42. Since the velocity is constant, $\vec{a} = 0$ and the horizontal component of the worker's push $F\cos\theta$ (where $\theta = 32°$) must equal the friction force magnitude $f_k = \mu_k N$. Also, the vertical forces must cancel, implying

$$N = mg + F\sin\theta \quad \Longrightarrow \quad F\cos\theta = \mu_k\,(mg + F\sin\theta)$$

which is solved to find $F = 71$ N.

(a) The work done on the block by the worker is, using Eq. 7-7,

$$W = Fd\cos\theta = (71\,\text{N})(9.2\,\text{m})\cos 32° = 5.6 \times 10^2\ \text{J}\ .$$

(b) Since $f_k = \mu_k\,(mg + F\sin\theta)$, we find

$$\Delta E_{\text{th}} = f_k d = (60\,\text{N})(9.2\,\text{m}) = 5.6 \times 10^2\ \text{J}\ .$$