

13. The forces are all constant, so the total work done by them is given by $W = F_{\text{net}} \Delta x$, where F_{net} is the magnitude of the net force and Δx is the magnitude of the displacement. We add the three vectors, finding the x and y components of the net force:

$$\begin{aligned} F_{\text{net } x} &= -F_1 - F_2 \sin 50^\circ + F_3 \cos 35^\circ \\ &= -3.00 \text{ N} - (4.00 \text{ N}) \sin 35^\circ + (10.0 \text{ N}) \cos 35^\circ \\ &= 2.127 \text{ N} \\ F_{\text{net } y} &= -F_2 \cos 50^\circ + F_3 \sin 35^\circ \\ &= -(4.00 \text{ N}) \cos 50^\circ + (10.0 \text{ N}) \sin 35^\circ \\ &= 3.165 \text{ N} . \end{aligned}$$

The magnitude of the net force is

$$F_{\text{net}} = \sqrt{F_{\text{net } x}^2 + F_{\text{net } y}^2} = \sqrt{2.127^2 + 3.165^2} = 3.813 \text{ N} .$$

The work done by the net force is

$$W = F_{\text{net}} d = (3.813 \text{ N})(4.00 \text{ m}) = 15.3 \text{ J}$$

where we have used the fact that $\vec{d} \parallel \vec{F}_{\text{net}}$ (which follows from the fact that the canister started from rest and moved horizontally under the action of horizontal forces – the resultant effect of which is expressed by \vec{F}_{net}).