

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?

Physics Concept

- Rotational Inertia
 - A body that's rotating tends to continue rotating.
 - A body at rest tends to remain at rest.

Physical Quantities

- Angular Position
 - An object's orientation

Physical Quantities

- Angular Position
- Angular Velocity
 - An object's change in angular position with time

Physical Quantities

- Angular Position
- Angular Velocity
- Torque
 - A twist or spin

Newton's First Law of Rotational Motion

A rigid object that's not wobbling and that is free of outside torques rotates at a constant angular velocity.

Physics Concept

- Center of Mass
 - The point about which an object's mass balances

Physics Concept

- A free object rotates about its center of mass while its center of mass follows the path of a falling object

Physical Quantities

- Angular Position
- Angular Velocity
- Torque
- Angular Acceleration
 - An object's change in angular velocity with time

Physical Quantities

- Angular Position
- Angular Velocity
- Torque
- Angular Acceleration
- Moment of Inertia
 - The measure of an object's 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.

$$\text{Torque} = \text{Moment of Inertia} \cdot \text{Angular Acceleration}$$

Physics Concept

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

$$\text{Torque} = \text{Lever Arm} \cdot \text{Force}$$

(where the lever arm is perpendicular to the force)

Physics Concept

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

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