Torque pt 2

Tourqe
- ★ The rotational equivalent of a force
- ★ Counter-clockwise is positive
- ★ Clockwise is negative

$$\tau = rF\sin\theta = r_\perp F$$
$$\quad\quad \blacktriangleright r_\perp = r\sin\theta$$

- ★ Units: newtons times meter (m•N)
- ★ If Net $\tau = 0$
    - ○ Then $\tau_1 - \tau_2 = 0$
        - ■ So $\tau_1 = \tau_2$

Mechanical

Conceptual questions

Under what conditions can a rotating body be in equilibrium? Give an example.

What three factors affect the torque created by a force relative to a specific pivot point?

Mechanics sometimes put a length of pipe over the handle of a wrench when trying to remove a very tight bolt. How does this help? (It is also hazardous since it can break the bolt.)

How does a pulley enable a person to lift a load as heavy as a piano with little effort?

A person carries a plank of wood 2.00 m long with one hand pushing down on it at one end with a force F1 and the other hand holding it up at .500 m from the end of the plank with force F2. If the plank has a mass of 20.0 kg and its center of gravity is at the middle of the plank, what are the magnitudes of the forces F1 and F2?

Suppose you needed to raise a 250-kg mower a distance of 6.0 cm above the ground to change a tire. If you had a 2.0-m long lever, where would you place the fulcrum if your force was limited to
300 N?

A 75-kg man stands on his toes by exerting an upward force through the Achilles tendon, as in the figure. (a) What is the force in the Achilles tendon if he stands on one foot? (b) Calculate the force at the pivot of the simplified lever system shown. This force represents the forces acting on the ankle joint.