GCSE Maths – Algebra

Straight Line Graphs

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to work out different types of questions involving straight line graphs. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Plot point $(3, -2)$ on a graph.

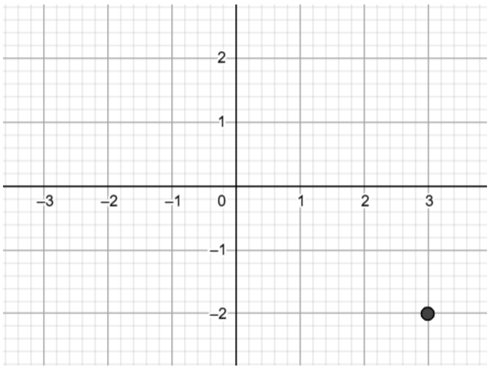
Step 1: Work out the x and y values of the point

The x value is 3.
The y value is -2.

Step 2: Locate where these points will be placed

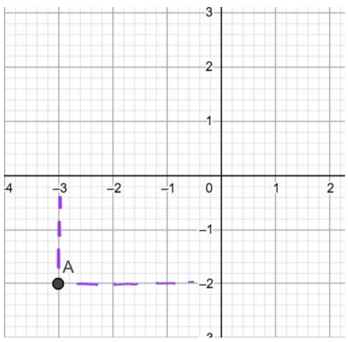
From the x-coordinate we know the point will be 3 units right from the origin and from the y-coordinate we know the point will be 2 units down from the origin.

Step 3: Plot the point on a graph.



Guided Example

State the coordinates of Point A given in the graph below.



Step 1: Locate the values of x and y of the point A.

From the x-coordinate, A is 3 units left from the origin. From y-axis, it is 2 units down from the origin.

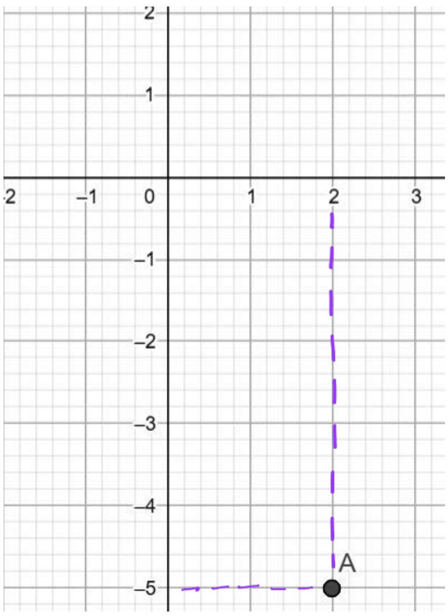
Step 2: Write the point A in coordinate form.

$(-3, -2)$

should be (x, y). A has a value of $x = -3$ and $y = -2$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. State the coordinates of Point A given in the graph below.



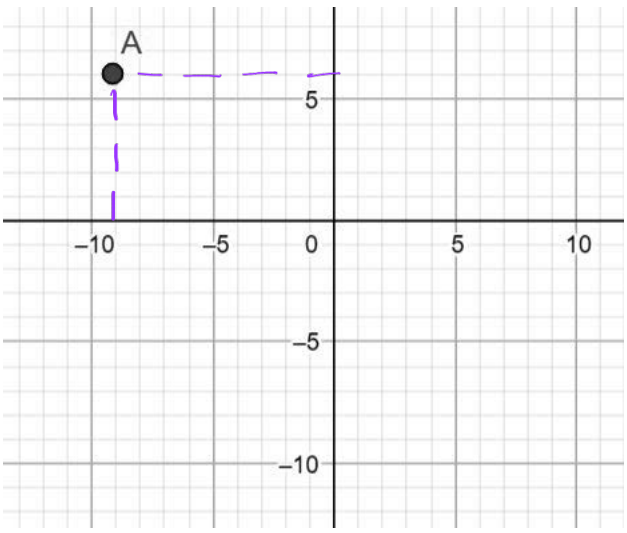
From the x-axis, A is 2 units to the right from the origin.
$x = 2$

From the y-axis, A is 5 units down from the origin.
$y = -5$

Coordinate of A = $(2, -5)$

coordinate is in the form of (x, y)

