INTRODUCTION TO 3D

OCTANTS

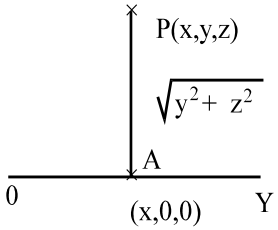
In 3D there are three axes which divide space into 8 equal regions they are called octants.

I	II	III	IV
XOYZ	X'OYZ	X'OY'Z	XOY'Z
V	VI	VII	VIII
XOYZ'	X'OYZ'	X'OY'Z'	XOY'Z'

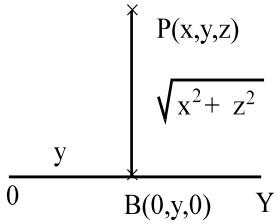
LT 2022

Point in space

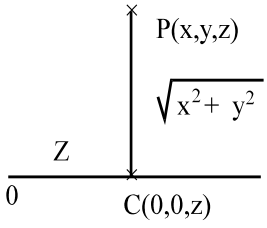
Point and X axis



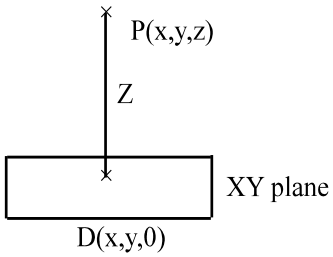
Point and Y axis



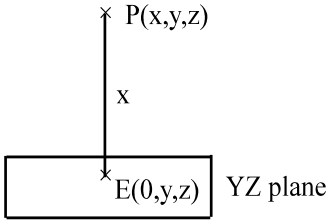
Point and Z axis



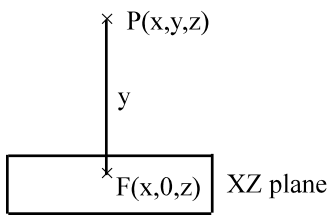
Point and XY plane



Point and YZ plane



Point and XZ plane



Distance Formula

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

Section Formula

Internal division $x = \frac{mx_2 + nx_1}{m+n}$, $y = \frac{my_2 + ny_1}{m+n}$, $z = \frac{mz_2 + nz_1}{m+n}$

External division $x = \frac{mx_2 - nx_1}{m-n}$, $y = \frac{my_2 - ny_1}{m-n}$, $z = \frac{mz_2 - nz_1}{m-n}$

Midpoint Formula

$x_2 = \frac{x_1 + x_2}{2}$, $y = \frac{y_1 + y_2}{2}$, $z = \frac{z_1 + z_2}{2}$

Centroid of a Triangle

$x = \frac{x_1 + x_2 + x_3}{3}$, $y = \frac{y_1 + y_2 + y_3}{3}$, $z = \frac{z_1 + z_2 + z_3}{3}$

Eq. of X axis in 3D is

$y = 0, z = 0$ or $y^2 + z^2 = 0$

Eq. of Y axis in 3D is

$x = 0, z = 0$ or $x^2 + z^2 = 0$

Eq. of Z axis in 3D is

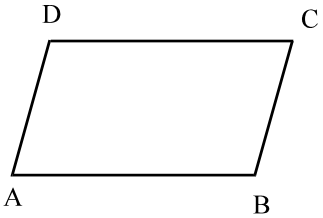
$x = 0, y = 0$ or $x^2 + y^2 = 0$

Eq. of XY plane is $z = 0$

Eq. of XZ plane is $y = 0$

Eq. of YZ plane is $x = 0$

In a parallelogram



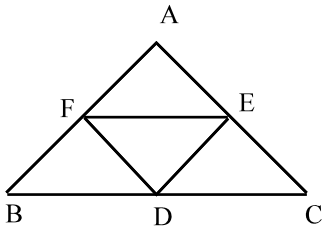
D = A + C - B

C = B + D - A

B = A + C - D

A = B + D - C

In a ΔABC



A = E + F - D

B = D + F - E

C = D + E - F