To do ...
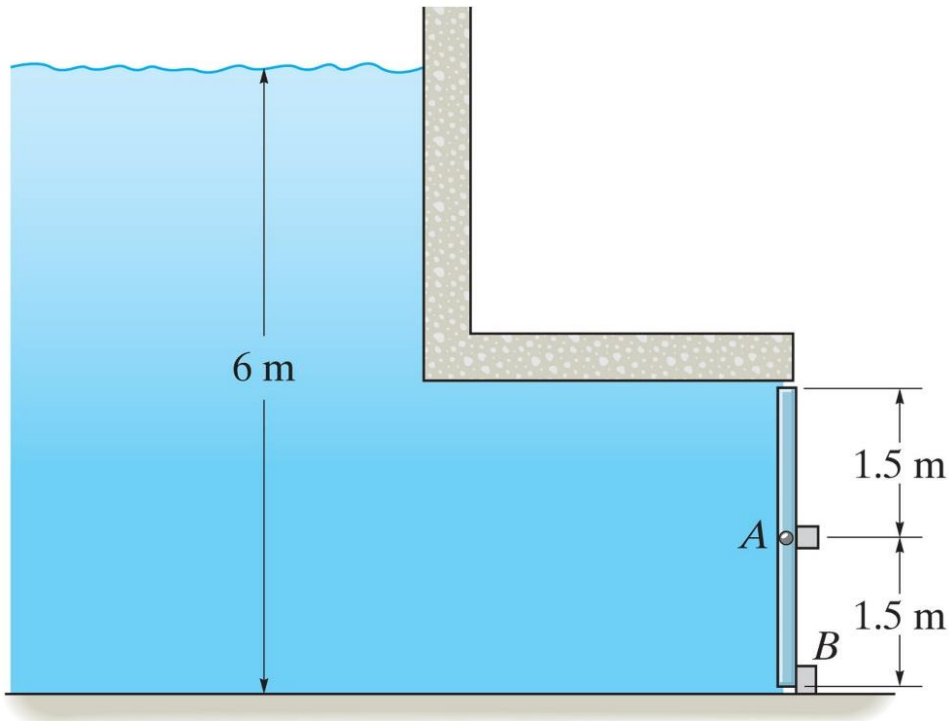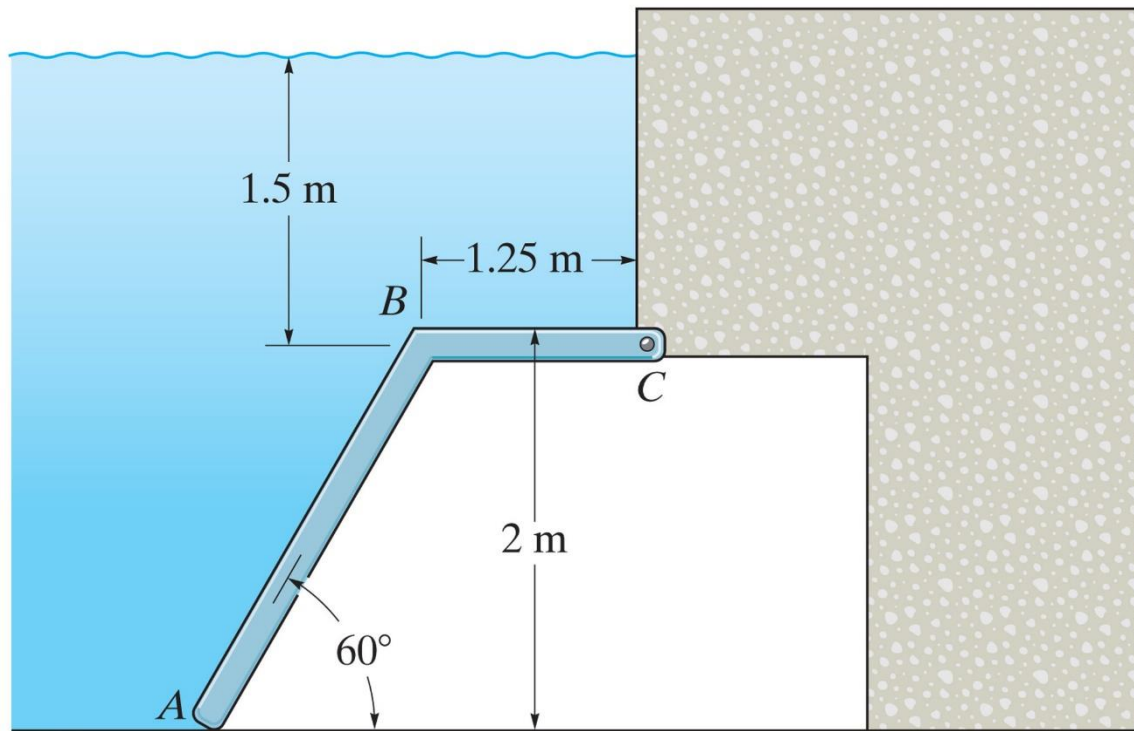
- Quiz 7 next week

- Last day of office hours and piazza help: **Wed, Dec 13**

- No discussion sections next week

- HW 24 PL due **Tues**

- HW 27 ME due **Sat**

6 m

1.5 m

A

1.5 m

B

The 2-m-wide rectangular gate is pinned at its center A and is prevented from rotating by the block at B. Determine the reactions at these supports due to hydrostatic pressure.

