THE LINEAR FUNCTION

Notes 1 Gradients can be positive / or negative \

2 A gradient of 2 is steeper than a gradient of 1

3 Gradient is measured by Rise / run : the change in y divided by change in x e.g. 6-3 divided by 8-2 = ½

4 The GENERAL Equation is given by $y = mx + c$

5 Using these facts we can obtain the equation of a straight line given the gradient and a point.

6 Given TWO points we can find the gradient and thus the equation as with #5 above.

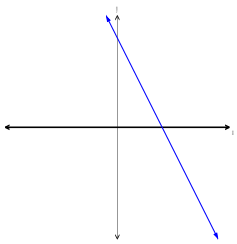
EXAMPLES

1 Find the equation of the line with gradient -2 and passing through the point (4, 1)

$y = mx + c$ Then $y = -2x + c$ Now sub in the x and y value $1 = (-2)\ 4 + c$ so $c = 9$

That is $y = -2x + 9$ Note that 9 is the value of the y – intercept.

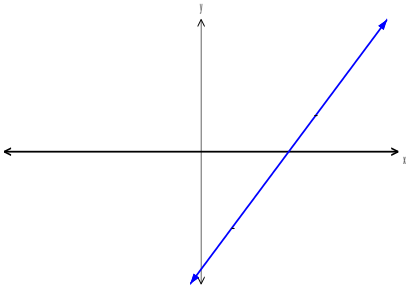
It is always helpful to draw a small sketch. See sketch for this example below.



2 When given two points, first find the gradient (change in y divided by change in x) then proceed as above.

Find the equation of the line which goes through the following points. (6, 2) (3, - 4)

gradient m = 2 – (-4) divided by 6 – 3 = 6/3 = 2



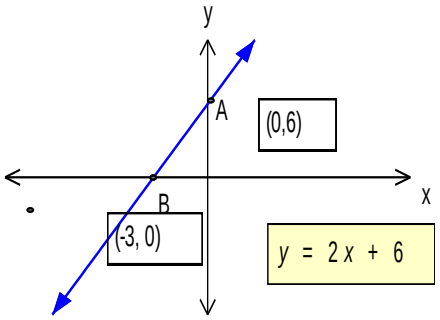
Then $y = 2x + c$ $2 = 12 + c$ then $c = -10$ $y = 2x - 10$

LINEAR FUNCTION II

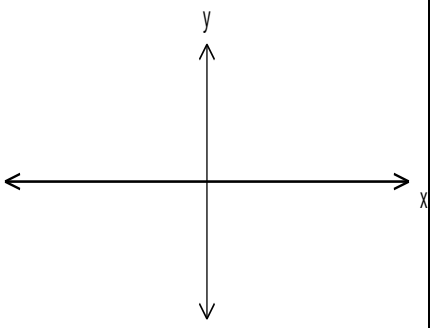
1 Sketching a linear function. Simply find out where the line crosses the x-axis (put y = 0) and where it crosses the y axis. (put x = 0)

Sketch the linear function y = 2x + 6

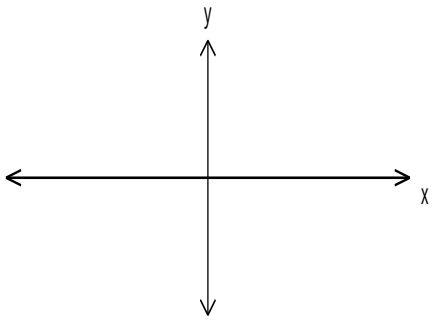
x	0	-3
y	6	0



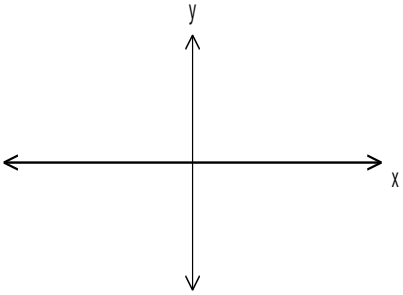
Note that if the equation is in the form y = mx + c then c is always the y – intercept.



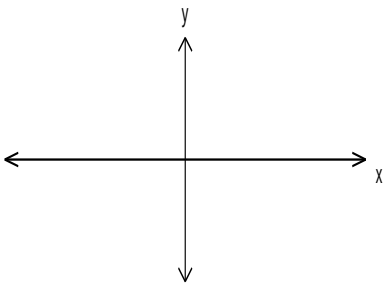
Sketch y = 2x + 4



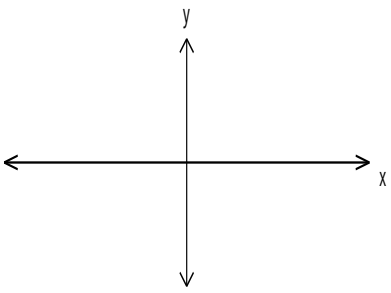
Sketch x + y = 6



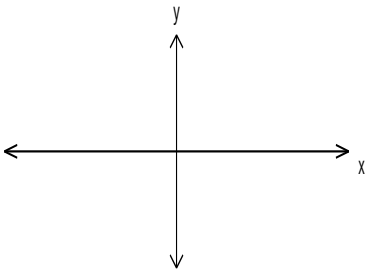
Sketch 2y + x = 12



Sketch 2x + 3y = 6



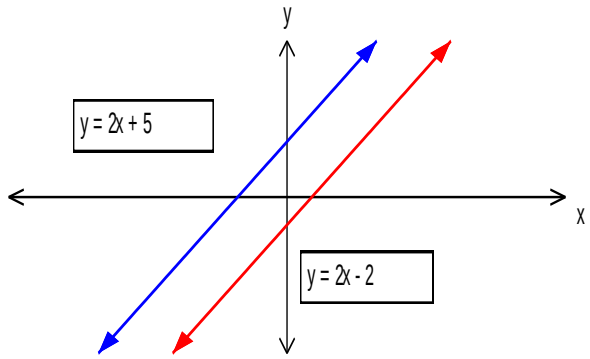
Sketch 2y – 3x = 9



Sketch 5 x – 2y = 100

The Linear Function III

Gradients Parallel and Perpendicular Note the two lines below are PARALLEL.



They both have the same gradient of 2

Perpendicular gradients. Note a gradient of 1 is perpendicular to one of -1
a gradient of 2 is perpendicular to one of -½

So to obtain a perpendicular gradient follow the rules below.

Make the given gradient an IMPROPER FRACTION e.g. 1½ becomes $\frac{3}{2}$

Invert the fraction e.g. $\frac{3}{2}$ *becomes* $\frac{2}{3}$

Change the sign. Now we have the answer $-\frac{2}{3}$

Try the following by stating the gradient of the line perpendicular to the given gradient.

m1	m2
-4	
0.75	
-0 . 3	
$\overline{0.3}$	
y=2x + 5	
2y -3x = 10	
3x + 4y = 30	
2x – 5y = 36	

Note also that when the two lines are perpendicular then $m_1 \times m_2 = -1$

Note also the lines such as y = 5 Parallel to x-axis and x = -2 Parallel to y-axis.