Unit-1
STATICS OF PARTICLES

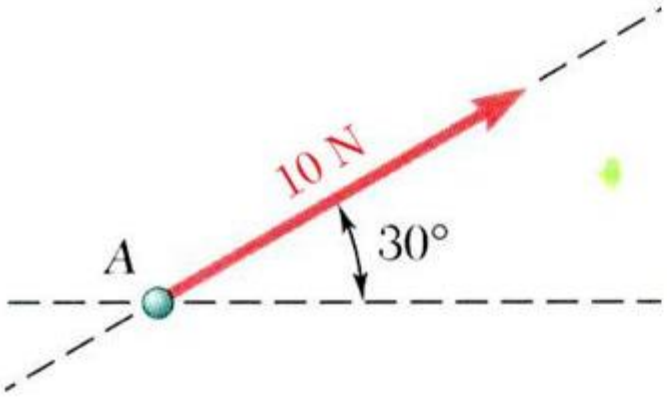
Topic-4

Vectorial Representation of Forces

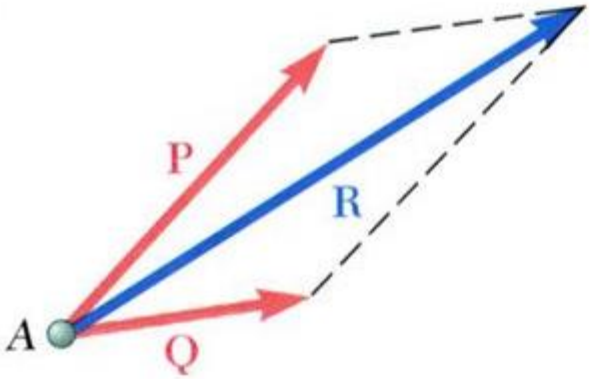
VECTORIAL REPRESENTATION OF FORCE

- The quantities which possess magnitude as well as direction are called as vector quantities.
- Symbol of vector ‘P’ is represented with an arrow such as
- Magnitude of vector is represented by or P.
- **Free vector** can be moved anywhere in space provided it maintains the same direction and magnitude.
- **Sliding vector** may be applied at any point along its line of action.
- **Bound vector** It will remain at the same point of application.
- **Negative vector** The negative of a vector P is the vector-P which has same magnitude & inclination but in opposite direction.

