Lines with one intercept

Year 9
Mathematics

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Learning Objectives

By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- Understand what it means to be a horizontal or vertical line
- That these lines only have one axis intercept
- Be able to sketch horizontal and vertical line
- Understand that lines can cross through the origin
- Be able to sketch lines that pass through the origin

RECAP

In previous lessons we have looked at how to find the x- and y-intercepts using algebra and the fact that x=0 and y=0 at each of the axis intercepts.

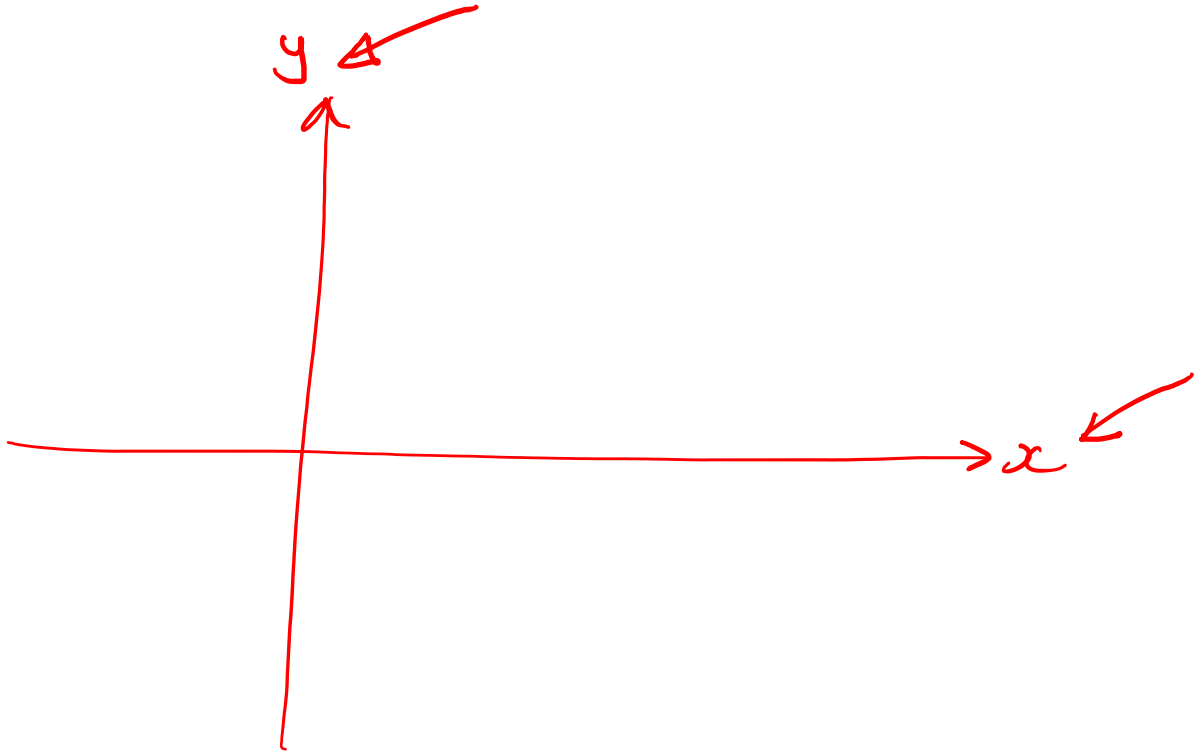
With each of the lines we have drawn, we have seen they all have two axis intercepts. But will this be the case of all lines?

This lesson looks at examples of lines where there is only one axis intercept.

$2x+3y=6$

$x=0$

$y=0$



Vertical lines

A vertical line has a very interesting equation.

One example of a vertical line is $x = 3$

This is shown on the graph to the right.

We can see that it doesn't matter what the y-value of the point is, the x-value is always 3.

