To do …

- Quiz 7 – good luck!
- Last day of office hours and piazza help: **Wed, Dec 13**
- No discussion sections next week

- HW 27 ME due **Sat – Last one!!**
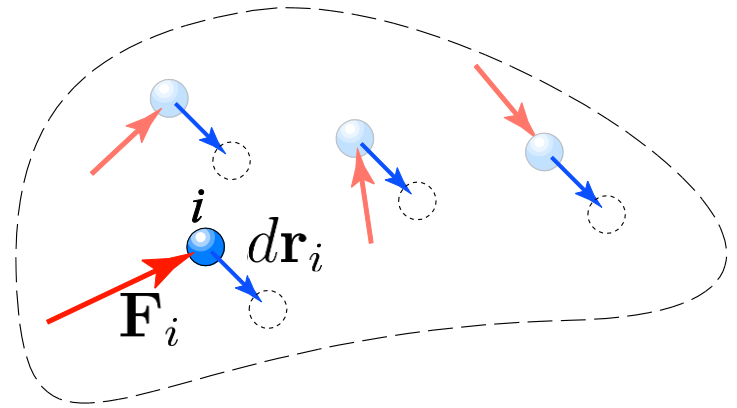- HW 26 PL due **Tues (Dec 12) – Last one!!**

Definition of Work

Work of a force

A force does work when it undergoes a displacement in the direction of the line of action.
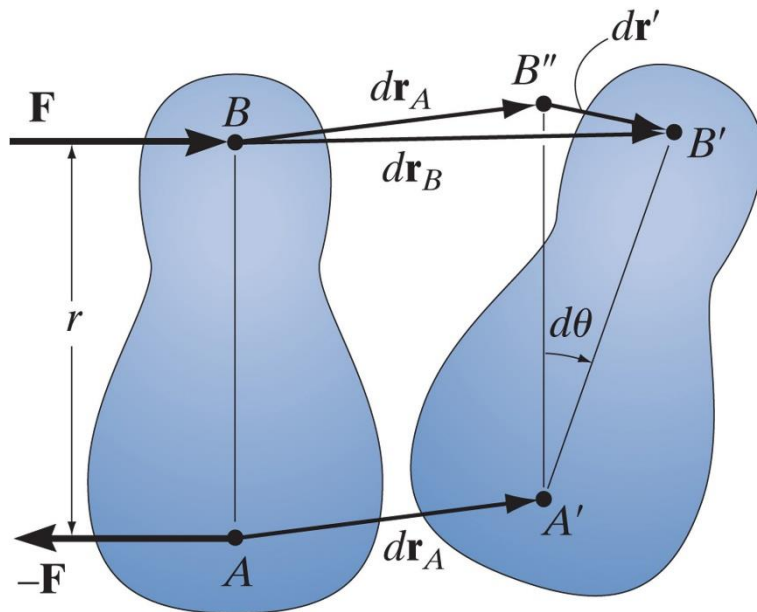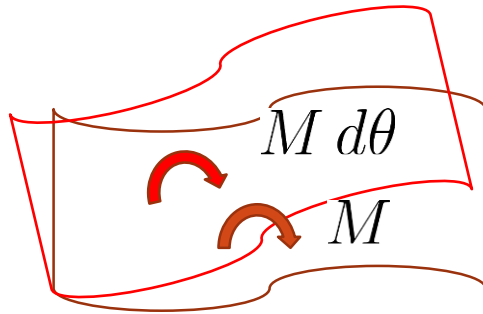
The work dU produced by the force $\boldsymbol{F}$ when it undergoes a differential displacement $d\boldsymbol{r}$ is given by

$$dU = \mathbf{F} \cdot d\mathbf{r}$$

Definition of Work

**Work of a couple** $dU = M\mathbf{k} \cdot d\theta\,\mathbf{k} = M\,d\theta$

Virtual Displacements

A *virtual displacement* is a conceptually possible displacement *or* rotation of all *or* part of a system of particles. The movement is assumed to be possible, but actually does not exist.

