## Solutions

Each answer shows the steps, then the **result**.

**2.1**

- angular momentum of a rigid body:

$$L = I\omega = (5\text{ kg m}^2)(4\text{ rad s}^{-1})$$

- $L = \mathbf{20}\text{ kg m}^2\text{ s}^{-1}$

**2.2**

- $\text{kg m}^2\text{ s}^{-1}$

**2.3**

- angular impulse equals the change in angular momentum:

$$\Delta L = \tau\,\Delta t = (3\text{ N m})(5\text{ s})$$

- $\Delta L = \mathbf{15}\text{ kg m}^2\text{ s}^{-1}$

**2.4**

- angular momentum of a particle moving in a circle:

$$L = mvr = (2\text{ kg})(3\text{ m s}^{-1})(4\text{ m})$$

- $L = \mathbf{24}\text{ kg m}^2\text{ s}^{-1}$

**3.1 B**

- angular momentum is the rotational analogue of linear momentum

**3.2 B**

- $L = I\omega$

**3.3**

(a)

- $L_i = I\omega = (2\text{ kg m}^2)(3\text{ rad s}^{-1}) = \mathbf{6}\text{ kg m}^2\text{ s}^{-1}$

(b)

- the torque adds angular impulse:

$$\Delta L = \tau\,\Delta t = (2\text{ N m})(4\text{ s}) = 8\text{ kg m}^2\text{ s}^{-1}$$

$$L_f = L_i + \Delta L = 6 + 8$$

- $L_f = \mathbf{14}\text{ kg m}^2\text{ s}^{-1}$

**3.4**

(a)

- $L = I\omega = (4\text{ kg m}^2)(2\text{ rad s}^{-1}) = \mathbf{8}\text{ kg m}^2\text{ s}^{-1}$

(b)

- Angular momentum ($\tau = dL/dt$)