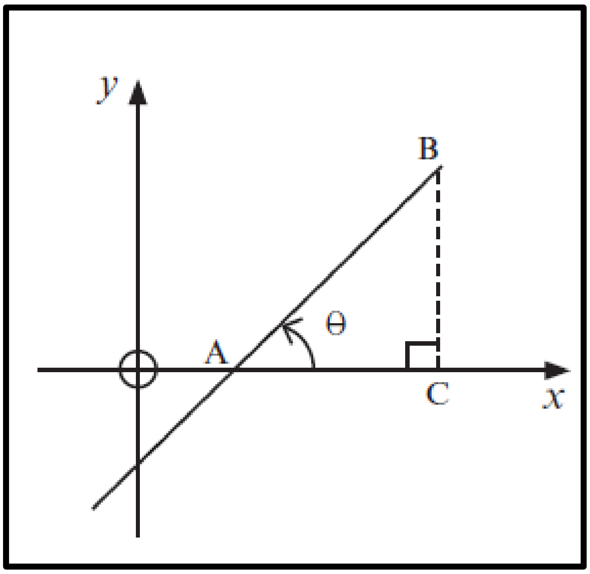
Analytical Geometry

Gr 11

Angle of Inclination

The angle of inclination is the angle that is made between the positive x-axis and a line

Angle θ shows the **slope or inclination** of the line AB.



$$tan\theta = \frac{BC}{AC} = \frac{CHANGE\ IN\ Y}{CHANGE\ IN\ X} = \frac{Y_B - Y_A}{X_B - X_A} = GRADIENT$$

THEREFORE $tan\theta = M_{AB}$

θ is called the angle of inclination.

NOTE: $\theta \in (0°; 180°)$

Example 1
Determine the Gradient of the following given the angle of inclination is:

a. 60^0
b. 135^0
c. 45^0
d. 90^0
e. 180^0

Answers

a. $m = tan\theta$
$m = \tan 60°$
$m = 1.7$

b. $m = tan\theta$
$m = tan135°$
$m = -1$

c. $m = tan\theta$
$m = \tan 45°$
$m = 1$

d. $m = tan\theta$
$m = \tan 90°$
$m = undefined$

e. $m = tan\theta$
$m = \tan 180°$
$m = 0$

Example 2

Determine the angle of inclination (correct to 1 decimal place) for each of the following:

a) a line with $m = \frac{3}{4}$

b) $2y - x = 6$

c) the line passes through the points $(-4; -1)$ and $(2; 5)$

d) $y = 4$

e) $x = 3y + \frac{1}{2}$

Answers

a)

$$\begin{aligned} \tan\theta &= m \\ &= \frac{3}{4} \\ \theta &= \tan^{-1}(0{,}75) \\ \therefore \theta &= 36{,}8^\circ \end{aligned}$$

b)

$$\begin{aligned} 2y - x &= 6 \\ 2y &= x + 6 \\ y &= \frac{1}{2}x + 3 \\ \tan\theta &= m \\ &= \frac{1}{2} \\ \theta &= \tan^{-1}(0{,}5) \\ \therefore \theta &= 26{,}6^\circ \end{aligned}$$

c)

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{5+1}{2+4} \\ &= \frac{6}{6} \\ \therefore m &= 1 \\ \tan\theta &= 1 \\ \theta &= \tan^{-1}(1) \\ \therefore \theta &= 45^\circ \end{aligned}$$

d) Horizontal line

e)

$$\begin{aligned} x &= 3y + \frac{1}{2} \\ x - \frac{1}{2} &= 3y \\ \frac{1}{3}x - \frac{1}{6} &= y \\ \therefore m &= \frac{1}{3} \\ \theta &= \tan^{-1}\left(\frac{1}{3}\right) \\ \therefore \theta &= 18{,}4^\circ \end{aligned}$$