



Box 1: Keywords

Word	Definition
Angular Motion	Refers to rotation movement around a fixed point or axis, eg. a somersault, throwing a discuss or moving around a high bar in gymnastics.
Torque	A rotational force. Moment of force/torque (Nm) = Force (N) x Perpendicular distance from the fulcrum (m)
Radian (rads)	The unit of measurement for angles. 1 radian = 57.3 degrees.
Angular Displacement	The smallest change in angle between the starting and finishing points, measured in radians.
Angular Velocity	The rotational speed of an object and the axis about which the object is rotation. Measured in rad/s. Angular displacement divided by time taken
Angular Acceleration	The rate of change of angular velocity over time. Measured in Rads/s ² . Change in velocity (rad/s) divided by time taken (s).
Angular Momentum	A conserved quantity that stays constant unless an external force acts upon it. Ang. Momentum (L) = Moment of Inertia (I) x Angular Velocity
Moment of Inertia	The resistance of a body to a change in angular motion.

Box 2: Key skills

Calculate biomechanical equations using units of measurement; make observations and draw conclusions from data.

Box 3: Application of Newton's Laws to Angular Motion

Newton's first law: A rotating body will continue in its state of angular motion unless an external rotational force is exerted upon it.

For example, an ice skating will continue to spin until the external force of landing on the ground changes their state of angular momentum.

Newton's second law: The rate of change of angular momentum of a body is proportional to the force causing it and the change takes place in the direction in which the force is applied.

For example, A platform diver will remain stationary until they begin their lean forwards to initial the dive causing angular motion. The greater the muscular force exerted on the board will determine the rate of angular velocity.

Newton's third law: when a force is applied by one body to another, the second body will exert an equal and opposite force on the other body.

For example, performing a twist on the trampoline exerts an equal and opposite force. When exerting muscular force to the right to initiate the angular motion, the twist occurs to the left.

Box 4: Conservation of Angular Momentum

Moment of inertia – The resistance of a body to change its state of angular motion.

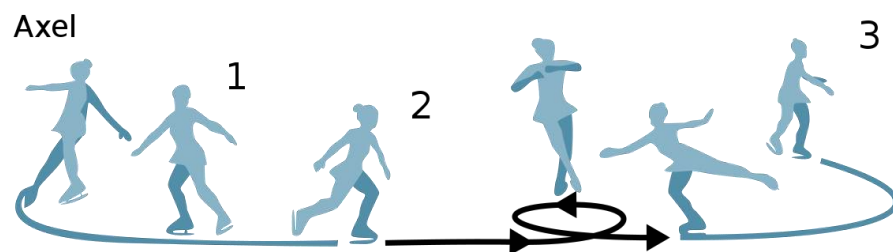
Factors affecting Moment of Inertia:

Mass – the greater the mass of the body, the greater the moment of inertia.

Distribution of Mass from the Axis of Rotation – the closer the mass is to the axis of rotation, the lower the moment of inertia.

For example an ice skater rotates around their longitudinal axis when performing an axel. Tucking their arms and legs in as close to the midline of their body as possible, will decrease their moment of inertia. This will increase their angular momentum, enabling them to perform a full rotation and land successfully.

To increase their moment of inertia and decrease their angular momentum ready for landing, the skater will open out their arms and legs, away from the longitudinal axis slowing down the spin for a controlled landing.



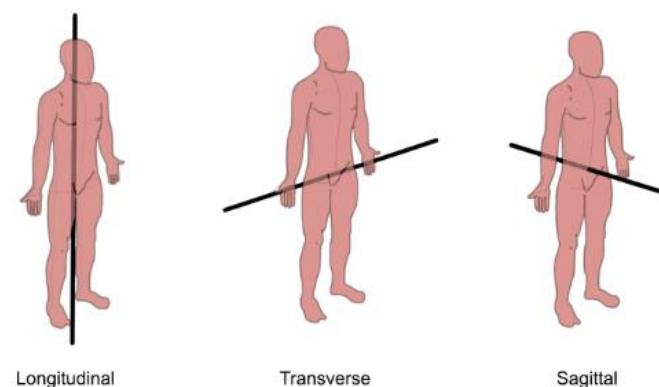
Box 5: Planes and Axes of Rotation Motion

Eccentric Force

Eccentric forces cause angular motion and occurs when a force is applied outside the centre of mass of the object.

Angular Motion

Angular motion occurs around one of the three axes of rotation.



Box 6: Pathway

Previous knowledge: Newton's Laws of Linear Motion

Future links: Synoptic links to A+P movement analysis

Careers: from curriculum narratives

Box 7: Cross curricular links