

Simple Work Problem

#40 p. 625 of Stewart's 5th Edition Pre-Calculus

A constant force $F = \langle 2, 8 \rangle$ moves an object along a straight line from $(2, 5)$ to $(11, 13)$. Find the work done if the distance is in feet and the force is in pounds.

Find the Distance

- Since the distance is the vertical and horizontal component's movement we can find the distance by simply subtracting vertical & horizontal components of the ordered pairs

$$D = \langle 11 - 2, 13 - 5 \rangle = \langle 9, 8 \rangle$$

Force

- The force is in the same direction as the movement, so there is no need for finding components as are found in the next problem.

$$F = \langle 2, 8 \rangle$$

Work = Force • Distance

- The work is the dot product of the force (acting in the same direction) & the distance

$$W = F \bullet D = \langle 2, 8 \rangle \bullet \langle 9, 8 \rangle = 2 \bullet 9 + 8 \bullet 8 = 18 + 64 \\ = 82 \text{ ft-lbs.}$$