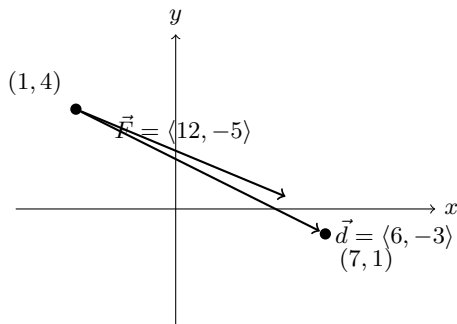


Question 4

A force $\vec{F} = \langle 12, -5 \rangle$ moves an object from $(1, 4)$ to $(7, 1)$. Find the work done.

Question 4 – Solution

Strategy Compute the dot product carefully, then choose the formula that matches the question. A zero, positive, or negative dot product also gives immediate geometric information.



Step 1 The displacement is $\vec{d} = \langle 7 - 1, 1 - 4 \rangle = \langle 6, -3 \rangle$.

Step 2 Work is the dot product: $W = \vec{F} \cdot \vec{d}$.

Step 3 Thus $W = 12(6) + (-5)(-3) = 72 + 15 = \boxed{87}$ force-distance units.

Verification The result follows from the defining vector formulas used above, and each component, magnitude, or scalar condition has been checked against the information in the question.

Key idea The dot product converts two vectors into a scalar measuring directional agreement: positive means generally aligned, zero means perpendicular, and negative means generally opposed.