1. (20 points) Determine the force exerted on the ball by the bolt cutters and the magnitude of the force in the member $AB$. 

![Diagram of bolt cutters with forces and distances indicated]
2. (30 points) Using the method of joints, calculate the force in each member of the truss shown. State whether each member is in tension or compression.
3. (30 points) A machine part consists of a steel hemisphere joined to an aluminum cylinder into which a hole has been drilled. Determine the location of the center of the mass. The mass densities for aluminum and steel are 2700 kg/m$^3$ and 7850 kg/m$^3$, respectively.
4. (20 points) Draw the free-body diagrams for the following situations. Do not solve!

(a) The mass \( m = 120 \) kg. Determine the forces on member \( ABC \).

(b) The weight \( W = 80 \) lb. Determine the forces on member \( ABCD \).

(c) A person exerts 20-N forces on the handles of the shears. Determine the magnitude of the forces exerted on the branch at \( A \).

(d) The structure shown (one of two identical structures that support the scoop of the excavator) supports a downward force \( F = 1800 \) N at \( G \). Determine the reactions on member \( CDK \) at \( K \).