



## Curiosity Guide #406

### Torque

Accompanies Curious Crew, Season 4, Episode 6 (#406)

#### Balanced Meter Stick

Investigation #6

#### Description

Try this torque trick with a meter stick!

#### Materials

- Meter stick

#### Procedure

1. Center and balance the meter stick on two fingers.
2. What happens when you push down on the center of the stick above the support fingers?
3. What happens when you push down lightly on one of the ends?

#### My Results

## Explanation

When the meter stick is balanced on two fingers, the stick is in equilibrium. The meter stick is not rotating at all, so nothing happens. When you push down with the index finger on the opposite hand right at the center, the meter stick still doesn't rotate. Applying the force at the center of rotation applies no torque. Pressing down on the stick **away** from the center causes the meter stick to begin to rotate. The light force you put on one of the ends does apply a torque because the force is away from the center of rotation. The formula for torque is  $T = Fr$ , where  $F$  is the force, perhaps a weight hooked to the stick, and  $r$  is the distance between the center and the mass itself. The unit is measured in Newton Meters. Torque is a force that makes an object rotate.

**Think about this:** Measuring torque is an important part of tightening lug nuts on a car's wheel. If the lug nuts are too loose, the wheel might not be stable. That could be dangerous for the passengers in the car. When mechanics put wheels on a car, they use a special wrench called a torque wrench to make sure the nuts are tight enough. After setting the handle to the required torque number, you rotate the lever until it clicks once, and then repeat until the lever clicks a second time. Tighten each nut in a star pattern on the wheel and you are ready to go!

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