2. State the coordinates of Point A given in the graph below.

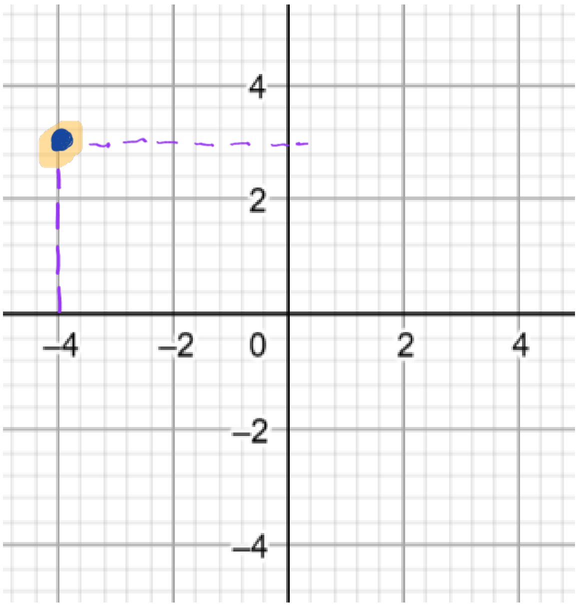


From the x-axis, A is 9 units to the left from the origin. $x = -9$

From the y-axis, A is 6 units above the origin.
$y = 6$

Coordinate of A = $(-9, 6)$

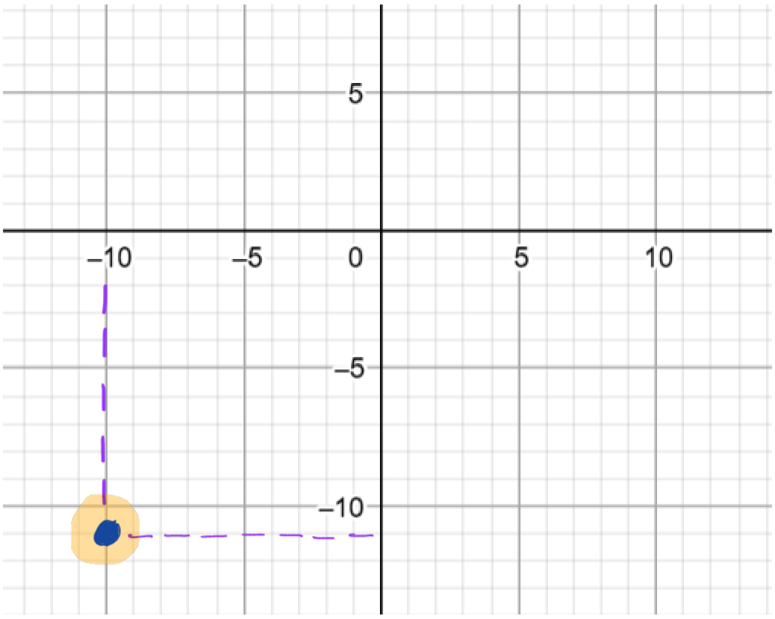
3. Plot point $(-4, 3)$ in the graph below.



$x = -4$ means the point is 4 units left from the origin along the x-axis.

$y = 3$ means the point is 3 units above the origin along the y-axis.

4. Plot point $(-10, -11)$ in the graph below.



$x = -10$ means the point is 10 units left from the origin along the x-axis.

$y = -11$ means the point is 11 units below the origin along the y-axis.

Section B

Worked Example

Draw the graph $y = -2x + 1$ between $-5 \leq x \leq -1$.

Step 1: Create a table with x values between -5 and -1.

x	-5	-4	-3	-2	-1
y					

Step 2: Calculate the y values by substituting in the x values to the given equation.

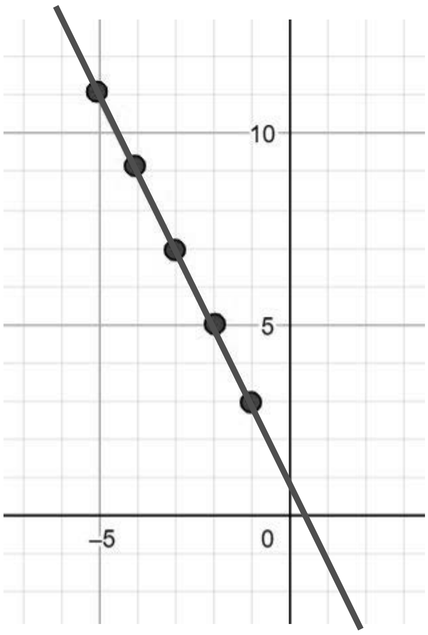
x	-5	-4	-3	-2	-1
y	11	9	7	5	3

For example, for $x = -5$:

$$y = -2x + 1$$
$$y = -2(-5) + 1$$
$$y = 10 + 1$$
$$y = 11$$

Step 3: Form coordinate points out of the table of values. Plot these points on the graphs and join this up with a ruler.

From the table, the graph passes through coordinate points $(-5,11)$, $(-4,9)$, $(-3,7)$, $(-2,5)$ and $(-1,3)$. We plot these points and then draw a line passing through the points. Extend the line beyond the points in both directions.



Guided Example

Draw the graph $y = 5x - 1$ between $2 \leq x \leq 10$

Step 1: Create a table with x values between 2 and 10.

x	2	4	6	8	10
y					

Step 2: Calculate the y values by substituting in the x values to the given equation.

$$y = 5x - 1$$

x	2	4	6	8	10
y	9	19	29	39	49

when $x = 2$
$y = 5(2) - 1$
$= 10 - 1$
$= 9$

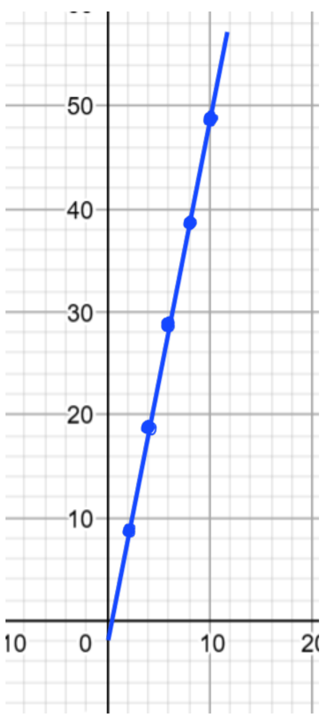
when $x = 4$
$y = 5(4) - 1$
$y = 20 - 1$
$= 19$