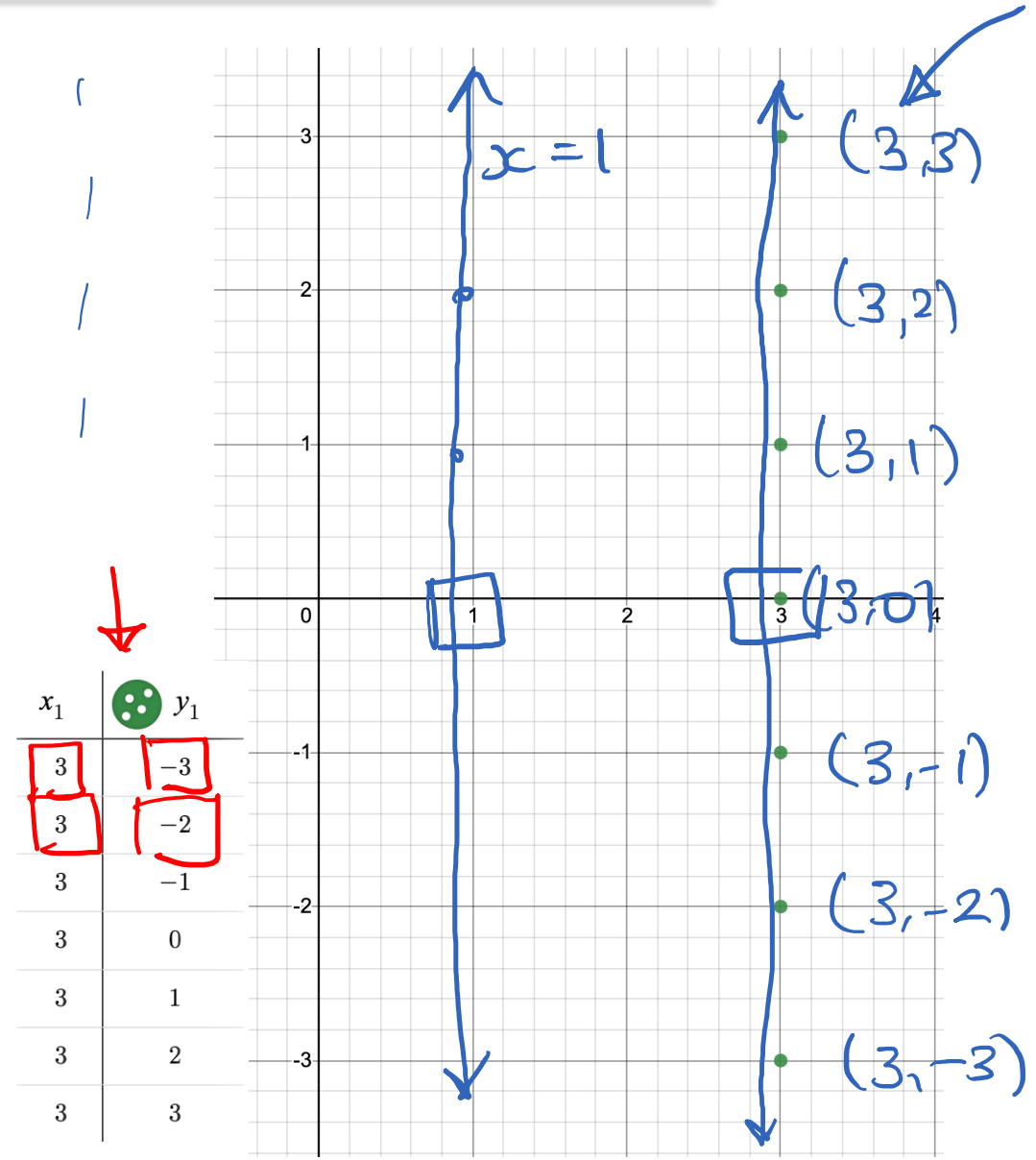
So, whenever we see lines like those shown below, we should always know that they are vertical. They also only have one axis intercept.

