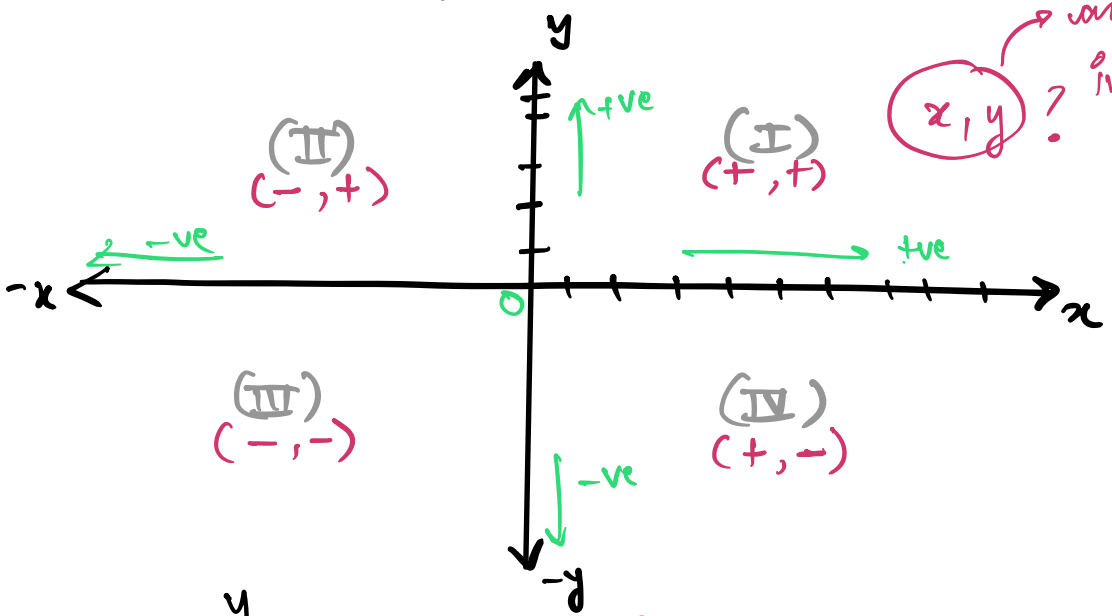
Basic Coordinate Geometry

point in a space (cartesian plane) → xy plane?

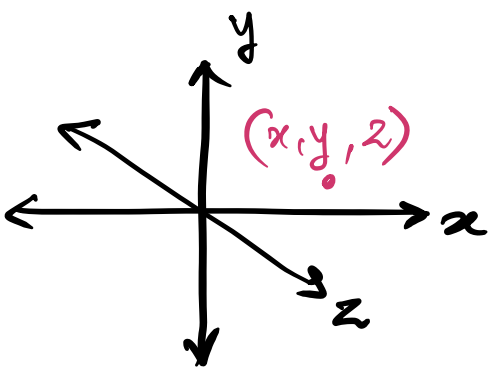
location

measurement



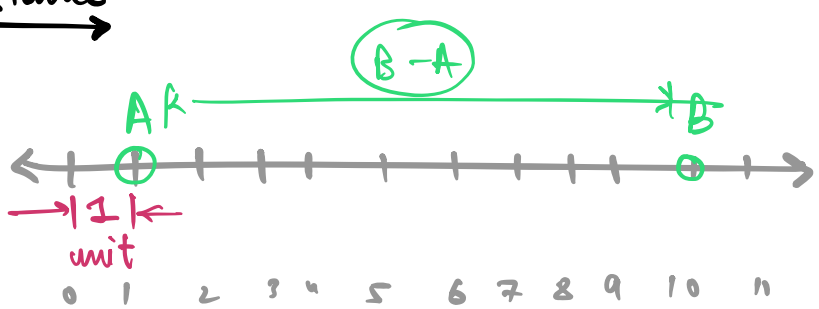
any point in the plane.

