YEAR 8 — REPRESENTATIONS...
Working in the Cartesian plane

What do I need to be able to do?

By the end of this unit you should be able to:

- Label and identify lines parallel to the axes
- Recognise and use basic straight lines
- Identify positive and negative gradients
- Link linear graphs to sequences
- Plot y = mx + c graphs

Keywords

Quadrant: four quarters of the coordinate plane.
Coordinate: a set of values that show an exact position.
Horizontal: a straight line from left to right (parallel to the x axis)
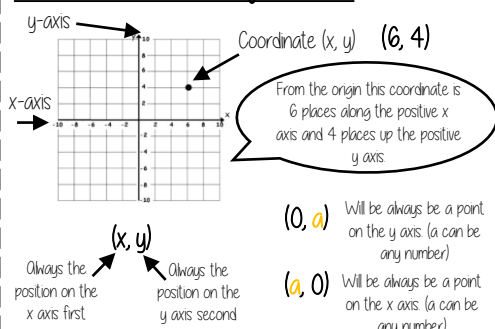**Vertical**: a straight line from top to bottom (parallel to the y axis)
Origin: (0,0) on a graph. The point the two axes cross
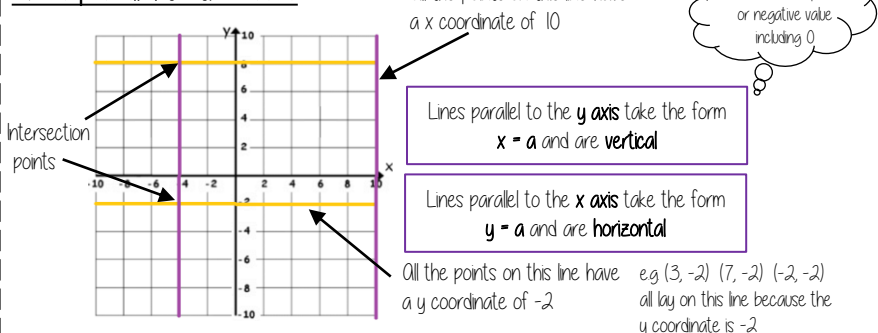**Parallel**: Lines that never meet
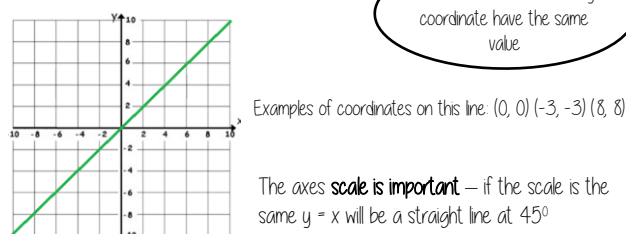**Gradient**: The steepness of a line
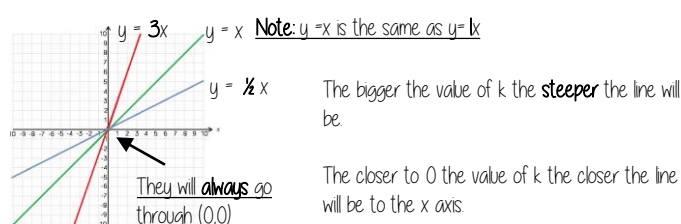**Intercept**: Where lines cross

Coordinates in four quadrants

y-axis

Coordinate (x, y)   (6, 4)

x-axis

From the origin this coordinate is 6 places along the positive x axis and 4 places up the positive y axis.