when $x = 6$
$y = 5(6) - 1$
$= 30 - 1$
$= 29$

when $x = 8$
$y = 5(8) - 1$
$= 40 - 1$
$= 39$

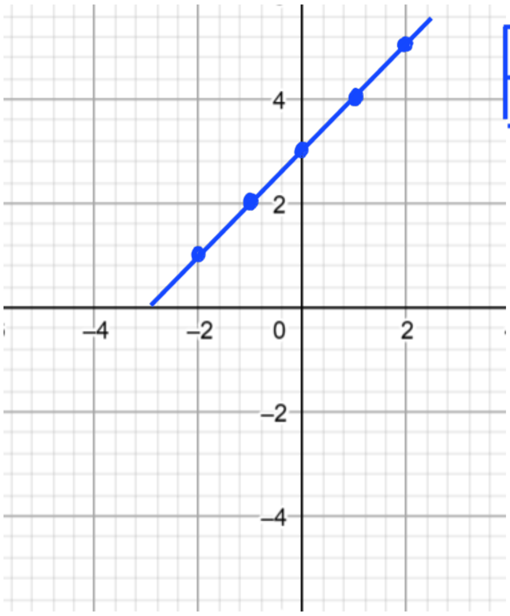
when $x = 10$
$y = 5(10) - 1$
$= 50 - 1$
$= 49$

Step 3: Form coordinate points out of the table of values. Plot these points on the graphs and join this up with a ruler.



Now it's your turn!
If you get stuck, look back at the worked and guided examples.

5. Draw the graph $y = x + 3$ between $-2 \leq x \leq 2$



x	-2	-1	0	1	2
y	1	2	3	4	5

① Form a table to find the value of y with the given x range.