(x, y) ?

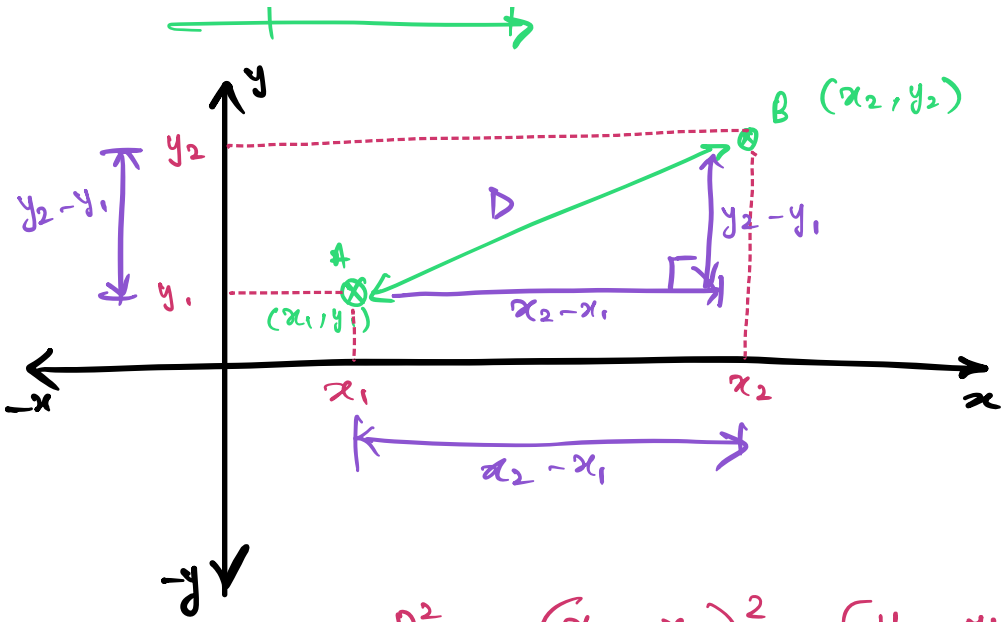


→ coordinate.