(x, y)

Always the position on the x axis first

Always the position on the y axis second

(0, *a*) Will be always be a point on the y axis (a can be any number)

(*a*, 0) Will be always be a point on the x axis (a can be any number)

Lines parallel to the axes

All the points on this line have a x coordinate of 10

Intersection points

Lines parallel to the **y axis** take the form **x = a** and are **vertical**

Lines parallel to the **x axis** take the form **y = a** and are **horizontal**

'a' can be ANY positive or negative value including 0

All the points on this line have a y coordinate of -2

e.g (3, -2) (7, -2) (-2, -2) all lay on this line because the y coordinate is -2

Recognise and use the line y=x

This means the x and the y coordinate have the same value

Examples of coordinates on this line: (0, 0) (-3, -3) (8, 8)

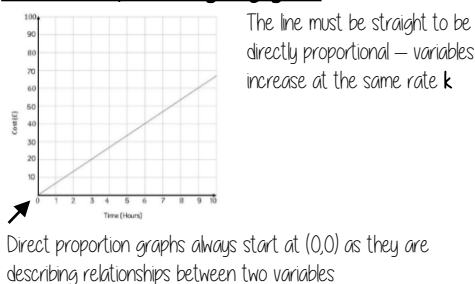The axes **scale is important** — if the scale is the same y = x will be a straight line at 45⁰

Recognise and use the lines y=kx

The value of **k** changes the steepness of the line

y = 3x   y = x   Note: y =x is the same as y= 1x

y = ½ x   The bigger the value of k the **steeper** the line will be.

They will **always** go through (0,0)

The closer to 0 the value of k the closer the line will be to the x axis.

Direct Proportion using y=kx

The line must be straight to be directly proportional — variables increase at the same rate **k**
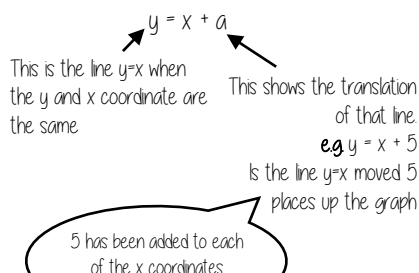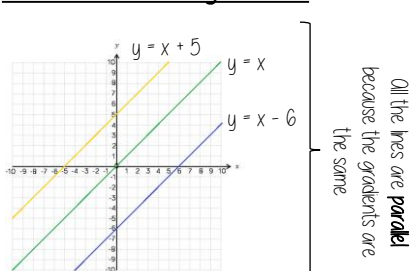
Direct proportion graphs always start at (0,0) as they are describing relationships between two variables

Lines with negative gradients

Any straight-line graph with a negative x value has a negative gradient.

Eg y = -2x
y = -x   y + x = 12

Direction of all negative gradients

Lines in the form y = x + a

y = x + 5
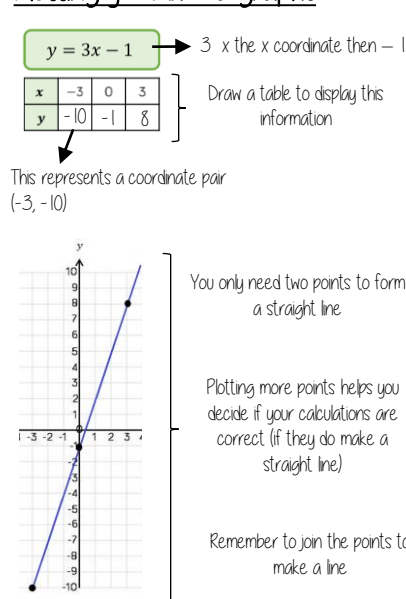
y = x

y = x - 6

All the lines are **parallel** because the gradients are the same

y = x + a

This is the line y=x when the y and x coordinate are the same

This shows the translation of that line.
e.g y = x + 5
Is the line y=x moved 5 places up the graph

5 has been added to each of the x coordinates

Plotting y = mx + c graphs

$y = 3x - 1$ 3 x the x coordinate then – 1

x	-3	0	3
y	-10	-1	8

Draw a table to display this information

This represents a coordinate pair (-3, -10)

You only need two points to form a straight line

Plotting more points helps you decide if your calculations are correct (if they do make a straight line)

Remember to join the points to make a line