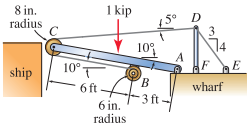
A walkway for loading and unloading ships at a wharf is shown. The elevation of the walkway is controlled by cable BCD which is attached to a drum on a geared motor at B. If the 1 kip force is vertical and is positioned halfway between points A and C, determine the forces supported by cables BCD and DE, the reactions at A, and the force supported by bar DF.

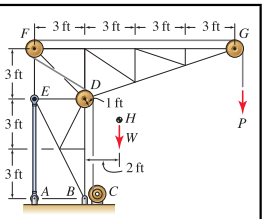


Consider the structure from Example 5.8 on p. 282, shown again here where W is the weight of the structure with center of gravity at point H.

(a) If $W = 2$ kip, determine the support reactions due to the weight of the structure only (i.e., $P = 0$).

(b) Use superposition of the results from Part (a) and Example 5.8 to determine the total values of the support reactions when $W = 2$ kip and $P = 3$ kip.

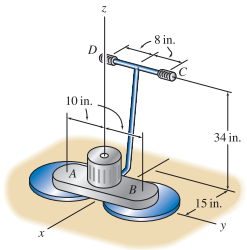
(c) Use superposition of the results from Part (a) and Example 5.8 to determine the total values of the support reactions when $W = 1.8$ kip and $P = 4$ kip.



A machine for sanding wood floors is shown. The machine weighs 80 lb with center of gravity along the z axis. At each sanding drum a moment of 60 in.·lb is applied to the machine in the direction opposite the rotation of the drum. Assume the operator's hands, positioned at points C and D, can apply forces in the positive or negative x direction. Determine the forces on the operator's hands if

(a) Both sanding drums rotate about the positive z direction.

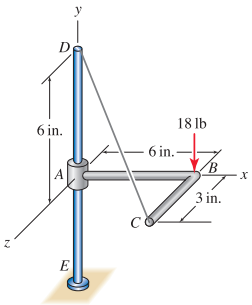
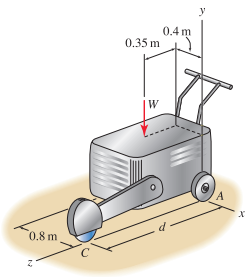
(b) The sanding drums at A and B rotate about the positive and negative z directions, respectively.



Vertical bar ED has circular cross section and is built in at E. Member ABC is a single member that lies in a horizontal plane, with portion BC parallel to the z axis and with cable CD attached to point C. The collar at A can freely slide in the y direction and can freely rotate about the y axis.

(a) Does the structure ABC have complete fixity or partial fixity, and is it statically determinate or statically indeterminate? Explain.

(b) When point B is subjected to a downward vertical force of 18 lb, determine the force supported by the cable and all support reactions at A.



A machine for sawing concrete is shown. It is supported by a cutting disk at point C and two wheels at points A and B (the wheel at B is not shown). The wheels at A and B are separated by a 0.8 m distance along the x axis. Determine the dimension d where the cutting disk should be located so that the force supported by wheel A is 20% of the force supported by wheel B.