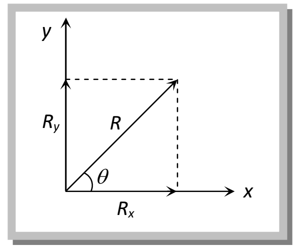
Resolution of vector into components.

Consider a vector $\vec{R}$ in *x-y* plane as shown in fig. If we draw orthogonal vectors $\vec{R}_x$ and $\vec{R}_y$ along *x* and *y* axes respectively, by law of vector addition, $\vec{R} = \vec{R}_x + \vec{R}_y$



Now as for any vector $\vec{A} = A\hat{n}$ so, $\vec{R}_x = \hat{i}R_x$ and $\vec{R}_y = \hat{j}R_y$

So $\quad \vec{R} = \hat{i}R_x + \hat{j}R_y$ .....(i)

But from fig $\quad R_x = R\cos\theta$ .....(ii)

And $\quad R_y = R\sin\theta$ .....(iii)

Since *R* and θ are usually known, Equation (ii) and (iii) give the magnitude of the components of $\vec{R}$ along x and *y*-axes respectively.

Here it is worthy to note once a vector is resolved into its components, the components themselves can be used to specify the vector as –

(1) The magnitude of the vector $\vec{R}$ is obtained by squaring and adding equation (ii) and (iii), *i.e.*

$$R = \sqrt{R_x^2 + R_y^2}$$

(2) The direction of the vector $\vec{R}$ is obtained by dividing equation (iii) by (ii), *i.e.*

$$\tan\theta = (R_y / R_x) \qquad \text{Or} \qquad \theta = \tan^{-1}(R_y / R_x)$$