**Additional Formulae**

**Absolute value Inequalities**: (i) $|x-a|<k$ is equivalent to $-k<x-a<k$

(ii) $|x-a|>k$ is equivalent to $x-a>k$ or $x-a<-k$

## VECTOR EQUATION OF A LINE

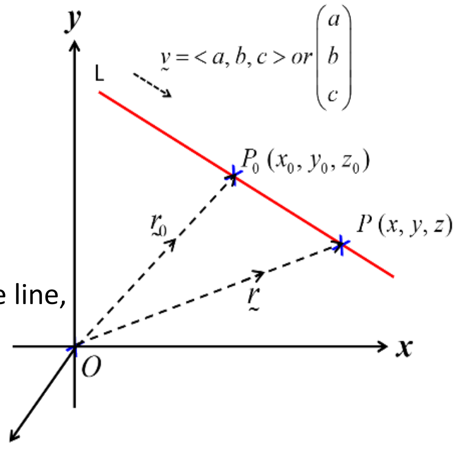
$$\underset{\sim}{r}=\underset{\sim}{r}_0+\lambda\underset{\sim}{v}\quad,\ \lambda\in\mathbb{R}$$

where

$\underset{\sim}{r}=\ <x,y,z>$ is the position vector of any point on the line,

$\underset{\sim}{r}_0=\ <x_0,y_0,z_0>$ is the position vector of a known point on the line,

$\underset{\sim}{v}=\ <a,b,c>$ is a non-zero vector parallel to the line.




## PARAMETRIC EQUATIONS OF A LINE

$$x=x_0+\lambda a,\quad y=y_0+\lambda b,\quad z=z_0+\lambda c\qquad \text{where } \lambda\in\mathbb{R}$$

## EQUATION OF A PLANE

The plane in $\mathbb{R}^3$ that passes through the point $P_0(x_0,y_0,z_0)$ and is normal to the non-zero vector $\underset{\sim}{n}=\langle a,b,c\rangle=a\underset{\sim}{i}+b\underset{\sim}{j}+c\underset{\sim}{k}$ has equations:

In vector form: $\underset{\sim}{n}\bullet\overrightarrow{P_0P}=0$ or $\underset{\sim}{r}\bullet\underset{\sim}{n}=\underset{\sim}{r}_0\bullet\underset{\sim}{n}$

In point-normal form: $a(x-x_0)+b(y-y_0)+c(z-z_0)=0$