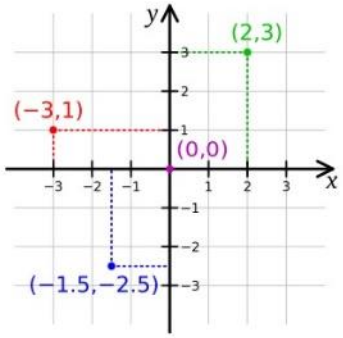
Topic 10: The Line

1) The Basics:

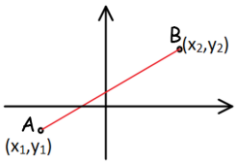
a) Cartesian Plane/Coordinates:

Notes:

- Coordinates must be listed in brackets with a comma in between the two numbers
- We always list the X value first and the Y value second...see examples in diagram above.
- The point (0,0), shown in purple, is also called the **Origin**.
- The X and Y axes divides the plane up into 4 **quadrants**
  - Quadrant 1 is top right of the plane and they are numbered in an anti-clockwise direction



b) Distance/Midpoint Formula:



Tables pg 18

Distance |AB|

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_y)^2}$$

Midpoint of AB

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

e) Intersecting Lines:

We can find where two lines meet by solving the equations simultaneously. See Algebra – Section 5

f) Graphing/Sketching Lines:

Easiest method: Find where the line crosses the x-axis (y = 0) and the y-axis (x = 0)

c) Slope:

Notes:

- Slope is a measure of the steepness of a line.
- Slopes can be negative or positive:

⊕ Positive Slope ("Puff Puff Positive")	⊖ Negative Slope ("Nice Negative")

- There are three different ways we can find it:

Formula when we know **2 points**:	When given **diagram**:
Slope |AB| $\frac{y_2 - y_1}{x_2 - x_1}$	Rise, Run, Slope = $\frac{RISE}{RUN}$
Tables pg 18	**Not** in Tables

d) Equation of a line:

Notes:

- A unique licence plate that identifies a particular line.
- To use the formula, we have to know:
  - A **point on the line**
  - The **slope** of the line (See section above)
- Once we know the two things above we use the formula:

$$y - y_1 = m(x - x_1)$$ ← Tables pg 18

- The equation of a line can also be given in the form:

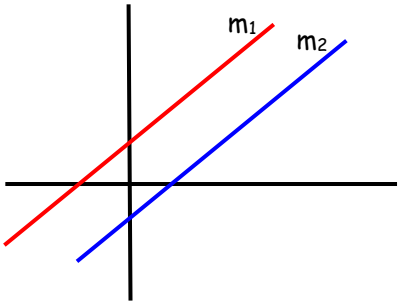
$$y = mx + c$$ ← Tables pg 18

where '**m**' = **the slope and** '**c**' = **the y-intercept** (where the line crosses the y-axis)

Example: A line with equation y = 3x – 5 has a slope of 3 and crosses the y-axis at the point (0, -5).

2) Parallel Lines:

Parallel Lines:



Not in Tables

$$m_1 = m_2$$