

41. (a) No external torques act on the system consisting of the man, bricks, and platform, so the total angular momentum of the system is conserved. Let I_i be the initial rotational inertia of the system and let I_f be the final rotational inertia. Then $I_i\omega_i = I_f\omega_f$ and

$$\omega_f = \left(\frac{I_i}{I_f} \right) \omega_i = \left(\frac{6.0 \text{ kg} \cdot \text{m}^2}{2.0 \text{ kg} \cdot \text{m}^2} \right) (1.2 \text{ rev/s}) = 3.6 \text{ rev/s}.$$

(b) The initial kinetic energy is $K_i = \frac{1}{2} I_i \omega_i^2$, the final kinetic energy is $K_f = \frac{1}{2} I_f \omega_f^2$, and their ratio is

$$\frac{K_f}{K_i} = \frac{I_f \omega_f^2}{I_i \omega_i^2} = \frac{(2.0 \text{ kg} \cdot \text{m}^2)(3.6 \text{ rev/s})^2}{(6.0 \text{ kg} \cdot \text{m}^2)(1.2 \text{ rev/s})^2} = 3.0.$$

(c) The man did work in decreasing the rotational inertia by pulling the bricks closer to his body. This energy came from the man's store of internal energy.