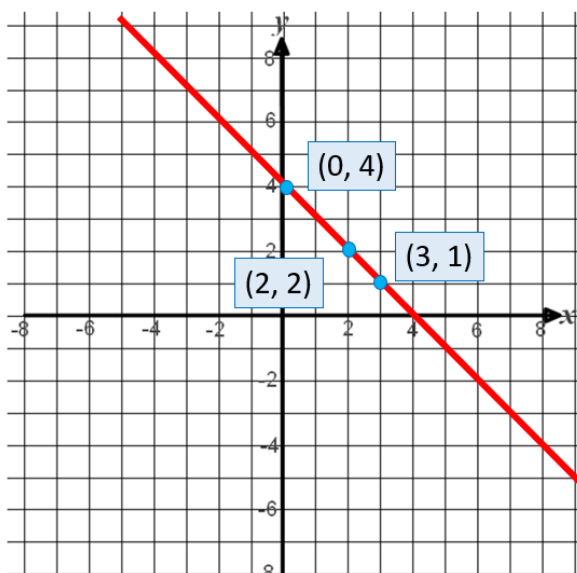
So, the answer is set C since: $1 - 6 = -5$

$$2 - 6 = -4$$

$$3 - 6 = -3$$

Example 4

Write down three coordinates of points on the line $x + y = 4$



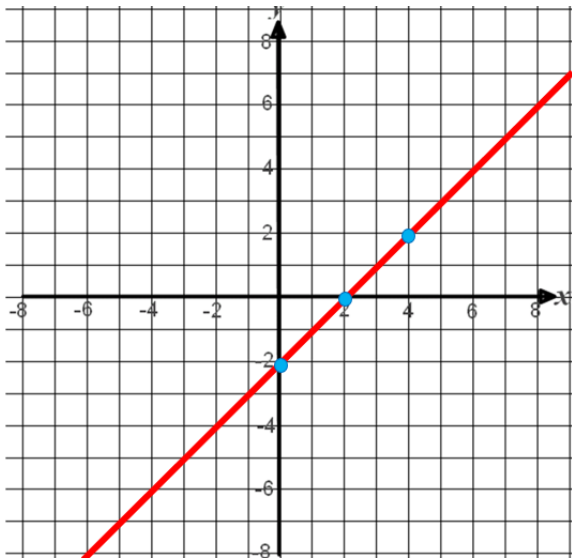
$x + y = 4$ means that the x -coordinates and the y -coordinates have to add to get 4.

So, find some sets of numbers that add to give 4.

(0, 4), (2, 2), (3, 1)

Example 5

Draw the graph with the equation $y = x - 2$



$y = x - 2$ means that we subtract 2 from the x -coordinates to get the y -coordinates.

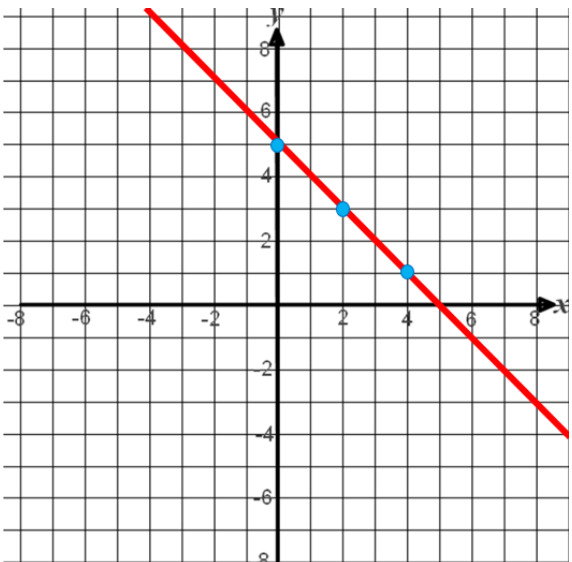
Choose any x -coordinates you like (just make sure they can be seen on the graph) $(0, \quad)$, $(2, \quad)$, $(4, \quad)$

Then subtract 2 from each of these to get the y -coordinates:
 $(0, -2)$, $(2, 0)$, $(4, 2)$

Plot these points on the graph and join with a straight line.

Example 6

Draw the graph with the equation $x + y = 5$



$x + y = 5$ means that the x -coordinate and the y -coordinate have to add to 5.

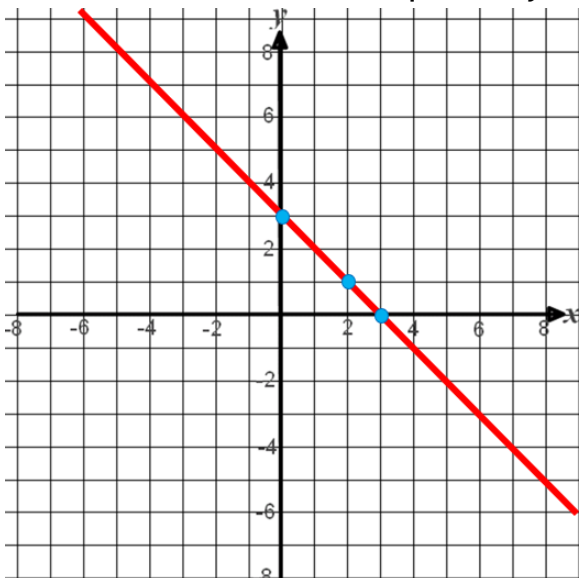
So, pick some sets of numbers that add to 5:

$(0, 5)$, $(2, 3)$, $(4, 1)$

Plot these coordinates and join with a straight line.

Example 7

Draw the line with the equation $y = 3 - x$



Choose some x -coordinates. You can choose anything you like (just make sure you can see them on the graph)

$(0, \quad)$, $(2, \quad)$, $(3, \quad)$

Now let's find the y -coordinates:

$$y = 3 - 0 = 3$$

$$y = 3 - 2 = 1$$

$$y = 3 - 3 = 0$$

The coordinates are $(0, 3)$, $(2, 1)$, $(3, 0)$