when $x = -2$
$y = -2 + 3$
$y = 1$

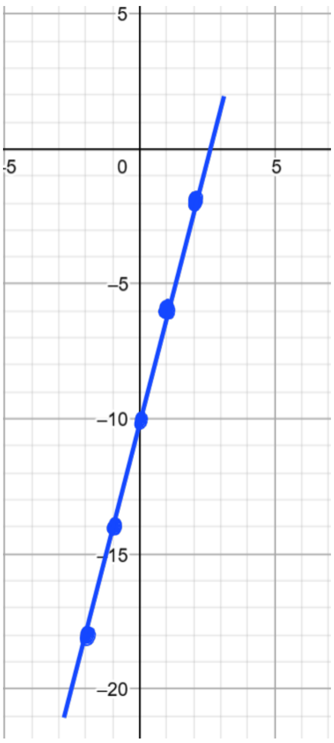
when $x = 0$
$y = 0 + 3$
$y = 3$

when $x = 2$
$y = 2 + 3$
$y = 5$

when $x = -1$
$y = -1 + 3$
$y = 2$

when $x = 1$
$y = 1 + 3$
$y = 4$

6. Draw the graph $y = 4x - 10$ between $-2 \leq x \leq 2$



x	-2	-1	0	1	2
y	-18	-14	-10	-6	-2

when $x = -2$
$y = 4(-2) - 10$
$= -8 - 10$
$= -18$

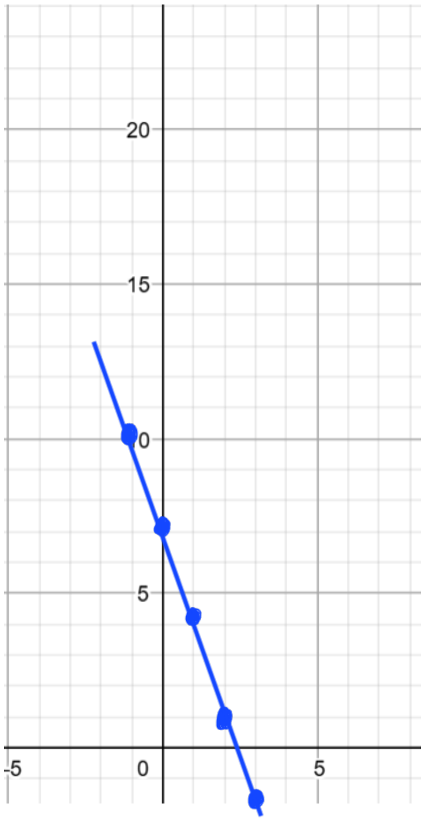
when $x = 0$
$y = 4(0) - 10$
$= -10$

when $x = 2$
$y = 4(2) - 10$
$y = 8 - 10$
$y = -2$

when $x = -1$
$y = 4(-1) - 10$
$= -4 - 10$
$= -14$

when $x = 1$
$y = 4(1) - 10$
$= 4 - 10$
$= -6$

7. Draw the graph $y = -3x + 7$ between $-1 \leq x \leq 5$



x	-1	0	1	2	3
y	10	7	4	1	-2

when $x = -1$

$y = -3(-1) + 7$
$= 3 + 7$
$= 10$

when $x = 0$

$y = -3(0) + 7$
$= 0 + 7$
$= 7$

when $x = 1$

$y = -3(1) + 7$
$= -3 + 7$
$= 4$

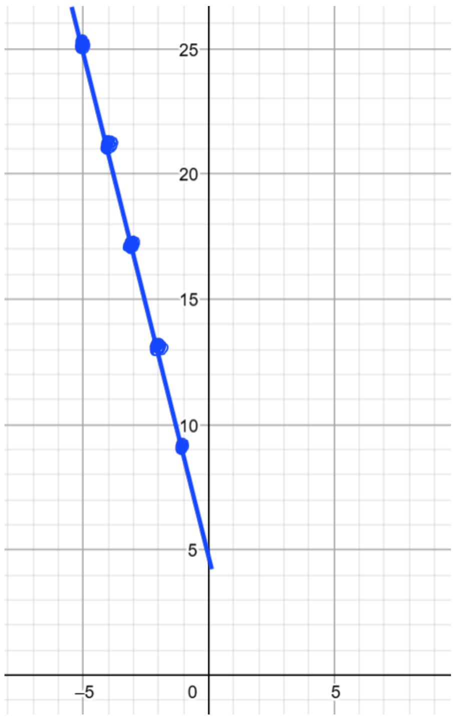
when $x = 2$

$y = -3(2) + 7$
$= -6 + 7$
$= 1$

when $x = 3$

$y = -3(3) + 7$
$= -9 + 7$
$= -2$

8. Draw the graph $2y = -8x + 10$ between $-5 \leq x \leq -1$



x	-5	-4	-3	-2	-1
y	25	21	17	13	9

Rearrange $2y = -8x + 10$ to make y as the subject :

$2y = -8x + 10 \quad | \div 2$
$y = -4x + 5$

when $x = -5$

$y = -4(-5) + 5$
$= 20 + 5$
$= 25$

when $x = -4$

$y = -4(-4) + 5$
$= 21$

when $x = -3$

$y = -4(-3) + 5$
$= 17$

when $x = -2$

$y = -4(-2) + 5$
$= 13$

when $x = -1$, $y = -4(-1) + 5 = 9$

Section C

Worked Example

Line M passes through the points $(4, 15)$ and $(2, 7)$. Find the equation of Line M in the from $y = mx + c$.

Step 1: Using the coordinates of the two points given, calculate the gradient of Line M.

We are given $(x_1, y_1) = (4,15)$ *and* $(x_2, y_2) = (2,7)$.

Gradient $\boldsymbol{m}$ *of the Line M:*

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{15-7}{4-2} = \frac{8}{2} = 4$$

The gradient of Line M is 4.

Step 2: Find the value of c (the y-intercept) by substituting known values into the form $y = mx + c$.

We know $m = 4$ *and we also know the line passes through the point* $(x, y) = (4,15)$.
Substitute these known values into the form $y = mx + c$ *and solve for* c*:*

$$y = mx + c$$
$$15 = 4(4) + c$$
$$15 = 16 + c \quad \Rightarrow \quad c = -1$$

Step 3: Substitute m and c values into the general form $y = mx + c$ to find the equation of the line.

We found $m = 4$ *and* $c = -1$*:*

$$\boldsymbol{y = 4x - 1}$$

Guided Example

Line L passes through the point $(-3, 11)$ and $(1, -9)$. Find the equation of Line L in the from $y = mx + c$.

Step 1: Using the coordinates of the two points given, calculate the gradient of Line M.

$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{11-(-9)}{-3-1} = \frac{20}{-4} = -5$ gradient $= -5$

Step 2: Find the value of c (the y-intercept) by substituting known values into the form $y = mx + c$.

substitute one of the coordinates

$y = mx + c$
$y = -5x + c$
$11 = -5(-3) + c$

$11 = 15 + c$
$c = 11 - 15$
$c = -4$

Step 3: *Substitute* m *and* c *values into the general form* $y = mx + c$ *to find the equation of the line.*

$y = -5x - 4$

gradient $= m = -5$
$c = -4$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

9. The gradient of a line is equal to 2 and the line passes through the point $(-5,3)$. Find the equation of the line.

write down all the information given : $m = 2$, coordinate $(-5,3)$

$y = mx + c$ ← substitute known values to find c

$3 = 2(-5) + c$

$3 = -10 + c$

$3 + 10 = c$

$c = 13$

Equation of the line is $y = 2x + 13$

substitute m and c into the form $y = mx + c$

10. The gradient of a line is $-\frac{1}{3}$ and the line passes through the point $(-6,-2)$. Find the equation of the line.

$m = -\frac{1}{3}$ point : $(-6,-2)$

$y = -\frac{1}{3}x + c$

$-2 = -\frac{1}{3}(-6) + c$

$-2 = 2 + c$

$-2 - 2 = c$

$c = -4$

substitute m and c into the equation

$y = mx + c$

$y = -\frac{1}{3}x - 4$

Equation of the line : $y = \frac{-1}{3}x - 4$

11. A line passes through the points $(2,10)$ and $(1,3)$. Find the equation of the line in the from $y = mx + c$.

Find m from the 2 points given.

$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{10 - 3}{2 - 1} = \frac{7}{1} = 7$

Find c from known m value and one coordinate.

$y = 7x + c$

$3 = 7(1) + c$

$c = 3 - 7 = -4$

Equation of the line :

$y = 7x - 4$

12. A line passes through the points $(-10,1,)$ and $(4,7)$. Find the equation of the line in the from $y = mx + c$.

Find m from the 2 points given.

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{7-1}{4-(-10)} = \frac{6}{14} = \frac{3}{7}$$

Find c from known m value and one coordinate.

$$y = mx + c$$
$$y = \frac{3}{7}x + c$$
$$7 = \frac{3}{7}(4) + c$$
$$7 = \frac{12}{7} + c$$
$$7 - \frac{12}{7} = c$$
$$c = \frac{37}{7}$$

Equation of the line:

$$y = \frac{3}{7}x + \frac{37}{7}$$

13. A line passes through the points $(6,-9)$ and $(4,2)$. Find the equation of the line in the from $y = mx + c$.

Find m from the 2 points given.

