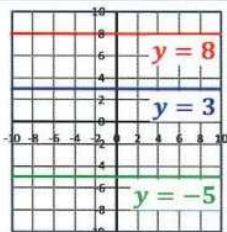


Understanding graphs

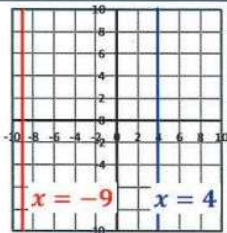
Horizontal lines

$$\rightarrow y = ?$$



Vertical lines

$$\rightarrow x = ?$$



A set of values that indicate the position of a point.

They normally occur in pairs in the form (x, y)

(x, y)

Direction along the x-axis

Along the corridor

Direction up/down the y-axis

Up, Down the stairs

Start from a central point $(0,0)$ - Origin

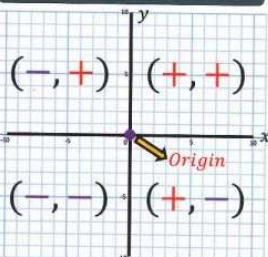
Reading the coordinates will lead you to the exact position.

$(7, -4) \Rightarrow$ Seven units **right**, Four units **down**

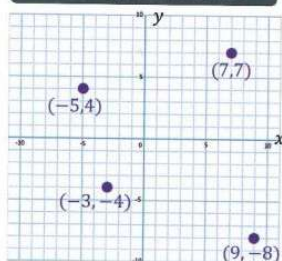
$(-2, 6) \Rightarrow$ Two units **left**, Six units **up**

$(-5, -2) \Rightarrow$ Five units **left**, Two units **Down**

Four Quadrants



Plotting coordinates



Linear graphs

All straight line graphs follow the same rule

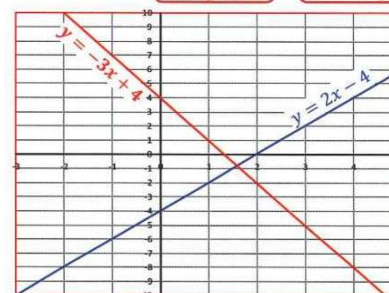
$$y = mx + c$$

Gradient

y intercept

Gradient is the 'steepness' of the line

Calculated by $\frac{\text{Change in } y}{\text{Change in } x}$ or $\frac{\text{Rise up}}{\text{Run along}}$



Equation of line from coordinates

Calculate gradient between points (m)

Substitute in points and solve (c)

Find the equation of the line that passes through $(0,2)$ and $(3,8)$

$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1} \Rightarrow \frac{6}{3} = 2 \Rightarrow (m)$$

$$y = 2x + c \xrightarrow{\text{substitute}} 8 = 2(3) + c$$

$$8 = 6 + c \xrightarrow{\text{solve}} 2 = c$$

$$y = mx + c$$

$$y = 2x + 2$$

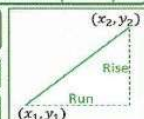
Rate of change

A rate that describes how one quantity changes in relation to another quantity

It is represented by the Gradient of a line

$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1}$$

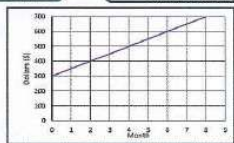
$$\text{Gradient} = \frac{\text{Rise}}{\text{Run}}$$



Interpreting Rates of Change

Gradient \rightarrow

Amount of (y) per Amount of (x)



Rate of change = \$50 per month

Mid points and parallel lines

Midpoints

A midpoint is the halfway point between two end points of a line segment

$$\left(\frac{x_A + x_B}{2}, \frac{y_A + y_B}{2} \right)$$

Add up the x coordinates and halve it

Add up the y coordinates and halve it

Find the coordinate of the midpoint joining the points $(6,11)$ and $(15,-9)$

$$x = \frac{6 + 15}{2} = 10.5 \Rightarrow (10.5, 1) \Rightarrow y = 1$$



The distance between two points will always be the hypotenuse

Parallel lines

Parallel lines are lines that run equidistant to each other and never intersect (cross)

Parallel lines have the same gradient. Different y-intercepts

$$y = mx + c$$

Same Different

Find the equation of the line parallel to $y = 2x + 4$ that passes through $(4,2)$

Substitute in point and solve (c)

$$y = 2x + c \Rightarrow 2 = 2(4) + c$$

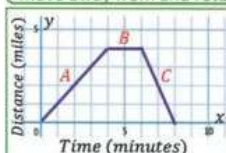
$$2 = 8 + c \Rightarrow -6 = c$$

$$y = 2x - 6$$

Real life graphs

Distance - Time graphs

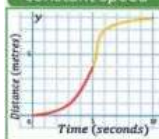
Distance - Time graphs record the journey of an object as it begins to move away from and return to a point.



A Moving away
B Stationary
C Returning

Gradient = Speed

Not all objects travel at a constant speed



Gradient = $\frac{\text{rise}}{\text{run}}$

Speed = $\frac{\text{Distance}}{\text{Time}}$

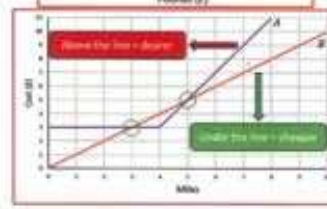
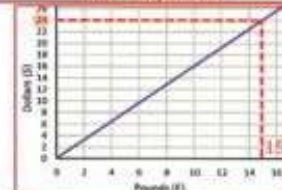
Calculate speed at a specific point by creating a tangent.

Financial graphs

Currency Conversions

Predict future costs

Cost Comparisons

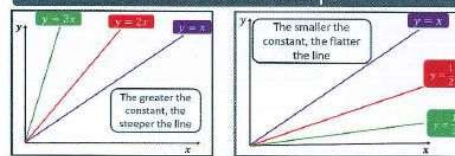


Proportion graphs

Direct Proportion

$y \propto x \rightarrow y = k \times x$ As one value increases, so does the other

Linear relationships



Non-linear relationships