$x = -3$
$x = 4$
$x = 0$

y-axis

desmos.com

x_1	y_1
3	−3
3	−2
3	−1
3	0
3	1
3	2
3	3



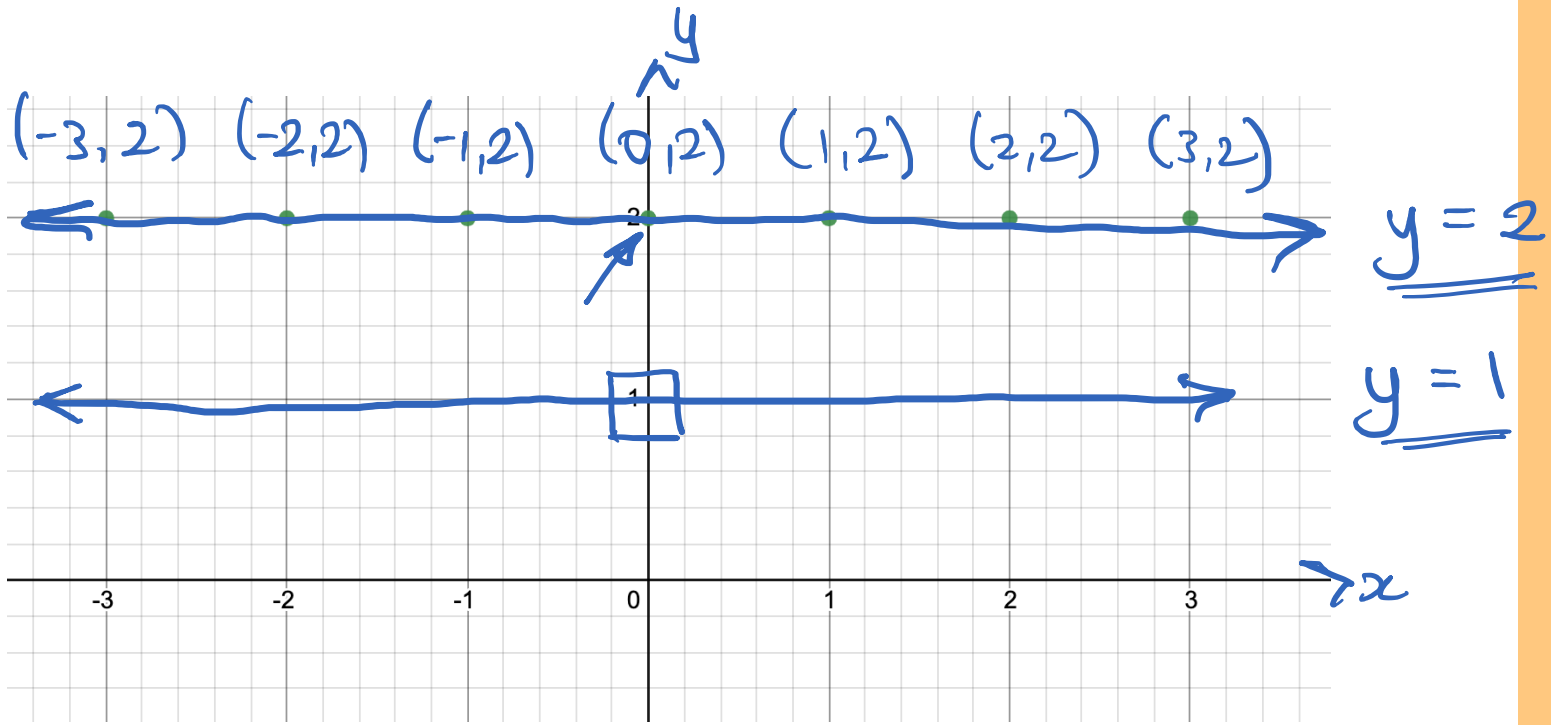
Horizontal lines

In the same way as we can have vertical lines, we can also have horizontal lines.

In this case, it doesn't matter what the x-value is, the y-value is always going to be the same.

Horizontal lines have equations starting $y =$

The line below has the equation $y = 2$



Lines which pass through the origin

Another family of lines which is really interesting are those which pass through the origin.

