

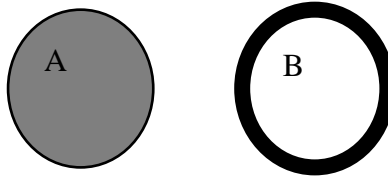
During this interactive you are going to investigate torque and its relationship to angular acceleration.

1. What effect does moment of inertia have on the angular acceleration?

Part 1 Demonstrations

----- Demonstration -----

The two cylinders have the same outside radius and the same mass.



----- Predictions -----

P1. Which cylinder has a larger moment of inertia?

P2. Which cylinder is more difficult to start rotating?

P3. Which cylinder will reach the bottom of the ramp first, starting from rest?

Explain

----- Partner Discussion -----

Discuss your predictions with your partner.

----- Class Discussion -----

----- Physics Speaks -----

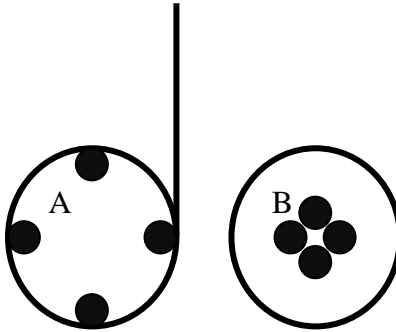
----- Results -----

What happened?

Explain.

----- Demonstration -----

The two cylinders have the same radius and the same mass but the mass is arranged differently.



----- Predictions -----

P4. Which cylinder has a larger moment of inertia?

P5. Which cylinder is more difficult to start rotating?

P6. Which cylinder will reach the table first, starting from rest?

Explain

----- Partner Discussion -----

----- Class Discussion -----

----- Physics Speaks -----

----- Results -----

What happened?

Explain.

Part 2 Lab

You are King Kong, and your task is to close a bridge in order to save an invaluable load of bananas (well, invaluable to you at least).

To close the bridge quickly enough to save the fruit without breaking off the bumper pilings, you need to apply a torque so that the bridge's angular acceleration is 0.196 rad/s^2 . The moment of inertia of the rotating part of the bridge is $45,400,000 \text{ kg}\cdot\text{m}^2$.

Two trucks are parked on this part of the bridge, and you must include them when you calculate the total moment of inertia. Each truck has a mass of 4160 kg ; the midpoint of one is 20.0 m and the midpoint of the other is 30.0 m from the pivot (axis of rotation) of the swinging bridge. The trucks will increase the bridge's moment of inertia. In solving this problem, consider all the mass of each truck to be concentrated at its midpoint. You apply your force 35.0 m from the pivot and your force is perpendicular to the rotating component of the bridge.

2.1 Calculate the moment of inertia the bridge and trucks body. **Show all work including substitution with units.**

2.2 Calculate the force you need to use to close the bridge and save the bananas. **Show all work including substitution with units.**

Open the shortcut “ILID Torque and Accel” on one of the lab stations.

Open the simulation contained in this section. **Do Not follow the directions in the simulation follow these instructions.**

Enter the amount of force you wish to apply to the nearest 0.01×10^5 N and press GO to start the simulation.

2.3 Did it work? _____ Record **all** trials here with the angular acceleration and force applied to the bridge. Circle the final one that worked.