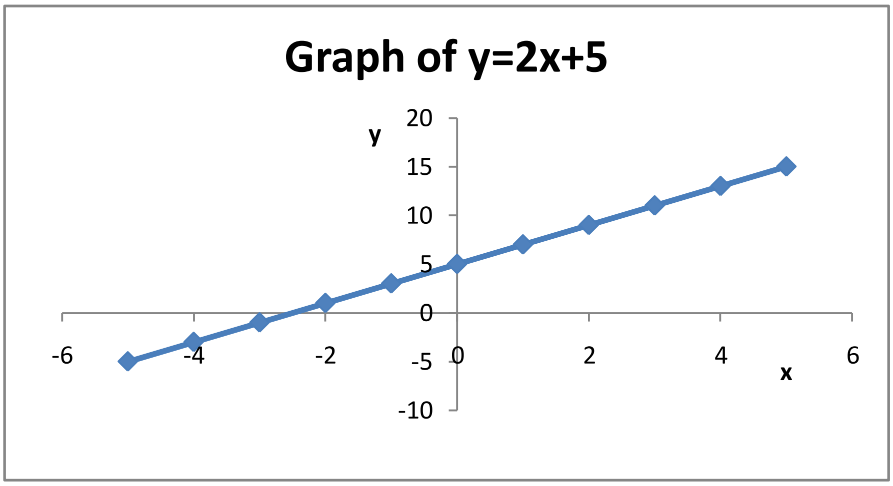
Equation of a Straight Line: Gradient and Intercept

Any graph with an equation of the form $y = mx + c$, where m and c are constants, is a straight line.

For example let us plot the graph of the function $y = 2x + 5$

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
y	-5	-3	-1	1	3	5	7	9	11	13	15



Since a graph with an equation of the form $y = mx + c$ is always a straight line only two of the table elements are required (perhaps three to confirm) then the graph can be drawn with a ruler.

Intercept

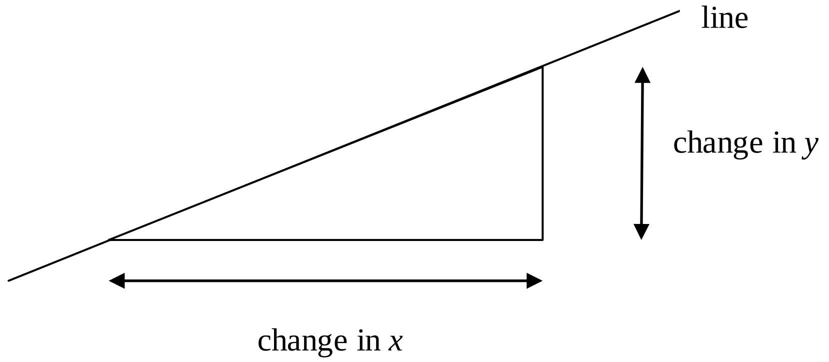
The intercept is the value of y when the line crosses the y-axis. That is it is the value of y when x=0. For the general equation $y = mx + c$, we note that when $x=0$, $y=c$; the intercept is equal to c.

For example for the function $y = 2x + 5$, the graph clearly crosses the y-axis when $y=5$. Comparing this with the general equation, we can see that $c=5$. The intercept is 5.

Gradient

The gradient of a graph is the rate of change of one variable with respect to another. If the graph is a straight line then the gradient is constant. The gradient of a straight line can be found by taking any part of the line and determining the change in one variable (y) with respect to the change in the other variable (x).

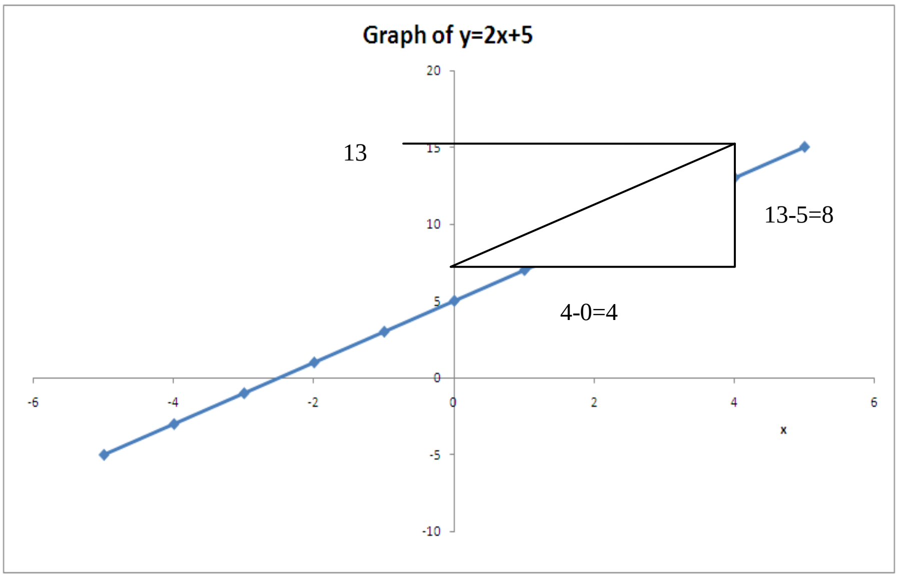
For a straight line graph we continue as follows:



gradient = change in y / change in x.

For a line with equation $y = mx + c$, the gradient is also equal to m.

For example for the function $y = 2x + 5$, the gradient can be determined as follows:



The gradient can be found using the method shown in the diagram:

$$\text{gradient} = \frac{8}{4} = 2.$$

Comparing this with the general equation, we can see that $m=2$. The gradient is 2.

Spreadsheet

The accompanying spreadsheet plots the graph for a given *m* (gradient) and *c* (intercept).

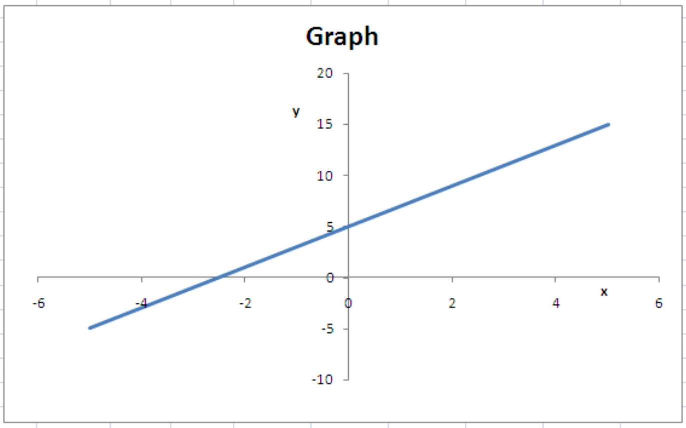
Graph of a straight line www.mathematics.me.uk

y = 2 x + 5

Table	
x	y
-5	-5
-4	-3
-3	-1
-2	1
-1	3
0	5
1	7
2	9
3	11
4	13
5	15

gradient= 2

intercept= 5



Positive and Negative Gradients

If the gradient is positive ($m>0$) then the graph slopes upward to the right. However, if the gradient is negative ($m<0$) then the graph slopes downward to the right

Graph of a straight line www.mathematics.me.uk

y = -3 x + 5

Table	
x	y
-5	20
-4	17
-3	14
-2	11
-1	8
0	5
1	2
2	-1
3	-4
4	-7
5	-10

gradient= -3

intercept= 5