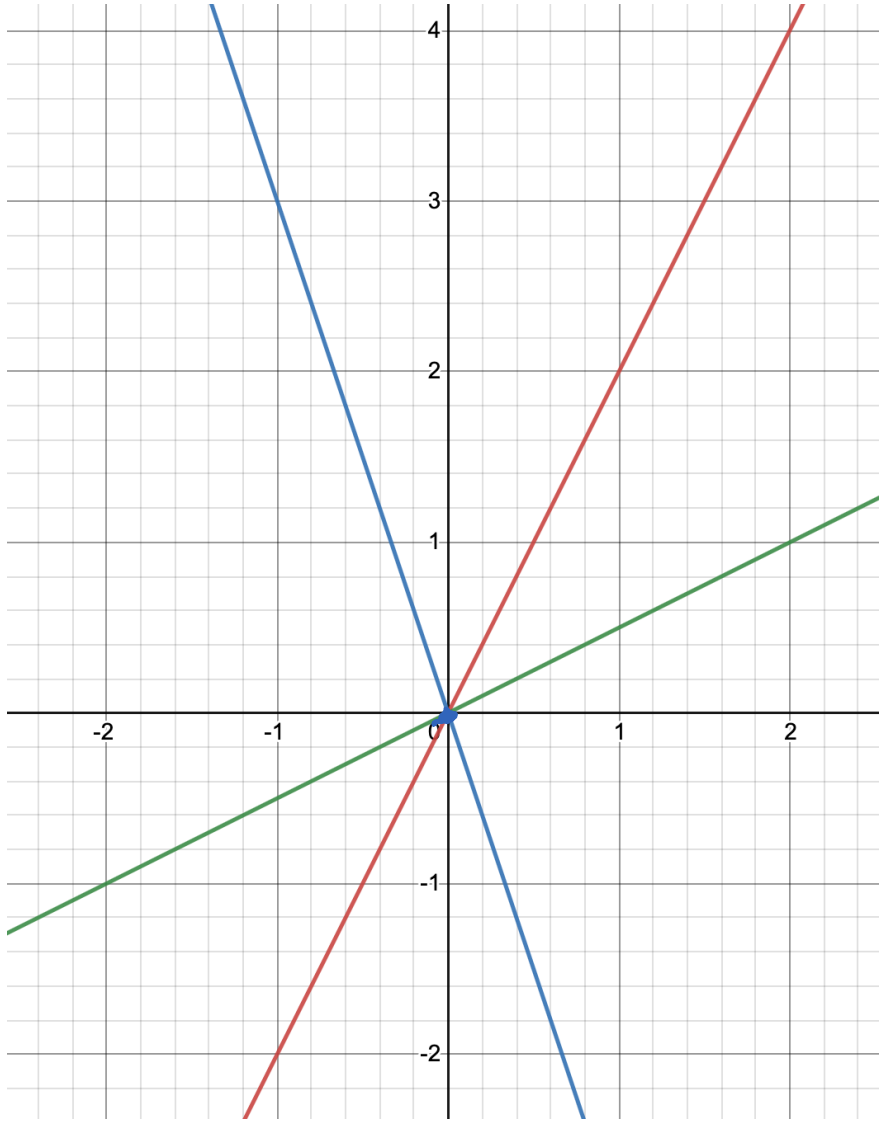
They have an equation of the form:

$$y = ax$$

Examples might be:

$$y = 2x$$
$$y = -3x$$
$$y = \frac{1}{2}x$$

Each graph is shown, but which is which?



origin

Points of intersection

We know that the word intersection means **to meet.**

Later in the course and throughout the rest of your Maths career you will be more and more interested in points of intersection. Basically where two lines or curves meet.

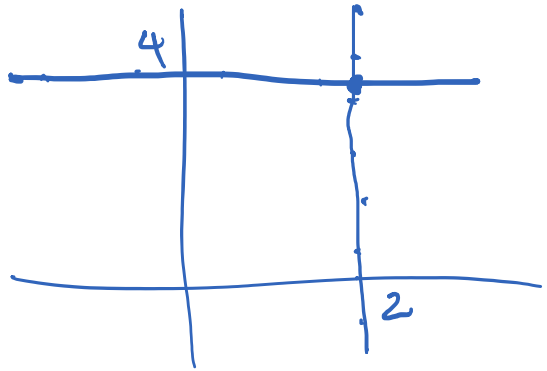
Where do you think the point of intersection would be for the lines $x = 2 \; and \; y = 4$