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-9-2}{6-4} = \frac{-11}{2}$$

Find c from known m value and one coordinate.

$$y = mx + c$$
$$y = -\frac{11}{2}x + c$$
$$2 = -\frac{11}{2}(4) + c$$
$$2 = -22 + c$$
$$2 + 22 = c$$
$$c = 24$$

Equation of the line:

$$y = mx + c$$
$$y = -\frac{11}{2}x + 24$$

14. A line passing through the origin also passes through the point $(1,-7)$. Find the equation of the line in the from $y = mx + c$

Find m from the 2 points given.

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-7-0}{1-0} = -7$$

Find c from known m value and one coordinate.

$$y = mx + c$$
$$y = -7x + c$$
$$-7 = -7(1) + c$$
$$-7 = -7 + c$$
$$+7 \left(\begin{array}{l} -7 = -7 + c \\ 0 = c \end{array} \right.$$

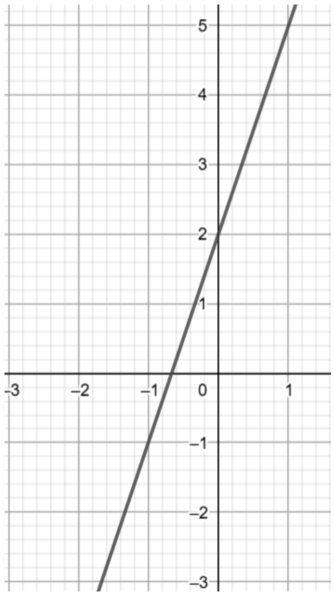
Equation of the line:

$$y = mx + c$$
$$y = -7x$$

Section D

Worked Example

Find the gradient of the line given in the following graph:



Step 1: Find the numerical value of the gradient by looking at how the y value changes as the x value increases by 1.

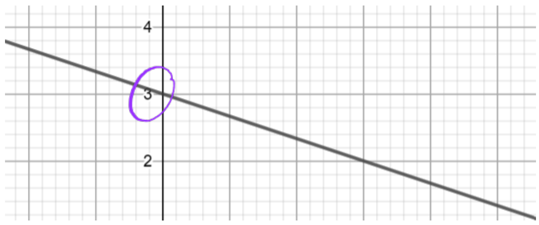
For every 1 *unit across in the x-direction, the y value of the graph increases by* 3*. This means the gradient of the line is* $m = 3$*.*

Step 2: Find the correct sign for the gradient.

The line slopes upwards towards the top right corner of the axis so the gradient is positive. The gradient of the line is 3*.*

Guided Example

Find the equation of the line given in the graph below:



Step 1: Find the numerical value of the gradient by looking at how the y value changes as the x value increases by 1.

For every 1 unit across the x-direction, the y value decreases by $\frac{1}{3}$. That means the gradient is $m = \frac{1}{3}$.

Step 2: Find the correct sign for the gradient.

The line slopes downwards, hence the gradient is negative. $m = -\frac{1}{3}$

Step 3: Identify the value of the y-intercept (the value of c).

The line intercept at the y-axis when $y = 3$. Hence, $c = 3$

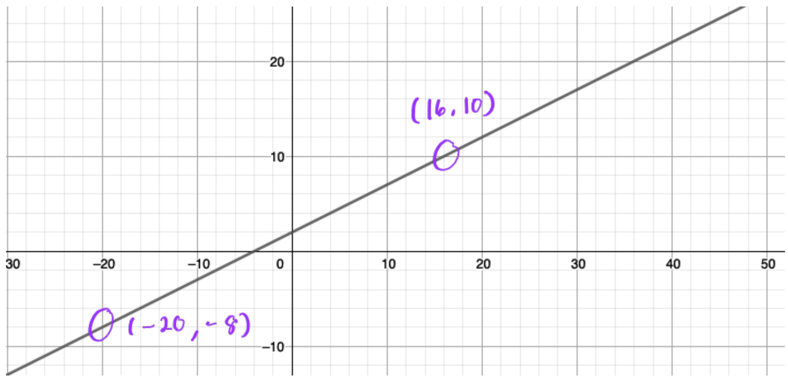
Step 4: Find the equation of the line by substituting the values of m and c into the form $y = mx + c$.

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

Now it's your turn!

If you get stuck, look back at the worked and guided examples.

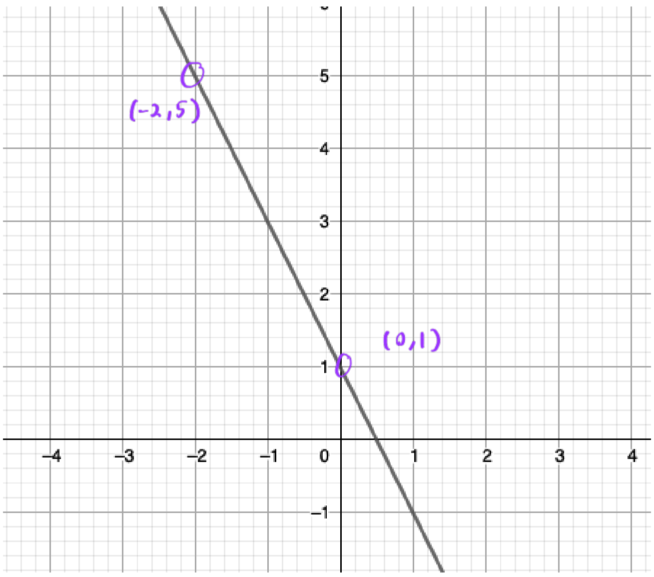
15. Find the gradient of the line given below:



coordinates : (−20, −8) and (16, 10)

