University of Virginia

Department of Physics

Physics 606: How Things Work II

Lecture #6 Slides:

Seesaws II

Physical Quantities

- Angular Position – an object's orientation
- Angular Velocity – its change in angular position with time
- Torque – a twist or spin
- Angular Acceleration – its change in angular velocity with time
- Moment of Inertia – measure of its rotational inertia

Newton's Second Law of Rotational Motion

The torque exerted on an object is equal to the product of that object's moment of inertia times its angular acceleration. The angular acceleration is in the same direction as the torque.

Torque = Moment of Inertia · Angular Acceleration

Physics Concept

- A force can produce a torque
- A torque can produce a force

Torque = Lever Arm · Force

(where the lever arm is perpendicular to the force)

Physics Concept

- Net Torque
  - The sum of all torques on an object.
  - Determines that object's angular acceleration.

Question:

You and a child half your height lean out over the edge of a pool at the same angle. If you both let go simultaneously, who will tip over faster and hit the water first?