VECTORIAL REPRESENTATION OF FORCE

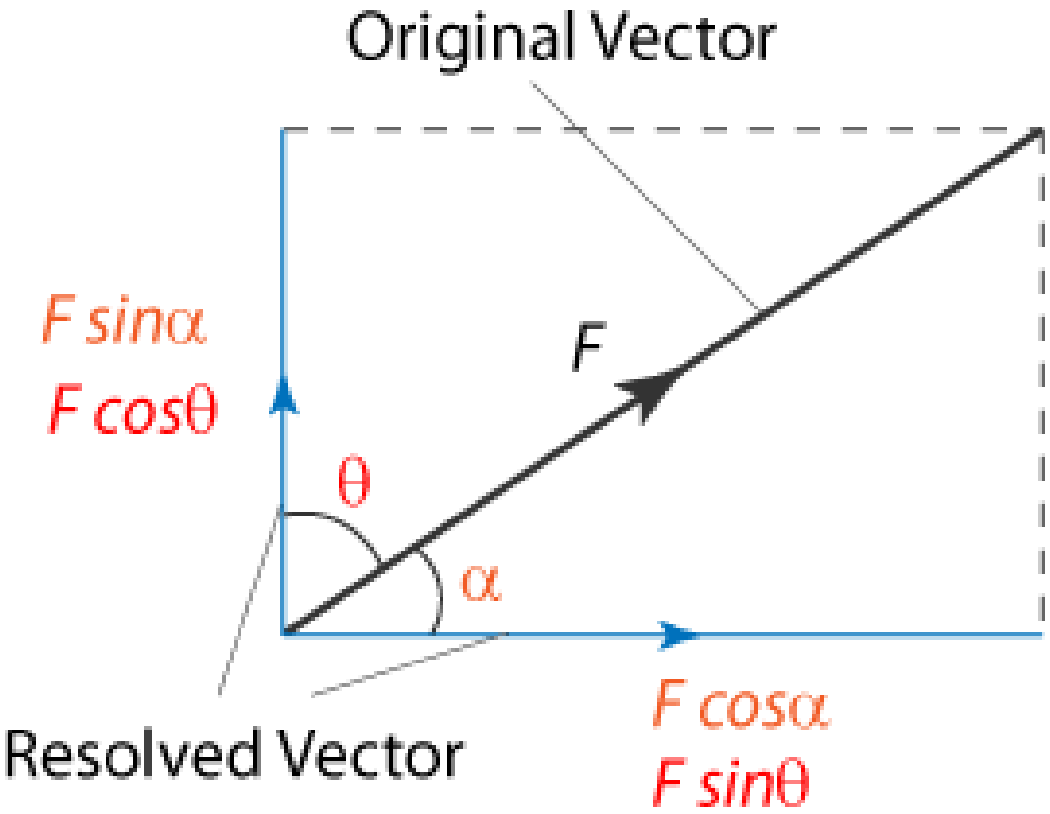


- force: action of one body on another; characterized by its *point of application*, *magnitude*, *line of action*, and *sense*.

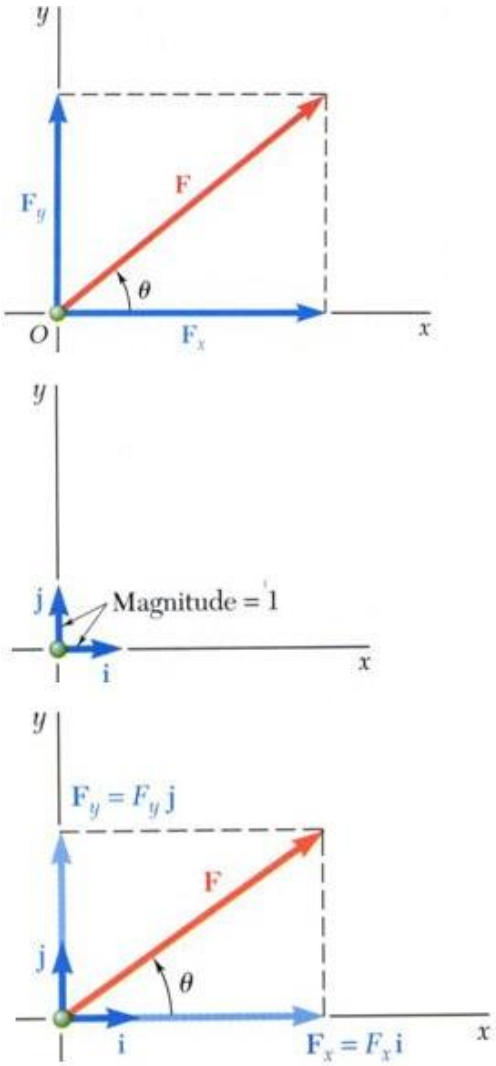


- Experimental evidence shows that the combined effect of two forces may be represented by a single *resultant* force.
- The resultant is equivalent to the diagonal of a parallelogram which contains the two forces in adjacent legs.
- Force is a *vector* quantity.

COMPONENTS OF FORCE



RECTANGULAR COMPONENTS OF A FORCE



- May resolve a force vector into perpendicular components so that the resulting parallelogram is a rectangle. $\bar{F}_x$ and $\bar{F}_y$ are referred to as *rectangular vector components* and

$$\bar{F} = \bar{F}_x + \bar{F}_y$$

- Define perpendicular *unit vectors* $\bar{i}$ and $\bar{j}$ which are parallel to the x and y axes.

- Vector components may be expressed as products of the unit vectors with the scalar magnitudes of the vector components.

$$\bar{F} = F_x\bar{i} + F_y\bar{j}$$

F_x and F_y are referred to as the *scalar components* of $\bar{F}$