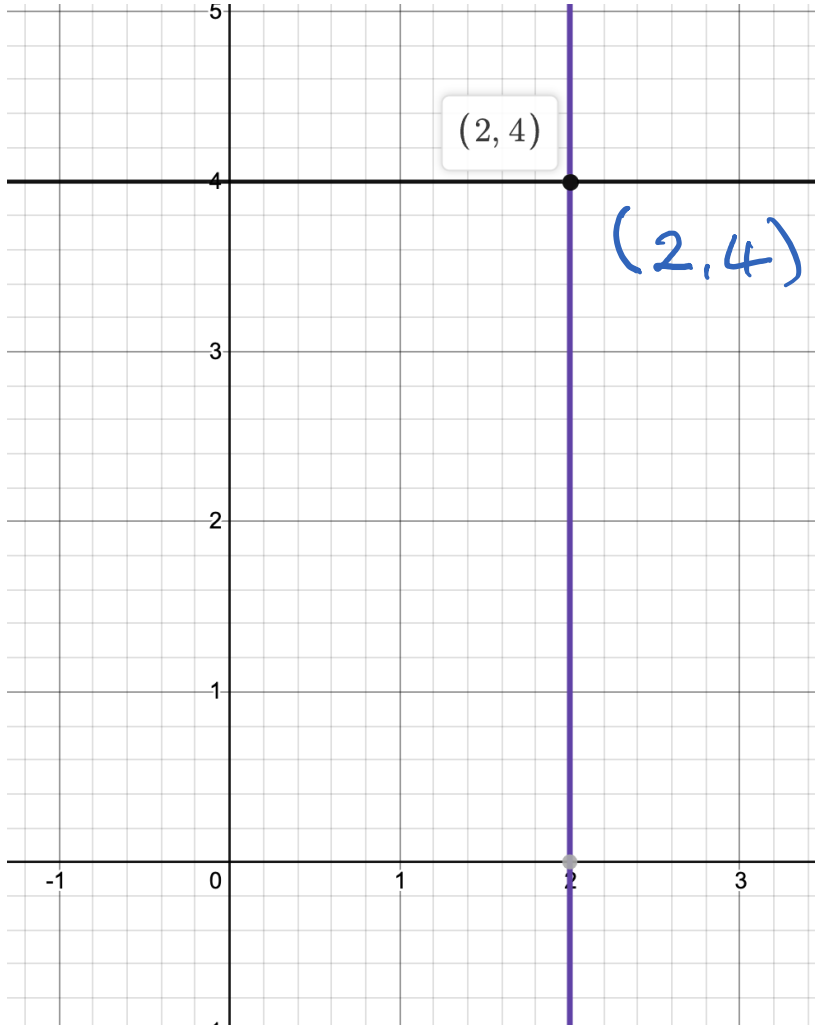
Sketching them is one way of finding the answer … but is there a better way?

$x = 2$

$y = 4$

$(2, 4)$





$x = 7$

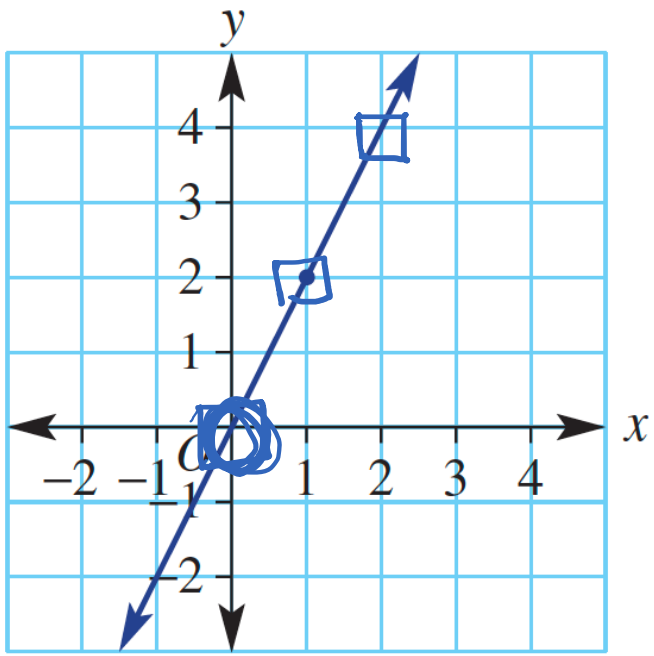
$y = -3$

$(7, -3)$

Finding equations of lines given a graph

What spend a lot of time teaching you how to do Mathematics in one direction, expecting you to be able to reverse it. This isn't always easy …

How would we find the equation of the following graphs?



y int ✓

gradient ✓

$y = mx + c$

m: grad.

c: y-int.

Coming soon

The next topic area looks at gradient. This is the measure of slope of a straight line. Knowing the gradient of a straight line is really helpful!