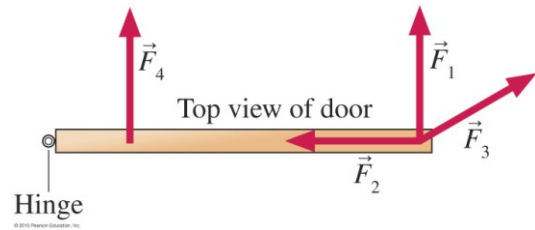


## Torque

Extend beyond the particle model

### Ch 7 Torque

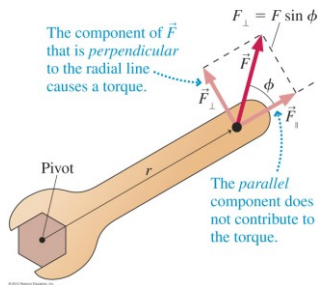
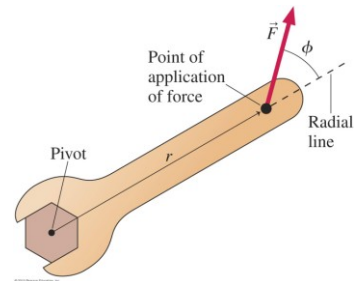
10/18/13



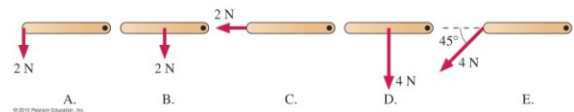
### Awkward angle to grab wrench

Torque = distance times Force (perpendicular)

$$\tau = r_{\perp} F$$

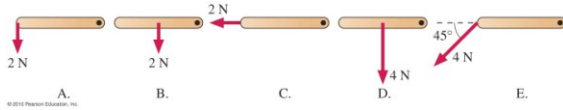


Rank in order, from largest to smallest, the five torques  $\tau_A$  to  $\tau_E$ . The rods all have the same length and are pivoted at the dot.



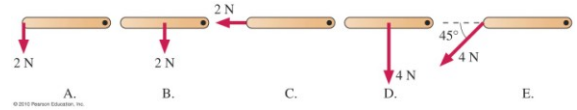
### Which has the largest torque?

The rods all have the same length and are pivoted at the dot.



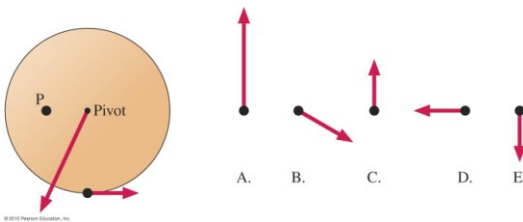
### Which two have the same torque?

The rods all have the same length and are pivoted at the dot.

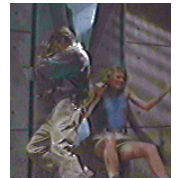


- A. A=B    B. A=C    C. A=D    D. B=C    E. B=D

Two forces act on the wheel shown. What third force, acting at point P, will make the net torque on the wheel zero?



In the movie Jurassic Park, there is a scene in which some members of the visiting group are trapped in the kitchen with dinosaurs outside of the door. The paleontologist is pressing against the center of the door, trying to keep out the dinosaurs who are on the other side. The botanist throws herself against the door at the edge right next to the hinge. A pivotal point in the film is that she cannot reach a gun on the floor because she is trying to help hold the door closed. If the paleontologist is pressing at the center of the door, and the botanist at the edge by the hinge, estimate how far the paleontologist would have to relocate in order to have a greater effect on keeping the door closed than both of them pushing together have in their positions as shown in the film.



- Why are these two types of wheel chairs different?



### Center of Mass

- Friction Meter Stick

## Center of Mass

$$x_{cm} = \frac{\sum m_i x_i}{\sum m_i}$$

Implies that a system of objects can be treated as one

## Center of Mass

$$x_{cm} = \frac{\sum m_i x_i}{\sum m_i}$$

You have a 4ft x 4ft piece of plywood missing the top right quarter. It needs hung with 1 nail.

Where can you place it so the plywood does not rotate?

