

6 Rotational energy and angular momentum – Part 1 —Answers

Answers

Work through these after you have tried the questions yourself.

2.1 $K_{\text{rot}} = \frac{1}{2}I\omega^2 = \frac{1}{2} \times 3.0 \times 4.0^2 = 24 \text{ J}.$

2.2 $W = \tau \Delta\theta = 6.0 \times 5.0 = 30 \text{ J}.$

2.3 $L = I\omega = 0.50 \times 8.0 = 4.0 \text{ kg m}^2/\text{s}.$

2.4 $I_1\omega_1 = I_2\omega_2 \Rightarrow 6.0 \times 1.0 = 2.0 \times \omega_2 \Rightarrow \omega_2 = 3.0 \text{ rad/s}.$

2.5 angular momentum stays the same (no outside torque); the angular velocity rises and the rotational kinetic energy rises (from his muscles' work).