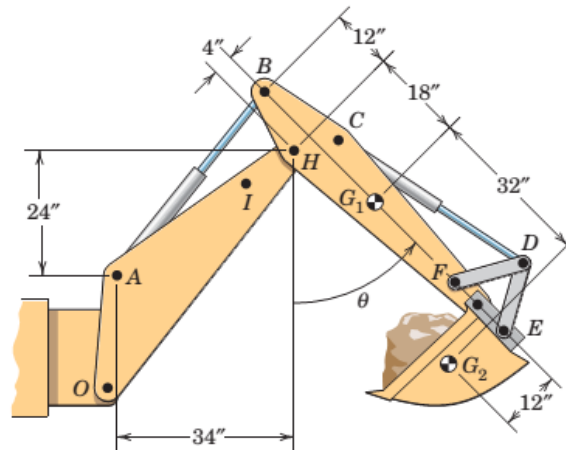
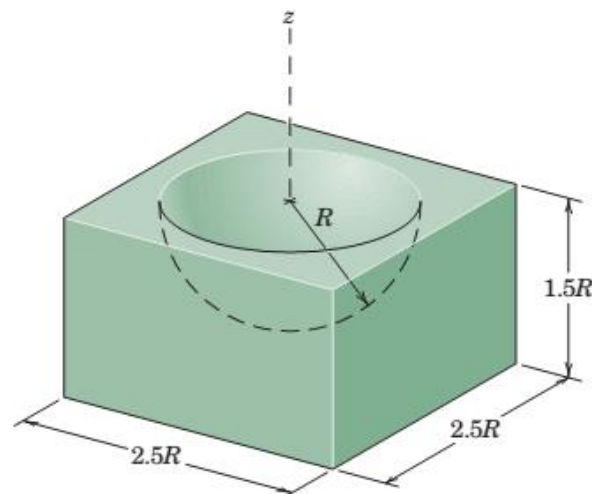




Problem 1. The basic features of a small backhoe are shown in the illustration. Member BE (complete with hydraulic cylinder CD and bucket-control links DF and DE) weighs 500 lb with mass center at G_1 . The bucket and its load of clay weigh 350 lb with mass center at G_2 . To disclose the operational design characteristics of the backhoe, determine and plot the force T in the hydraulic cylinder AB as a function of the angular position of member BE over the range $0^\circ \leq \theta \leq 90^\circ$. For what value of θ is the force T equal to zero? Member OH is fixed for this exercise; note that its controlling hydraulic cylinder (hidden) extends from near point O to pin I. Similarly, the bucket-control hydraulic cylinder CD is held at a fixed length.

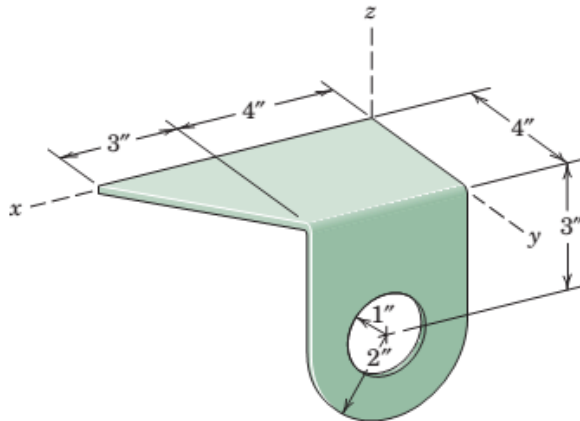


Problem 2. Determine the z-coordinate of the centroid of the rectangular solid with the hemispherical hole. The center of the hemisphere is centered on the upper face of the solid, and z is measured upward from the lower face.

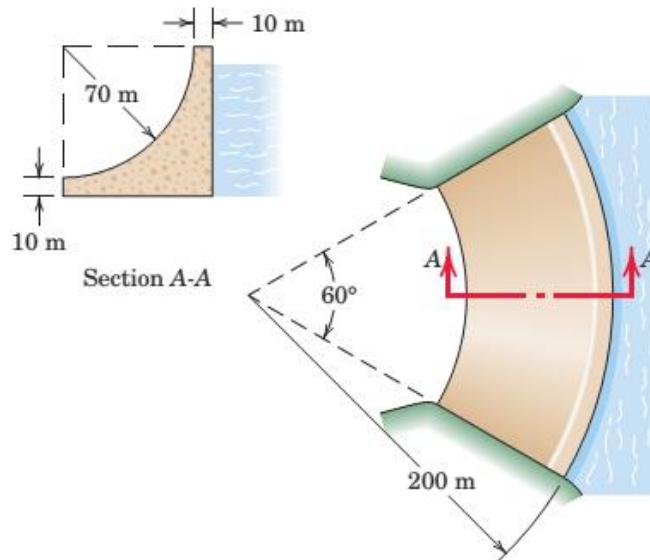




Problem 3. Determine the coordinates of the mass center of the bracket, which is constructed from sheet metal of uniform thickness.

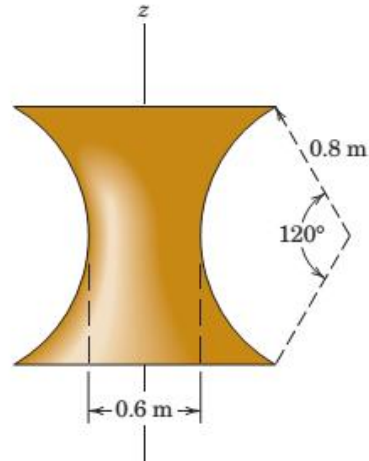


Problem 4. Calculate the mass m of concrete required to construct the arched dam shown. Concrete has a density of 2.4 Mg/m^3 .





Problem 5. A surface is generated by revolving the circular arc of 0.8-m radius and subtended angle of 120 completely about the z-axis. The diameter of the neck is 0.6 m. Determine the outside area A generated.



Problem 6. A steel die, shown in section, has the form of a solid generated by revolving the shaded area around the z-axis. Calculate the mass m of the die.