Principle of Virtual Work

The principle of virtual work states that if a body is in equilibrium, then the algebraic sum of the virtual work done by all the forces and couple moments acting on the body is zero for any virtual displacement of the body. Thus,
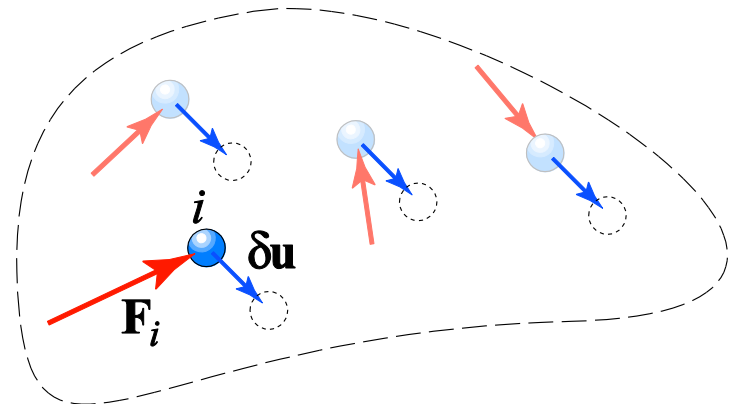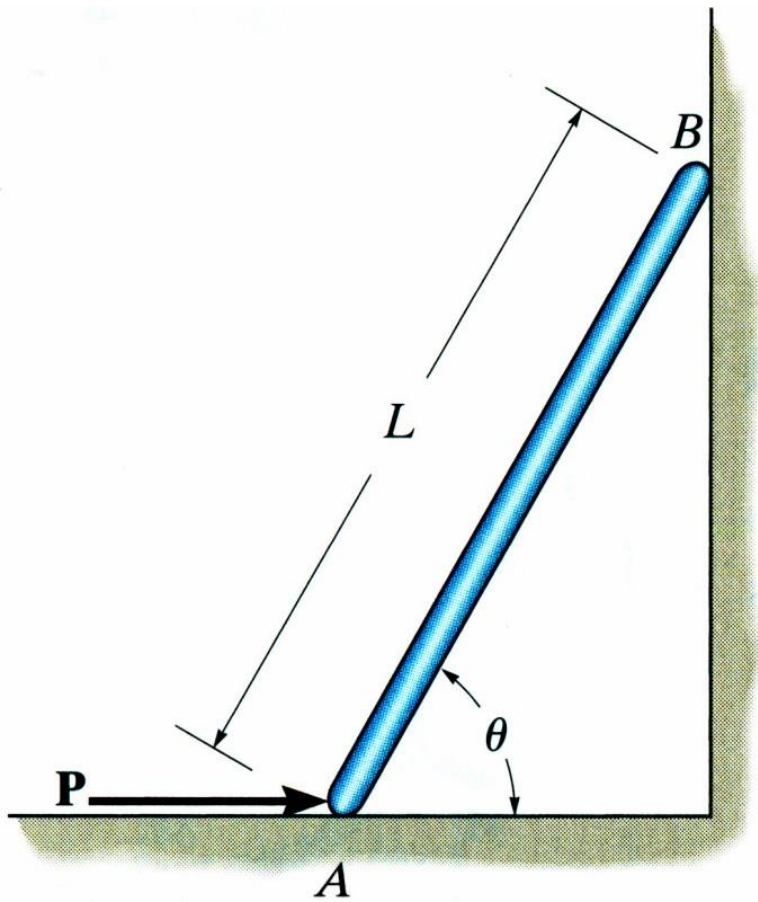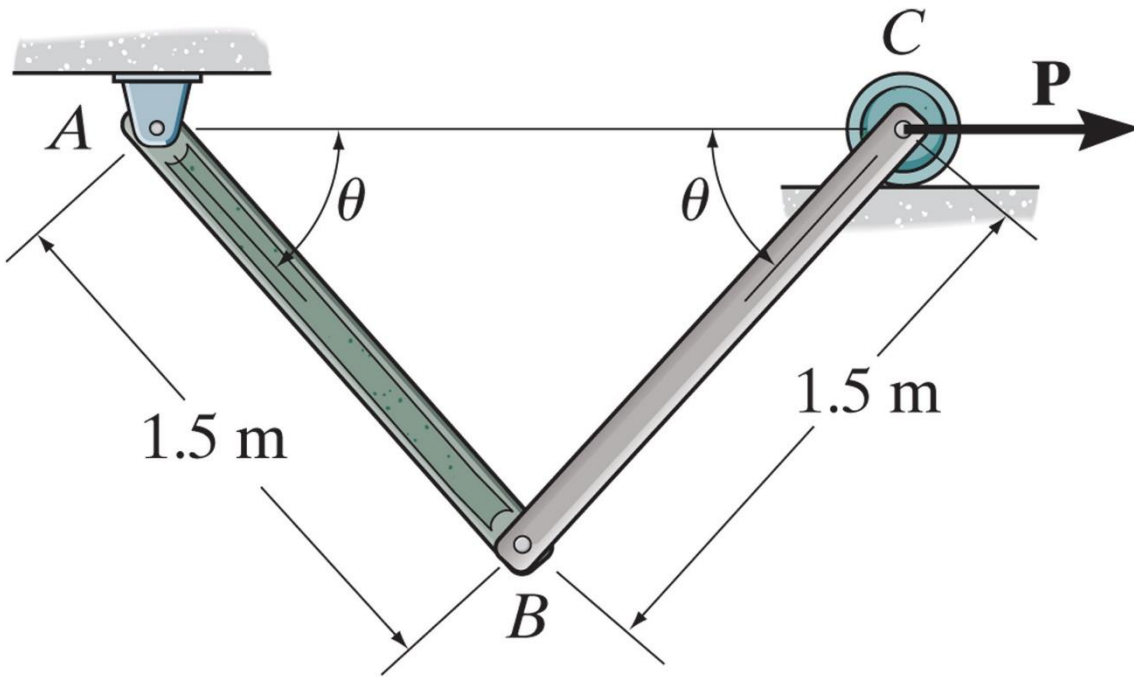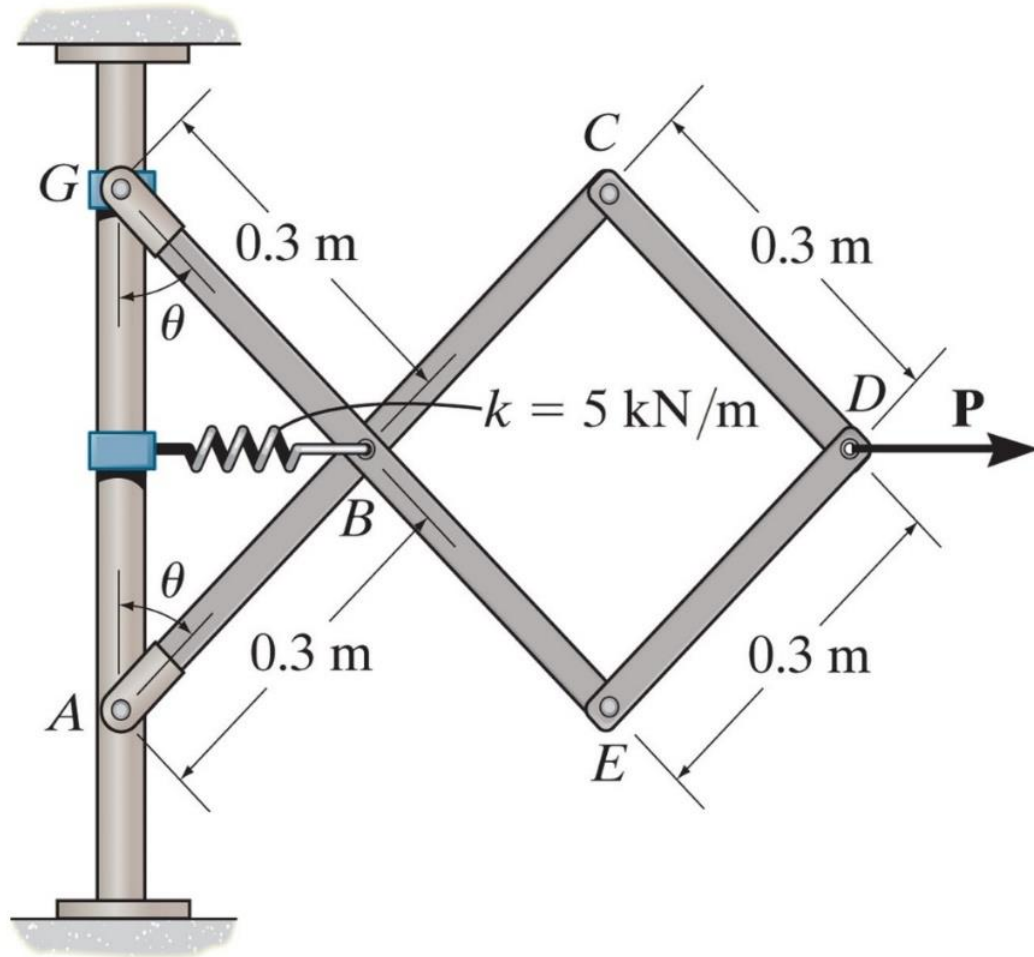
The thin rod of weight W rests against the smooth wall and floor. Determine the magnitude of force P needed to hold it in equilibrium.
