



Curiosity Guide #406

Torque

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

Get a Grip

Investigation #7

Description

Steady as you go! Can you keep the stick from twisting?

Materials

- Torque meters
 - 2 broom handles
 - 12 threaded hooks
 - Saw
 - Wood glue
 - Drill
 - One-fourth-inch drill bit
 - Forstner drill bit
 - Measuring tape
- Two kilogram weights (or ankle weights)
- Two friends

Figure 1: Underside of broom handle



Procedure

1. You will be making two torque meters.
2. Measure and cut 16 inches off the top of each broom handle with the saw.
3. To make a perpendicular handle on one end of each broom handle: Mark the center of a cut-off piece. Drill a hole large enough in the center to hold the tapered end of the broom handle.
4. Use wood glue to set the tapered end of the long broom handle in the cut-off piece. Let dry overnight.
5. Measure and mark 2 inches from the tapered end, and 2 inches from the glued joint, on each stick. Measure the distance between these two marks on the long handle, and drill six equidistant pilot holes.
6. Screw in the six metal hooks so they each face toward the glued joint when done.
7. Ask two friends to hold the handle of his or her stick on either side of the glue joint so the sticks are out horizontally from their bodies.
8. Hang a 1-kilogram weight from the first hook on each stick, then move the weight to the next furthest hook and so on.
9. What do you notice? What do you feel? Could you keep the stick horizontal?

My Results

Explanation

Torque is any kind of force that applies rotation, a turning force. Our bodies may experience torque in our joints when we lift something. For example, if the object is too heavy, our joints may rotate at the elbow or wrist. When the stick is first held with the weight near the hand, your friends find it easier to support and resist the rotation in the wrist, where the axis of rotation is. However, as the weight moves away from the hand, the torque increases until the wrist can no longer resist the rotational force. The dowel and weight begin to fall. When the length of the lever arm or mass on the lever increases, so does the torque.

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