Seesaws

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?

Observations About Seesaws

- A balanced seesaw can remain horizontal
- A balanced seesaw rocks back and forth easily
- Two equal-weight children balance a seesaw
- Two unequal-weight children don't balance
- But moving the heavy child inward helps

Physics Concept

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

Physical Quantities

- Angular Position – an object's orientation
- Angular Velocity – its change in angular position with time
- 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.

Center of Mass

- The point about which an object's mass balances
- 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 – 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.

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