

Knowledge Organiser: Straight line graphs (9b)

What you need to know:

Linear Graphs

Linear graphs are straight line graphs. We substitute the x value into the equation to get the y value. Once we have both we can then plot the coordinates and draw the graph.

Draw the graph of $y = 2x - 1$.

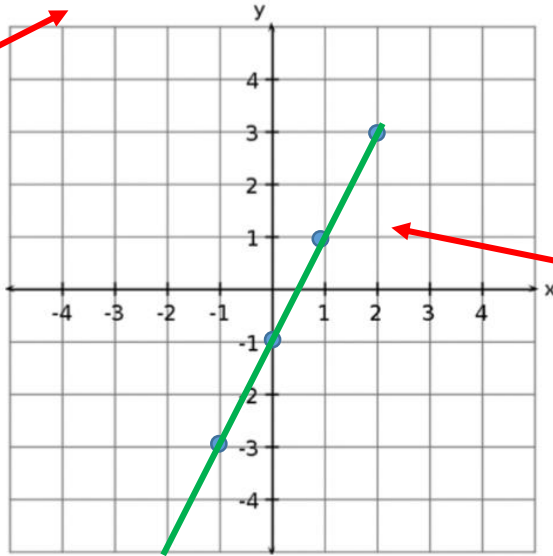
To do this we multiply the x value by 2 and then subtract 1 to get the y value.

$$y = 2x - 1$$

X	-2	-1	0	1	2
Y	-5	-3	-1	1	3

Multiply this value by 2 and then subtract 1 to get the y value.

This coordinate would be (-2,-5).



Don't forget to draw a straight line through all of the coordinates you have plotted.

Notice this graph has a gradient of 2 (the y values go up by 2 each time) and a y-intercept of -1 (the graph cuts through the y axis at -1).

Key Facts:

$$y = mx + c$$

The number next to the x is the **gradient**.

The number on it's own is the **y-intercept**.

Key Terms:

Gradient: This describes the steepness of the line.

y-intercept: Where the graph crosses the y-axis.

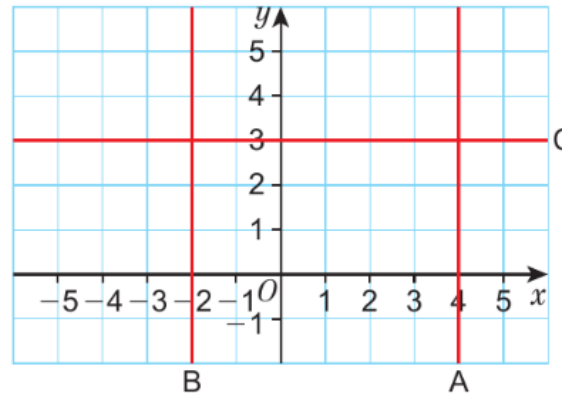
Linear: A linear graph is a straight line.

Parallel: Where 2 lines never meet. They have the same gradient.

Substitute: When a letter is replaced by a number.

Midpoint: The middle point between two coordinates.

Horizontal and Vertical Lines



A: $x = 4$

B: $x = -2$

C: $y = 3$

If a line is going through the x axis at the number 4, we say $x = 4$. If the line is going through the y axis at 3, we say $y = 3$.

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Topic: Identify the equation of a graph - 208



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What you need to know:

Equation of a Line

Linear equation: The general equation for a linear (straight line) graph is:

$$y = mx + c$$

m = gradient and c = the y intercept

We need to substitute the gradient first and then substitute one of the coordinates into the general equation to calculate the value of c .

Example:

Find the equation of the line with gradient 5 going through (3, 4).

Replace m with the gradient 5.

$$y = mx + c$$

$$y = 5x + c$$

Substitute in (3, 4)

$$4 = 5 \times 3 + c$$

$$4 = 15 + c$$

Rearrange to find c .

$$-11 = c$$

Substitute the coordinates into the general equation. $x=3$ and $y=4$.

Put c into the general equation.

$$\text{Equation: } y = 5x - 11$$

Identifying the Gradient and Intercept

The equations of all straight lines can be written in the form:

Gradient – The number in front of the x .
This tells us how steep the line is.

$$y = mx + c$$

Intercept – The number on its own.
Shows where the line cuts the y axis.

Example: Find the gradient and intercept of the following lines.

1) $y = 5x - 2$

Grad = 5 Intercept = - 2

2) $2y = 4x + 5$

$$y = 2x + 2.5$$

Grad = 2 Intercept = 2.5

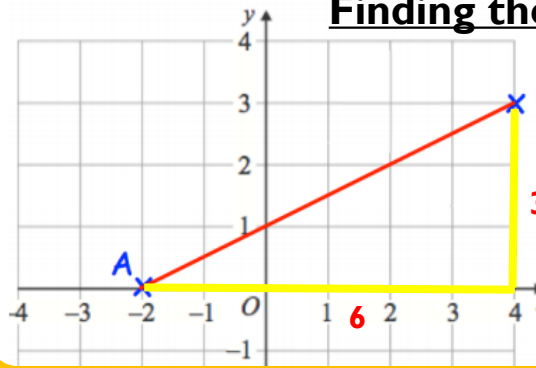
3) $x + y = 10$

$$y = -x + 10$$

Grad = - 1 Intercept = 10

Rearrange all equations so they are in the form $y = mx + c$ (the y must be isolated)

Finding the Gradient From a Graph



A and B are 'good' points as they lie on exact coordinates.

$$\frac{\text{Change in } y}{\text{Change in } x} = \frac{3}{6} = \frac{1}{2}$$

So the gradient of this line is $\frac{1}{2}$

Parallel Lines

Parallel lines: The gradient of parallel lines is the same, this is why they never meet.

$$y = 2x + 1$$

$$y = 2x - 4$$

$$y = 2x$$

The gradients are all 2 here so they are all parallel.

Midpoint

Example: Midpoint of (2,4) and (5,6)

$$\frac{2 + 5}{2} = 3.5$$

$$\frac{4 + 6}{2} = 5$$

Answer:
(3.5,5)

Add the x coordinates and divide by 2. Add the y coordinates and divide by 2.