

Chapter 6 Problem 51 [†]

Given

$$\vec{F} = \{67\hat{i} + 23\hat{j} + 55\hat{k}\} N$$

$$\vec{r}_1 = \{16\hat{i} + 31\hat{j}\} m$$

$$\vec{r}_2 = \{21\hat{i} + 10\hat{j} + 14\hat{k}\} m$$

Solution

Find the work done on the object.

From the definition of work

$$W = \vec{F} \cdot \Delta\vec{r} = \vec{F} \cdot (\vec{r}_2 - \vec{r}_1)$$

$$W = \{67\hat{i} + 23\hat{j} + 55\hat{k}\} \cdot (\{21\hat{i} + 10\hat{j} + 14\hat{k}\} - \{16\hat{i} + 31\hat{j}\}) J$$

$$W = \{67\hat{i} + 23\hat{j} + 55\hat{k}\} \cdot \{5\hat{i} - 21\hat{j} + 14\hat{k}\} J$$

$$W = (67(5) + 23(-21) + 55(14)) J$$

$$W = 622 J$$

[†]Problem from Essential University Physics, Wolfson