Determine the magnitude of the resultant force acting on the gate ABC due to hydrostatic pressure. The gate has a width of 1.5 m and the density of the water is 1000 kg/m^3.
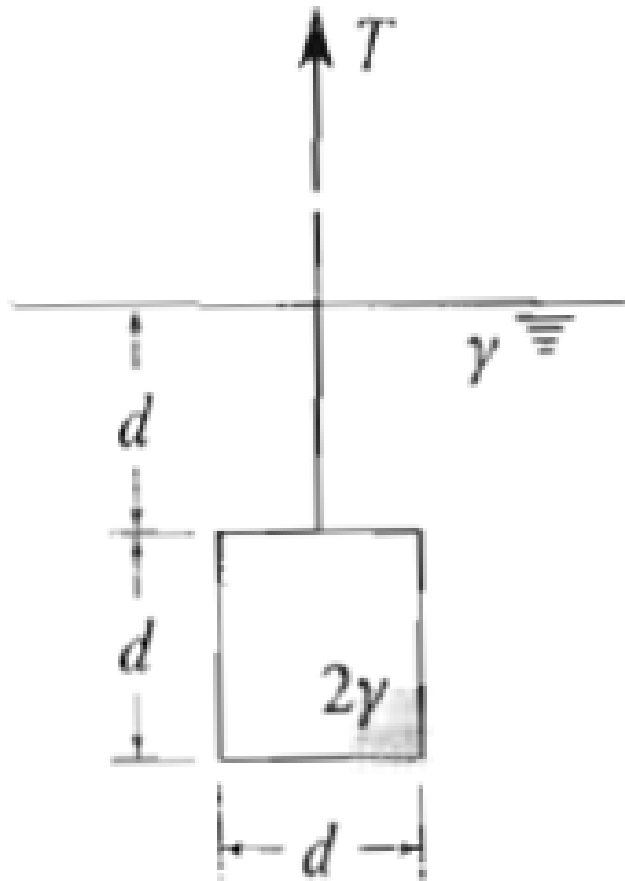
A cube of material with edge lengths d and specific weight 2γ is suspended by a cable and is submerged to a depth d in a fluid having specific weight γ. Determine the force T in the cable.

Chapter 11: Virtual Work
Main goals and learning objectives

- Introduce the principle of virtual work

- Show how it applies to determining the equilibrium configuration of a series of pin-connected members
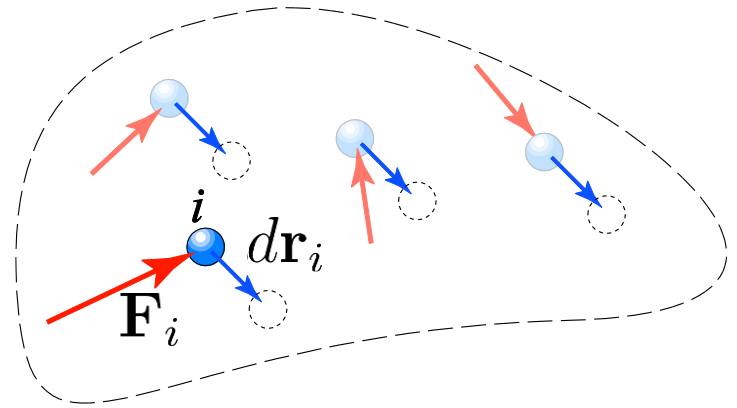
Definition of Work

Work of a force

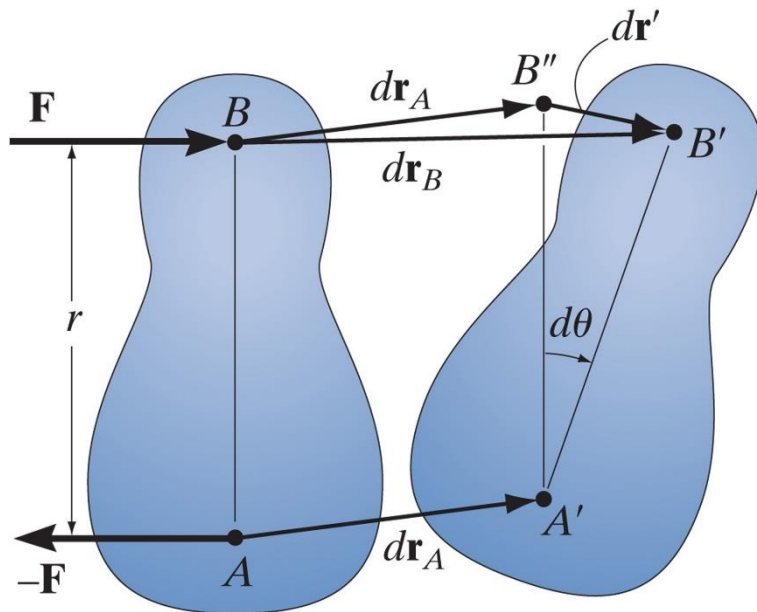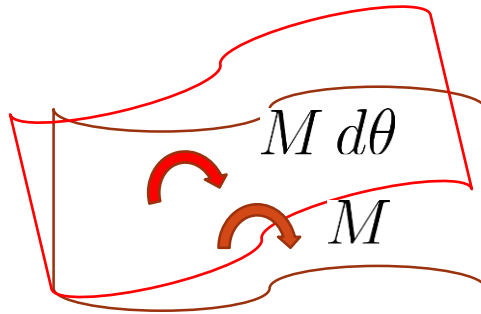A force does work when it undergoes a displacement in the direction of the line of action.

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 $\qquad dU = M\mathbf{k} \cdot d\theta\,\mathbf{k} = M\,d\theta$

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,