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{10 - (-8)}{16 - (-20)} = \frac{10 + 8}{16 + 20} = \frac{18 \div 8}{36 \div 8} = \frac{1}{2}$$

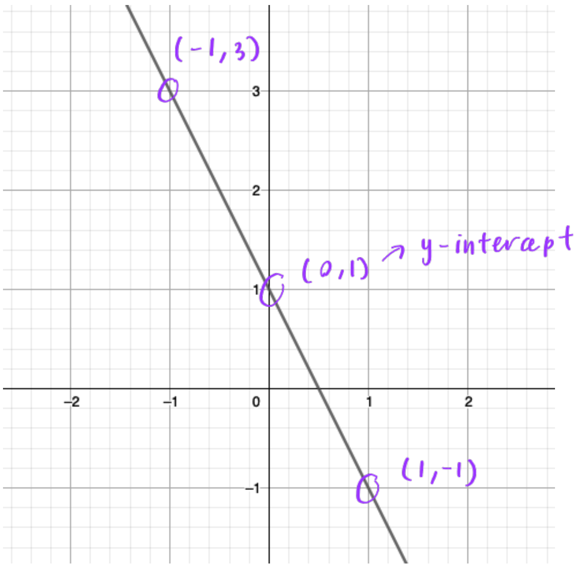
16. Find the gradient of the line given below:



coordinates : (−2, 5) and (0, 1)

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{5 - 1}{-2 - 0} = \frac{4}{-2} = -2$$

17. Find the equation of the line given below:



① Find gradient :

coordinates = (-1, 3) and (1, -1)

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{3-(-1)}{-1-1} = \frac{3+1}{-2} = \frac{4}{-2} = -2$$

② Find c from the graph :

$c = 1$

Equation of the line :

$y = -2x + 1$

18. Find the equation of the line given below:

Find 2 coordinates from the line

① (1, -1)

② (1.8, 1)

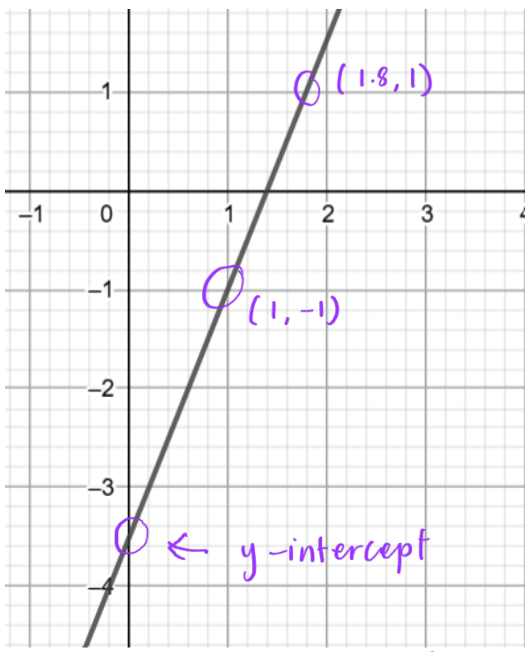
Find m :

$$m = \frac{y_1 - y_2}{x_1 - x_2}$$

$$m = \frac{1-(-1)}{1.8-1}$$

$$= \frac{2}{0.8}$$

$$= \frac{5}{2}$$



Equation of the line :

$y = mx + c$

$y = \frac{5}{2}x - \frac{7}{2}$

From the graph, y-intercept at $y = -3.5$.

Hence, $c = -\frac{7}{2}$

Section E

Worked Example

Find the equation of the line that is parallel to $y = \frac{1}{2}x - 1$ and passes through the point $(2, 1)$.

Step 1: When two lines are parallel, the gradient m will be the same for both lines.

The gradient of $y = \frac{1}{2}x - 1$ can be found by comparing it to the general form $y = mx + c$.

So, the gradient is $m = \frac{1}{2}$. The gradient of the new line will be $\frac{1}{2}$ also.

Step 2: *Calculate the value of c (the y-intercept) of the new line by substituting the gradient and coordinates given into the general form $y = mx + c$ and solving for c.*

We have $m = \frac{1}{2}$ and we are given coordinates $(2,1)$:

$$y = mx + c$$
$$1 = \frac{1}{2}(2) + c$$
$$1 = 1 + c$$
$$0 = c$$

Step 3: Substitute values for m and c into the form $y = mx + c$ to find the equation of the line.

Since $m = \frac{1}{2}$ and $c = 0$, the equation of the new line is $\boldsymbol{y = \frac{1}{2}x}$.

Guided Example

Determine whether the line $y = 3x + 1$ and $x + 3y = 6$ are parallel.

Step 1: If the two the lines are parallel, the gradient m will be the same for both lines. Rearrange both equations so they are in the standard form $y = mx + c$.

$y = 3x + 1$
$y = mx + c$
$m = 3$

$x + 3y = 6 \leftarrow$ change to $y = mx + c$

$-x \; (\; 3y = 6 - x$

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

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

Step 2: Compare the gradient m values and form a conclusion about whether the lines are parallel or not.

