

1. A beam is loaded and supported as shown in Fig. 1. Draw the complete shear and moment diagrams for the beam. (25%)
2. The uniform bar AB shown in Fig. 2 weighs 30 lb. If the spring is unstretched when  $\theta = 0^\circ$ , determine the angle  $\theta$  for the equilibrium of  $k = 15 \text{ lb/ft}$  and  $L = 3 \text{ ft}$ . (25%)
3. Determine the deflection at the left end of the cantilever beam with variable width shown in Fig. 3. (25%)
4. A 120-lb girl is walking up a uniform  $2 \times 12 \text{ in.}$  beam of negligible weight, as shown in Fig. 4. The coefficient of friction is 0.20 at all surfaces. When the beam begins to slip, the girl is standing at a distance  $x$  from the right end of the beam. Determine the maximum tensile and compressive normal stresses on a section at a distance  $x/2$  from the right end of the beam. (25%)

Fig. 1.

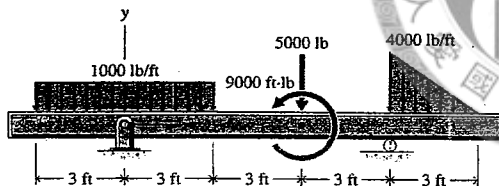


Fig. 2

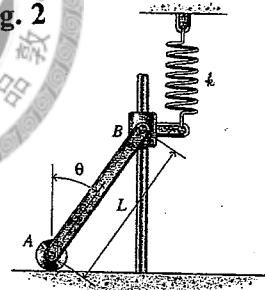


Fig. 3.

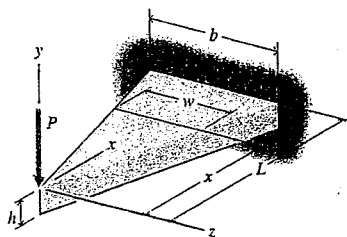


Fig. 4.

