

Work Done by a Constant Force.

Let a constant force \vec{F} be applied on the body such that it makes an angle θ with the horizontal and body is displaced through a distance s

By resolving force \vec{F} into two components:

- (i) $F \cos\theta$ in the direction of displacement of the body.
- (ii) $F \sin\theta$ in the perpendicular direction of displacement of the body.

Since body is being displaced in the direction of $F \cos\theta$, therefore work done by the force in displacing the body through a distance s is given by

$$W = (F \cos\theta)s = F s \cos\theta$$

or $W = \vec{F} \cdot \vec{s}$

Thus work done by a force is equal to the scalar or dot product of the force and the displacement of the body.

If a number of force $\vec{F}_1, \vec{F}_2, \vec{F}_3, \dots, \vec{F}_n$ are acting on a body and it shifts from position vector \vec{r}_1 to position vector \vec{r}_2 then $W = (\vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \dots + \vec{F}_n) \cdot (\vec{r}_2 - \vec{r}_1)$