The gradient for both lines are not the same. Hence, the lines are not parallel.

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

19. Determine whether the line $2y = 6x + 3$ and $4x + 6y = 1$ are parallel.

Convert both equations of the line to $y = mx + c$

$2y = 6x + 3$
$y = 3x + \frac{3}{2}$
$y = mx + c$
$m = 3$

$4x + 6y = 1$
$\xrightarrow{-4x}$ $6y = 1 - 4x$
$\xrightarrow{\div 6}$ $y = \frac{1}{6} - \frac{4}{6}x$
$= \frac{1}{6} - \frac{2}{3}x$
$y = -\frac{2}{3}x + \frac{1}{6}$ → $m = -\frac{2}{3}$
$y = mx + c$

The gradients for both lines are not the same. The lines are not parallel.

20. Write the equation of the line parallel to $y = -x + 2$ passing through point $(9,6)$.

Parallel lines have same gradient.

$y = -x + 2$
$y = mx + 2$
$m = -1$

The new line will also has a gradient of -1

Find the c value by substituting m and the coordinates into $y = mx + c$

$y = mx + c$
$6 = -1(9) + c$
$6 = -9 + c$
$6 + 9 = c$
$c = 15$

Equation of the line:
$y = mx + c$
$y = -x + 15$

21. Write the equation of the line parallel to $y = \frac{4}{5}x + 1$ passing through point $(10,7)$.

$y = \frac{4}{5}x + 1$
$y = mx + c$
$m = \frac{4}{5}$

$y = mx + c$
$7 = \frac{4}{5}(10) + c$
$7 = 8 + c$
$c = -1$

Find the c value by substituting m and the coordinates into $y = mx + c$

Equation of the line:
$y = \frac{4}{5}x - 1$

22. Line M passes through points $(0,5)$ and $(2,1)$. Line L is parallel to M and passes through the point $(6,7)$. Find the equation of Line L in the form $y = mx + c$.

① Find the gradient of Line M :

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{5-1}{0-2} = \frac{4}{-2} = -2$$

② Since Line L is parallel to Line M, line L also has a gradient of -2.

③ Substitute the value of m and coordinate at line L $(6,7)$ into the form $y = mx+c$ to find value of c $\rightarrow$

$y = mx + c$

$y = -2x + c$

$7 = -2(6) + c$

$7 = -12 + c$

$7 + 12 = c$

$c = 19$

Equation of the line :

$y = mx + c$

$y = -2x + 19$

23. Line A passes through points $(1,3)$ and $(2,6)$. Line B passes through the points $(-3,-8)$ and $(-5,-14)$. Are these lines parallel?

① Find the gradients for both lines, then compare them.

m for line A :

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{6-3}{2-1} = \frac{3}{1} = 3$$

m for line B :

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-8-(-14)}{-3-(-5)} = \frac{-8+14}{-3+5} = \frac{6}{2} = 3$$

The gradients for both lines are the same. Hence, the lines are parallel.

Section F

Worked Example

Line A passes through the points $(4, 12)$ and $(-1, -3)$. Given that line B is perpendicular to line A and passes through $(9, 2)$, find the equation of line B in the form $y = mx + c$.

Step 1: When lines are perpendicular, the product of their gradients m_1 and m_2 is $m_1 \times m_2 = -1$. Find the gradient m_1 for line A and use this to find the gradient m_2 for line B.

For line A, we are given $(x_1, y_1) = (4,12)$ *and* $(x_2, y_2) = (-1, -3)$. *Gradient* m_1 *of A:*

$$m_1 = \frac{y_1 - y_2}{x_1 - x_2} = \frac{12 - (-3)}{4 - (-1)} = \frac{15}{5}$$

Finding gradient of line B:

$$m_1 m_2 = -1$$
$$m_2 = \frac{-1}{3} = -\frac{1}{3}$$

The gradient of Line B is $m_2 = -\frac{1}{3}$.

Step 2: *Calculate the value of c (the y-intercept) of line B by substituting the gradient and coordinates given into the general form $y = mx + c$ and solving for c.*

We have $m = -\frac{1}{3}$ *and we are given coordinates* $(9,2)$:

$$y = mx + c$$
$$2 = -\frac{1}{3}(9) + c$$
$$2 = -3 + c$$
$$5 = c$$

Therefore, the equation of the Line B is $\boldsymbol{y = -\frac{1}{3}x + 5}$.

Guided Example

Determine whether the line $2y = 3x + 9$ and $2x - 3y = 1$ are perpendicular.

Step 1: Rearrange the equations so they are in the form $y = mx + c$. Identify the values of their gradients.

$\div 2$ $\quad 2y = 3x + 9$
$y = \frac{3}{2}x + \frac{9}{2}$

$+3y$ $\quad 2x - 3y = 1$
$2x = 1 + 3y$
-1 $\quad 2x - 1 = 3y$

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

Step 2: Calculate the product of the gradients to form a conclusion about whether the lines are perpendicular.

