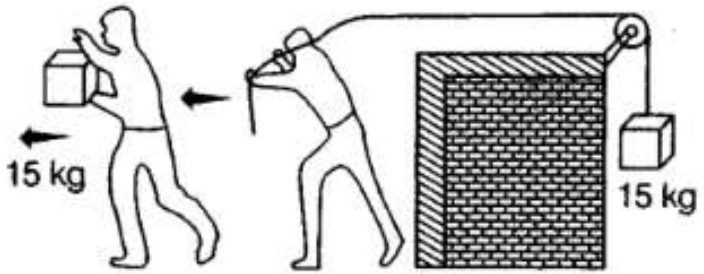
(4). In Fig. (a) the man walks 2 m carrying a mass of 15 kg on his hands. In Fig. (b) he walks the same distance pulling the rope behind him.
The rope goes over a pulley and a mass of 15 kg hangs at its other end. In which case is the work done greater?



Sol. In figure (a), the man carries the mass of 15 kg on his hands and walks 2 m. In this case, he is actually doing work against the friction force.
Friction force contribution by mass
$f = \mu N = \mu mg \times 15 \times 9.8\text{N}$
and work done against friction
$W_1 = fs = \mu \times 15 \times 9.8 \times 2 = 294\mu J$
In figure (b) the tension in the string, T = mg = 15× 9.8 N Hence, force applied by man for pulling the rope
F = T = 15 × 9.8 N
∴ Work done by man, $W_2 = fs = 15 \times 9.8 \times 2 = 294$ J and additional work has to be done against friction also. Thus, it is clear that $W_2 > W_1$.