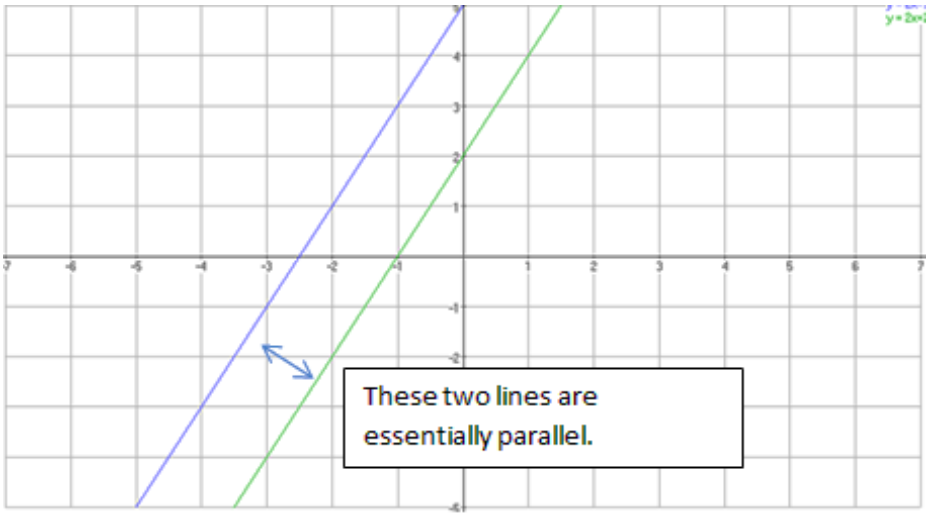
7.5 GRADIENT OF PARALLEL AND PERPENDICULAR LINES

Generally, Parallel lines have the same gradient"

Here is an example of a pair of parallel lines



These two lines are clearly parallel to each other.

Remember the form y= ax+b, where "a" is the gradient. The gradient here is the same; it is just the value of "b", the y intercept that is different. The rule to learn here is that for two functions y= ax+b and $y_1 = a_1x_1 + b_1$, $a=a_1$. The actual functions here are: 2x+2 and 2x+5.

As you can see, the two values of "a" are the same but the values of "b" are different. If you want to calculate the perpendicular of the gradient, simply remember this: For the linear function y= ax+b, $a \times a_1$ (where a_1 is the gradient of the perpendicular) = -1 provided that axes are perpendicular and units are the same for both axes

So:

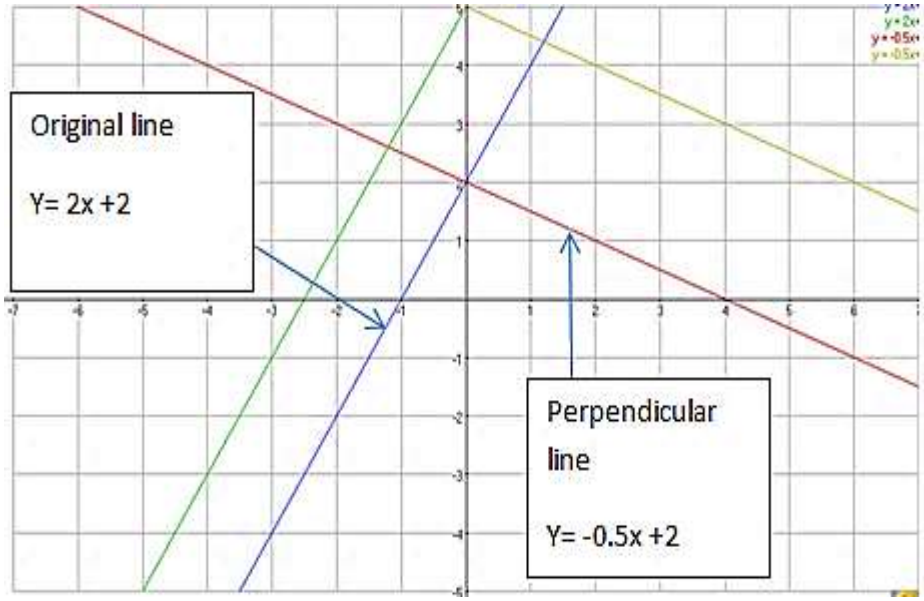
$a \times a_1 = -1$

We can rearrange this to get:

$a_1 = -1/ a$

So for the function y= 2x+2, the gradient of the perpendicular line is:

$a_1 = -1/2$



If we plot this graphically, we notice that the perpendicular line forms a right angle with the original line.

SELF-ASSESSMENT ACTIVITY

1. Determine whether the two lines below are parallel or perpendicular.

   y=2x-3 and 4x-2y=8

2. Determine whether the line passing through the points (1, 7) and (4, -2) is parallel to the line given by f(x) = -3x + 4.2.

3. Find a line perpendicular to y = -3x + 4.2 that passes through (1, 7).

4. Are the lines 3y+4x=9 and 6y+8x=2 parallel, perpendicular, or neither?
5. Are y = 2/3x + 6 and y = -3/2x - 4 perpendicular, parallel, or neither?
6. Are the line y = -1/8x – 4, and the line passing through the points (1,3) and (0,0) parallel, perpendicular, or neither?
7. A line has an equation y = 3x + 1.
   a) Find an equation of the parallel line B that passes through (1, 2)
   b) Find an equation of the perpendicular line C that passes through (-1, 1)