ANALYTICAL GEOMETRY

Basics

Co-ordinates $A(x_1\,;y_1)$ $B(x_2\,;y_2)$

Distance: $d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

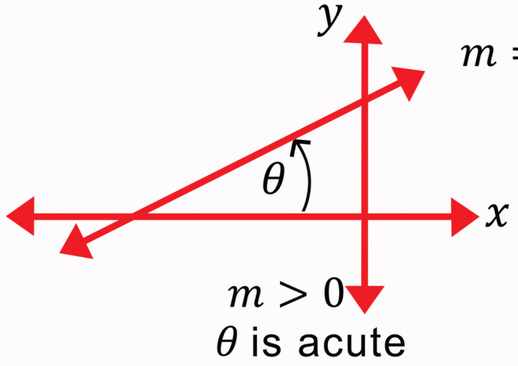
Midpoint: $\text{Midpt}_{AB} = \left(\frac{x_1+x_2}{2}\,;\frac{y_1+y_2}{2}\right)$

Gradient: $m_{AB} = \frac{y_2-y_1}{x_2-x_1}$

If $m_1 = m_2 \rightarrow$ lines are parallel

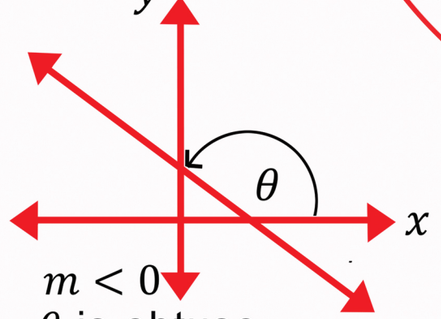
If $m_1 \times m_2 = -1 \rightarrow$ lines are perpendicular

Angle of inclination



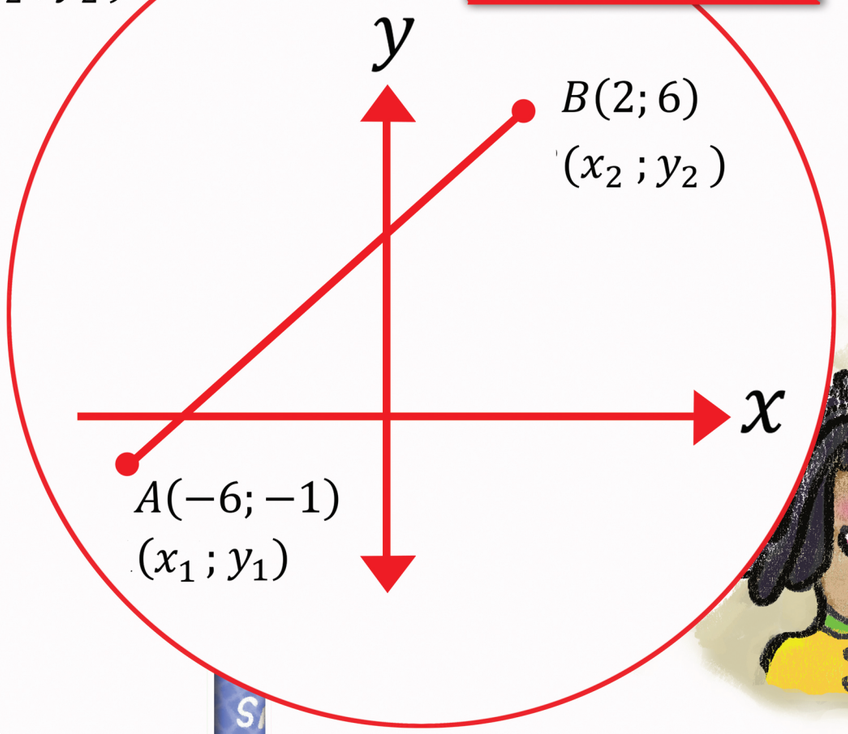
$m = tan\theta$

$m > 0$
θ is acute



$m < 0$
θ is obtuse

Example



$AB = \sqrt{(2+6)^2+(6+1)^2}$

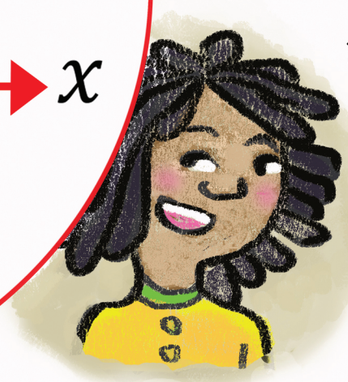
$= \sqrt{113} \quad (= 10{,}63)$

$\text{Midpt}_{AB} = \left(\frac{-6+2}{2}\,;\frac{-1+6}{2}\right)$

$= \left(-2\,;\frac{5}{2}\right)$

$m_{AB} = \frac{6+1}{2+6}$

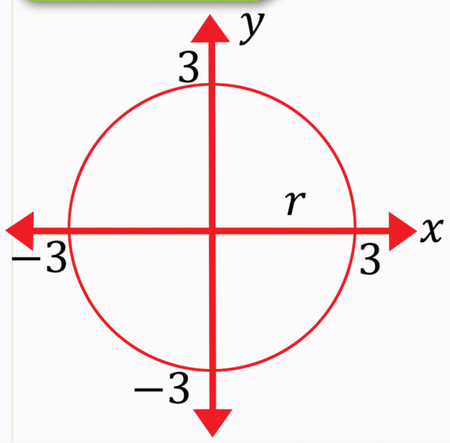
$= \frac{7}{8}$



Angle of inclination: $tan\theta = \frac{7}{8}$

$\therefore\ \theta = 41{,}19°$

Circles



$(x-0)^2+(y-0)^2 = 3^2$

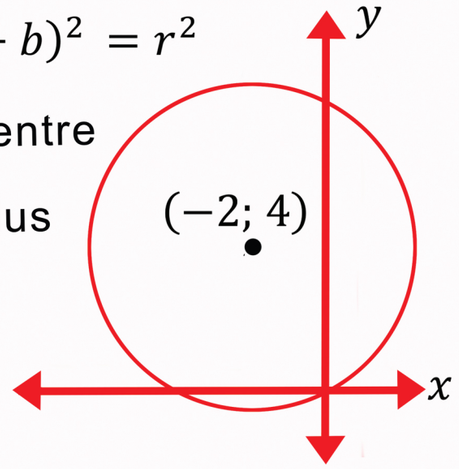
Centre $(0\,;0)$ radius $= 3$

$\therefore\ x^2+y^2 = 9$

$(x-a)^2+(y-b)^2 = r^2$

$(a\,;b) \rightarrow$ centre

$r \rightarrow$ radius



Example

$(x+2)^2+(y-4)^2 = \sqrt{20}^2$

Centre $(-2;\,4)$ radius $= \sqrt{20}$

$= 2\sqrt{5}$

$\therefore (x+2)^2+(y-4)^2 = 20$