

Answer on Question #90432, Physics / Mechanics | Relativity

A force $\vec{F} = 5\hat{i} + 3\hat{j}$ act on a body and changes its position from $P_1(4,5)$ to $P_2(-3,6)$ in a plane. Find the work done on the body if the force is in Newton and displacement in meter.

Solution: If $A(x_1, y_1)$ and $B(x_2, y_2)$ be two points in xy -plane, then the vector joining A and B is given by

$$\vec{AB} = \vec{OB} - \vec{OA}$$

$$\vec{AB} = (x_2\hat{i} + y_2\hat{j}) - (x_1\hat{i} + y_1\hat{j})$$

$$\vec{AB} = (x_2 - x_1)\hat{i} + (y_2 - y_1)\hat{j}$$

In the same manner, the displacement vector joining

$P_1(4,5)$ and $P_2(-3,6)$ is given by

$$\vec{P_1P_2} = (-3 - 4)\hat{i} + (6 - 5)\hat{j}$$

$$\vec{P_1P_2} = -7\hat{i} + \hat{j}$$

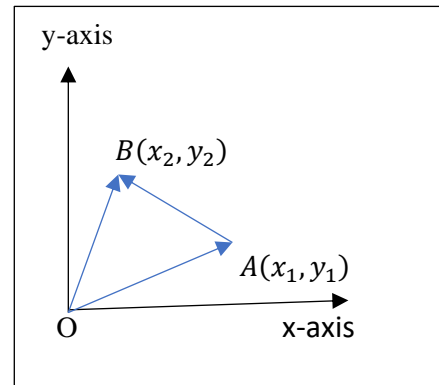
Force is given by $\vec{F} = 5\hat{i} + 3\hat{j}$

Then work done $W = \vec{F} \cdot \vec{P_1P_2}$

$$W = (5\hat{i} + 3\hat{j}) \cdot (-7\hat{i} + \hat{j})$$

$$W = -35 + 3$$

$$W = -32 \text{ N.m}$$



Therefore, work done on the body is -32 N.m

Answer provided by <https://www.AssignmentExpert.com>