Distance

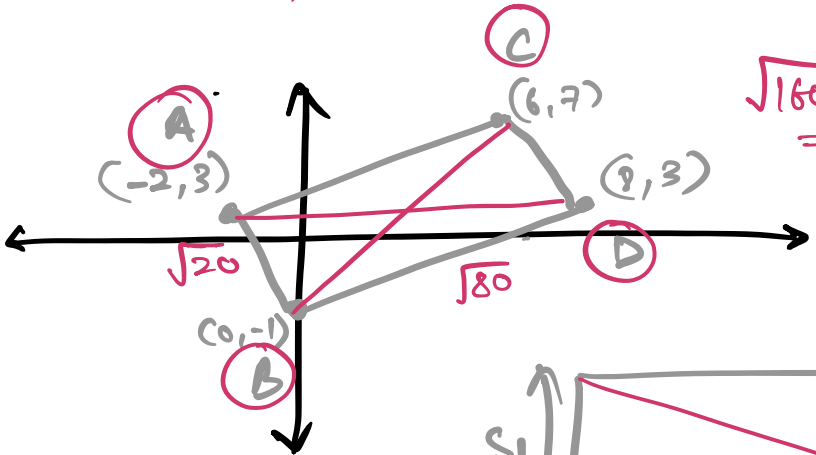


In case of a 2D space

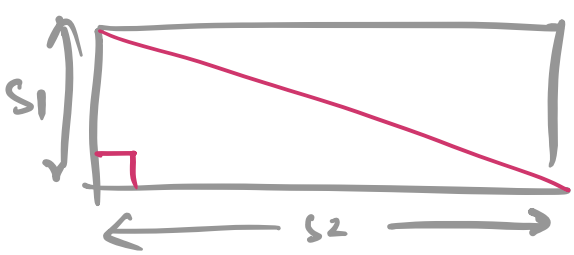


$$D^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

euclidian distance ⟵ $$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



$\sqrt{1600} = 40$



Angles

one line

a line is a set of points which follow a simple equation

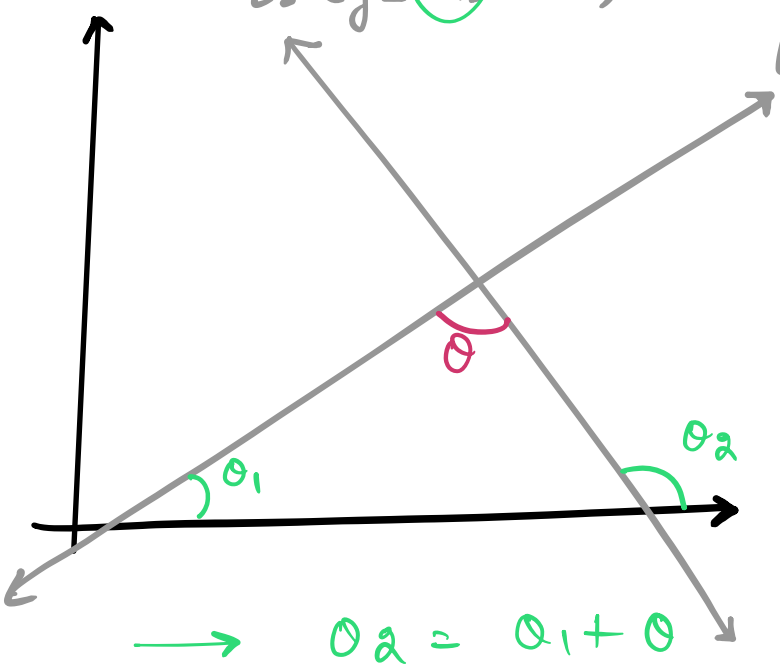
$y = 2x$

y coordinate changes twice as rapidly as the x coordinate.

$y = mx + c$

slope — rate of change of y with x.

c — intercept with y axis.



$\tan\theta_2 = m_2$

$\tan\theta_1 = m_1$

$\longrightarrow \quad \theta_2 = \theta_1 + \theta$

$\longrightarrow \quad \theta = \theta_2 - \theta_1$

$\longrightarrow \quad \tan\theta = \tan(\theta_2 - \theta_1)$

$\longrightarrow \quad \tan\theta = \dfrac{\tan\theta_2 - \tan\theta_1}{1 + \tan\theta_2 \tan\theta_1}$ ($\tan\theta_2 \to m_2$, $\tan\theta_1 \to m_1$)

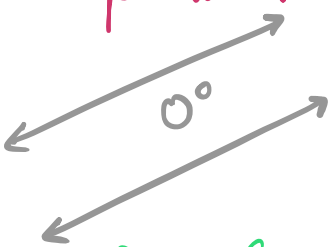
$\longrightarrow \quad \tan\theta = \dfrac{m_2 - m_1}{1 + m_2 m_1}$

...we'll move

You'll have to remember

$$\theta = \tan^{-1}\left(\frac{m_2 - m_1}{1 + m_2 m_1}\right)$$

when are lines parallel?



$\tan 0 = 0$

$\rightarrow 0 = \frac{m_2 - m_1}{1 + m_2 m_1}$

$\rightarrow 0 = m_2 - m_1$

$\Rightarrow \boxed{m_2 = m_1}$

when are lines perpendicular?

$\tan 90 = \infty$

$\frac{1}{\tan 90} = 0$

$0 \leftarrow \frac{1}{\tan 90} = \frac{1 + m_2 m_1}{m_2 - m_1}$

$0 = 1 + m_2 m_1$

$\Rightarrow \boxed{m_2 m_1 = -1}$