Suppose a particle is under the influence of a force $F = i + 5j$.

Compare the work done by the force along the path $O \rightarrow A \rightarrow C$ with that along the path $O \rightarrow C$.

A) $W_{OAC} < W_{OC}$.

B) $W_{OAC} = W_{OC}$.

C) $W_{OAC} > W_{OC}$.
Explanation:

For both cases, the work done is given by $W = \int_{\text{path}} \vec{F} \, ds$.

For a constant force $\vec{F}$ the work in going from $O$ to $C$ is given by $W_{OC} = F \cdot OC \cos \alpha$ (see sketch).

On the other hand to evaluate the work from $O$ to $A$ and then to $C$, one has: $W_{OAC} = F_x \cdot OA + F_y \cdot AC$.

The dot-product identity implies $W_{OAC} = W_{OC}$.

Answer B.

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