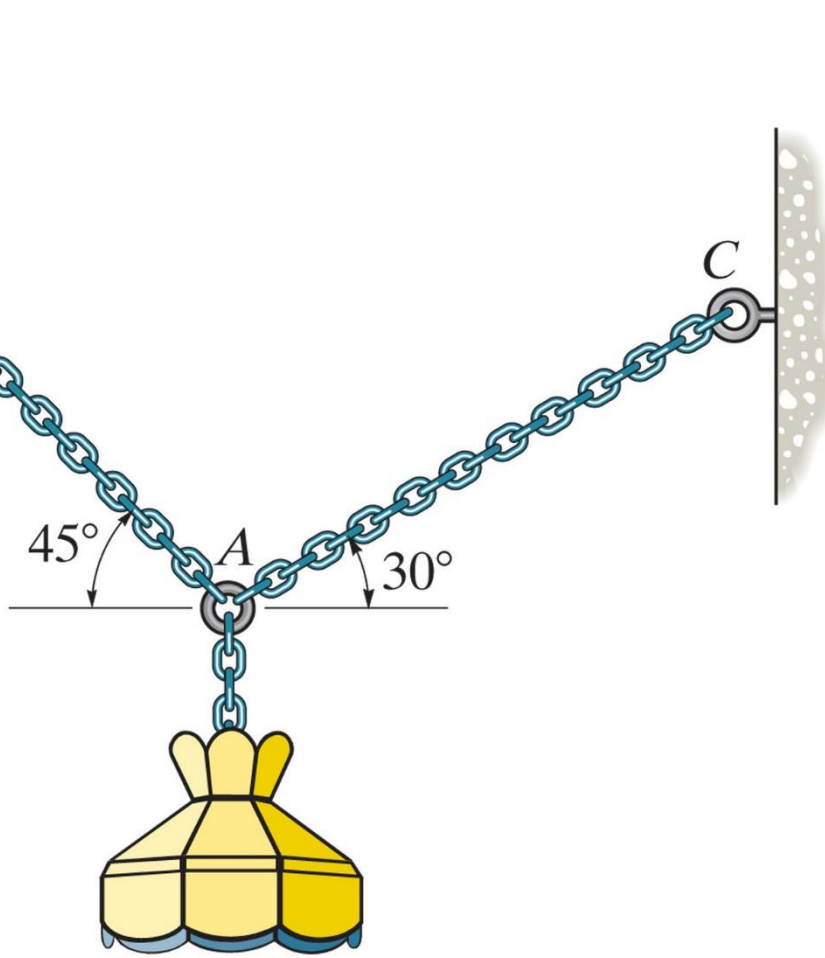
So what's the point....
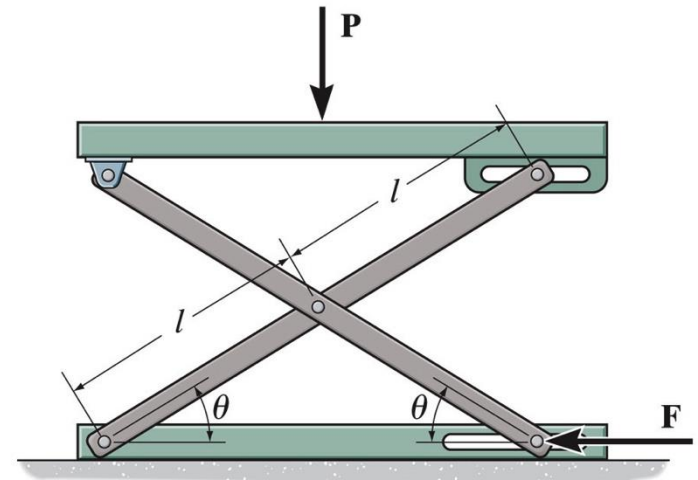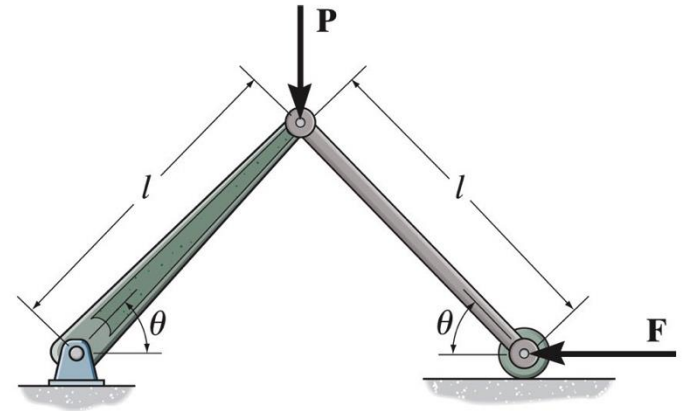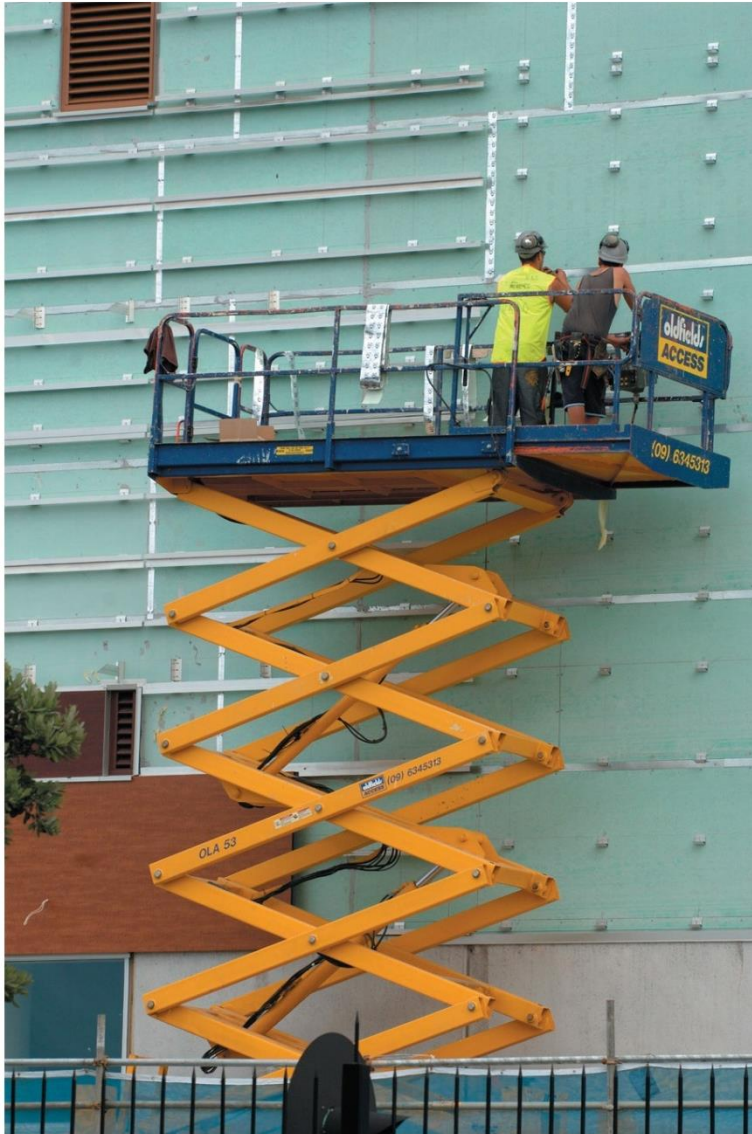
Determine the required magnitude of force P to maintain equilibrium of the linkage at an angle of 60 degrees. Each member has a mass of 20 kg.

Determine the required force P needed to maintain equilibrium of the scissors linkage when the angle is 60 degrees. The spring is unstretched when the angle is 30 degrees.

Determine the tension in the cable AC. The lamp weighs 10 lb.