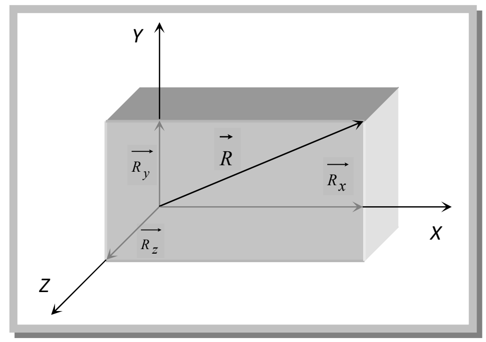
Rectangular components of 3-D vector.

$\vec{R} = \vec{R}_x + \vec{R}_y + \vec{R}_z$ or $\vec{R} = R_x\hat{i} + R_y\hat{j} + R_z\hat{k}$

If $\vec{R}$ makes an angle α with x axis, β with y axis and γ with z axis, then

$$\Rightarrow \cos\alpha = \frac{R_x}{R} = \frac{R_x}{\sqrt{R_x^2 + R_y^2 + R_z^2}} = l$$

$$\Rightarrow \cos\beta = \frac{R_y}{R} = \frac{R_y}{\sqrt{R_x^2 + R_y^2 + R_z^2}} = m$$



$$\Rightarrow \cos\gamma = \frac{R_z}{R} = \frac{R_z}{\sqrt{R_x^2 + R_y^2 + R_z^2}} = n$$

Where l, m, n are called Direction Cosines of the vector $\vec{R}$

$$l^2 + m^2 + n^2 = \cos^2\alpha + \cos^2\beta + \cos^2\gamma = \frac{R_x^2 + R_y^2 + R_z^2}{R_x^2 + R_y^2 + R_z^2} = 1$$

Note: When a point P have coordinate (x, y, z) then its position vector $\overrightarrow{OP} = x\hat{i} + y\hat{j} + z\hat{k}$

When a particle moves from point (x_1, y_1, z_1) to (x_2, y_2, z_2) then its displacement vector

$$\vec{r} = (x_2 - x_1)\hat{i} + (y_2 - y_1)\hat{j} + (z_2 - z_1)\hat{k}$$