



# Unit-1

# STATICS OF PARTICLES

## Topic-4

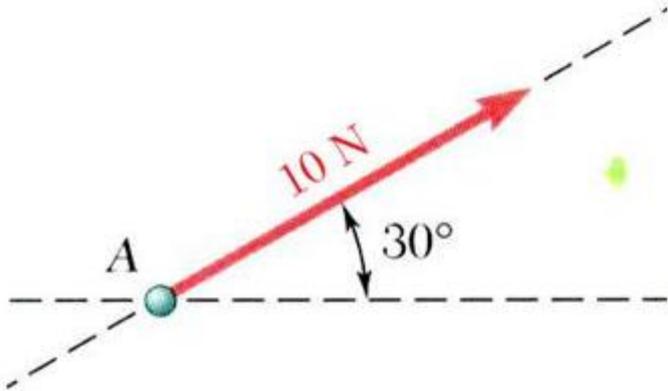
### Vectorial Representation of Forces



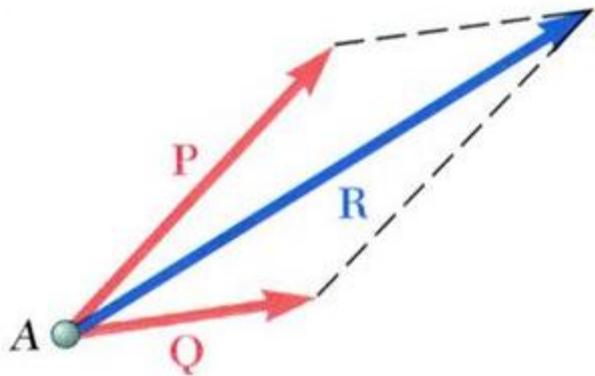
# VECTORIAL REPRESENTATION OF FORCE

- 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  $\vec{P}$
- Magnitude of vector is represented by  $|\vec{P}|$  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

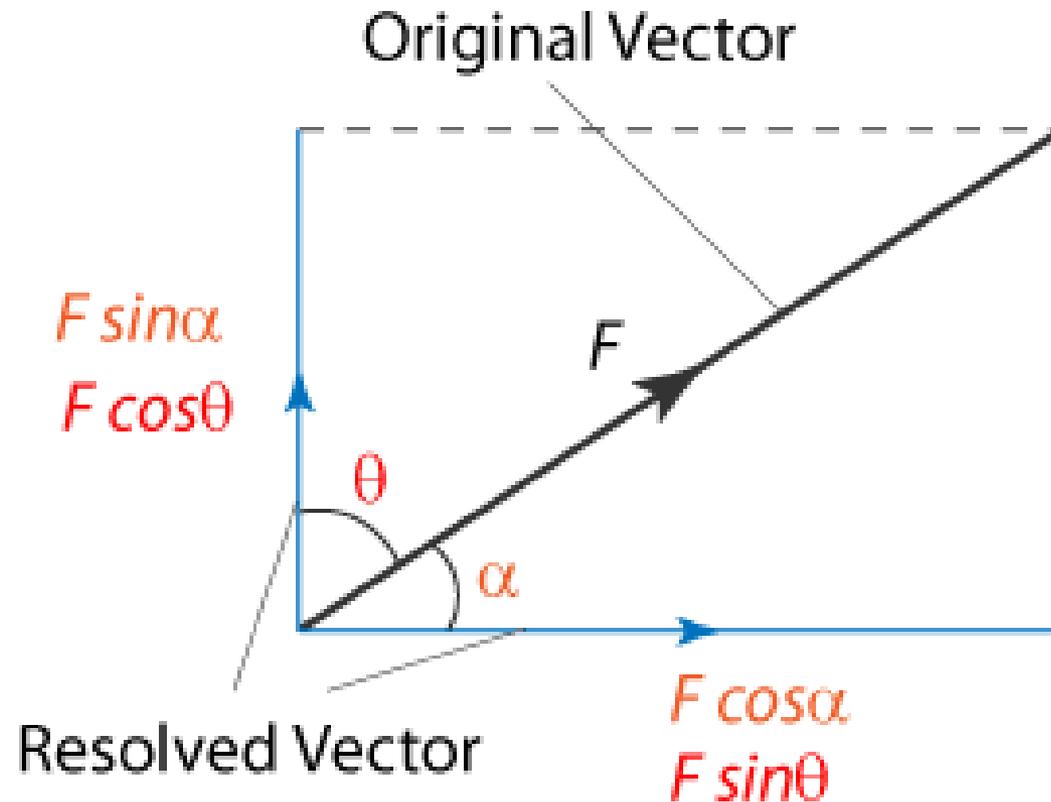


- force: action of one body on another; characterized by its *point of application*, *magnitude*, *line of action*, and *sense*.

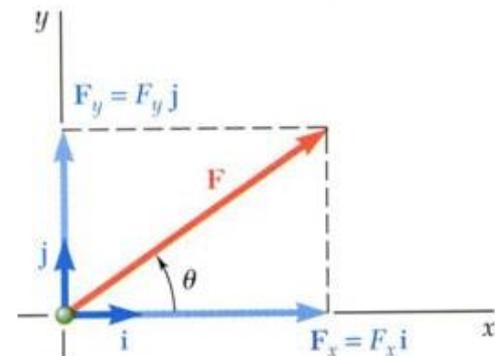
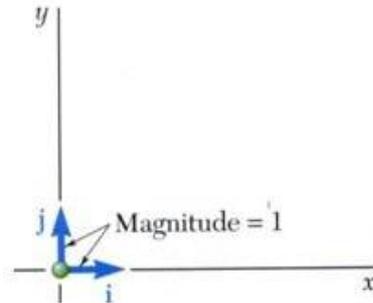
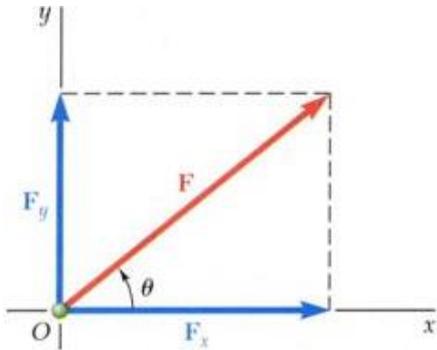


- Experimental evidence shows that the combined effect of two forces may be represented by a single *resultant* force.
- The resultant is equivalent to the diagonal of a parallelogram which contains the two forces in adjacent legs.
- Force is a *vector* quantity.

# COMPONENTS OF FORCE



# RECTANGULAR COMPONENTS OF A FORCE



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

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

- Define perpendicular *unit vectors*  $\vec{i}$  and  $\vec{j}$  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.

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

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