$m_1 = \frac{3}{2}, \quad m_2 = \frac{2}{3}$

$m_1 \times m_2 = \frac{3}{2} \times \frac{2}{3}$
$= 1$

not perpendicular as $m_1 \times m_2 \neq -1$

The lines are not perpendicular

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

24. Determine whether the lines $9y + 3x = -6$ and $6x - 8 = 2y$ are perpendicular.

① Rearrange both of the equations to $y = mx + c$

$9y + 3x = -6$ $\quad -3x$

$9y = -6 - 3x$ $\quad \div 9$

$y = -\frac{6}{9} - \frac{3}{9}x$

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

$m_1 = -\frac{1}{3}$

$6x - 8 = 2y$ $\quad \div 2$

$3x - 4 = y$

$y = 3x - 4$

$m_2 = 3$

② Calculate the product of both gradients. If they are perpendicular, the products should equal to -1.

$m_1 \times m_2 = -\frac{1}{\cancel{3}_1} \times \cancel{3}^1$

$= -1$

The lines are perpendicular to each other

25. Line A has equation $y = \frac{3}{5}x + 2$. Line B is perpendicular to A and passes through the point $(0, -2)$. Find the equation of line B.

$y = \frac{3}{5}x + 2$

$m = \frac{3}{5}$

Find gradient of line B. Since they are perpendicular, the product should equal to -1.

$m_1 \times m_2 = -1$

$\frac{3}{5} \times m_2 = -1$

$m_2 = -1 \times \frac{5}{3}$

$= -\frac{5}{3}$

Find c :

$y = mx + c$

$-2 = -\frac{5}{3}(0) + c$

$-2 = 0 + c$

$-2 = c$

$c = -2$

The equation of line B :

$y = mx + c$

$y = -\frac{5}{3}x - 2$

26. Line A passes through the points $\left(-\frac{1}{2}, 4\right)$ and $(2,9)$. Given that line B is perpendicular to line A and passes through $(-4, -5)$, find the equation of line B in the form $y = mx + c$.

① Find gradient for line A

$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{9 - 4}{2 - (-1/2)} = \frac{5}{2 + 1/2} = \frac{5}{5/2} = 2$

② Find gradient for line B

$m_1 \times m_2 = -1$

$2 \times m_2 = -1$

$m_2 = -\frac{1}{2}$

③ Find c

$y = mx + c$

$y = -\frac{1}{2}x + c$

$-5 = -\frac{1}{2}(-4) + c$

$-5 = 2 + c$

$c = -5 - 2$

$= -7$

The equation of line B = $y = -\frac{1}{2}x - 7$

27. Line A and line B intersect at point $(0, -3)$. Both these points pass through line A
Line A passes through the point $(-3, -2)$.
Given that line B is perpendicular to line A, find the equation of line B in the form $y = mx + c$.

pass through line A and B

Find gradient of Line A :

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{-3-(-2)}{0-(-3)} = \frac{-3+2}{3} = \frac{-1}{3}$$

Find gradient of Line B :

$$m_1 \times m_2 = -1$$
$$-\frac{1}{3} \times m_2 = -1$$
$$m_2 = \cancel{-}1 \times \frac{3}{\cancel{-}1}$$
$$= 3$$

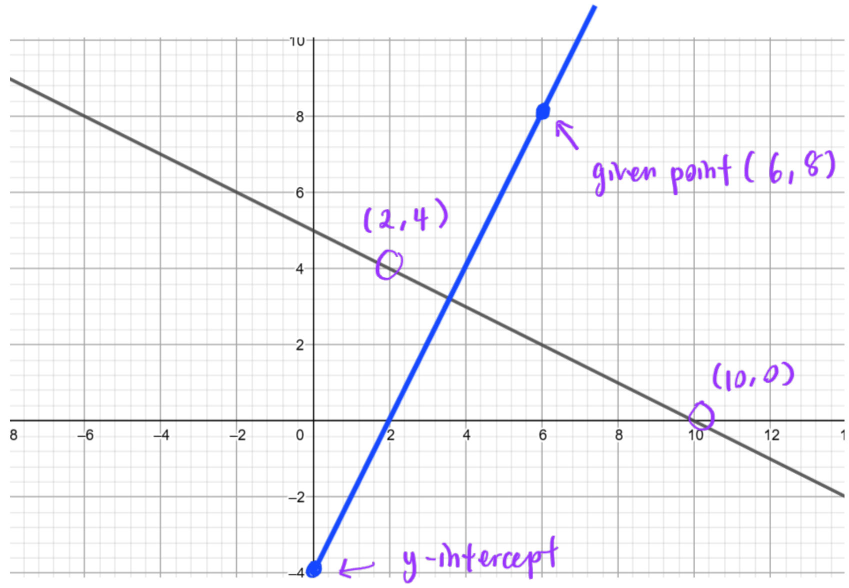
Find c :

$$y = mx + c$$
$$-3 = 3(0) + c$$
$$-3 = 0 + c$$
$$c = -3$$

Equation of line B :

$$y = 3x - 3$$

28. Line M is perpendicular to the line below. Line M passes through $(6,8)$. Find the equation for line M and draw it on the graph below.



① Find the gradient for line above :

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{4-0}{2-10} = \frac{4}{-8} = -\frac{1}{2}$$

② Find gradient for line M :

$$m_1 \times m_2 = -1$$
$$-\frac{1}{2} \times m_2 = -1$$
$$m_2 = -1 \times -\frac{2}{1}$$
$$= 2$$

③ Find c for line M :

$$y = mx + c$$
$$8 = 2(6) + c$$
$$8 = 12 + c$$
$$c = 8 - 12$$
$$c = -4 \text{ (y-intercept)}$$

Equation of line M :

$$y = 2x - 4$$