

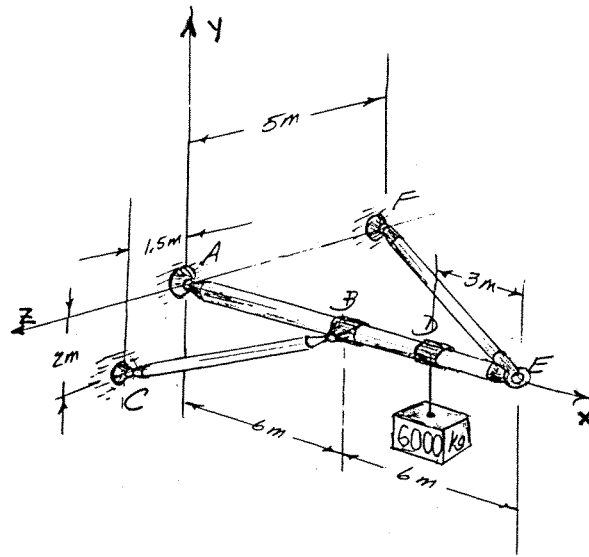
CIV100 – MECHANICS – SECTION 5

Assignment No. 4 – Thursday, October 10, 2013

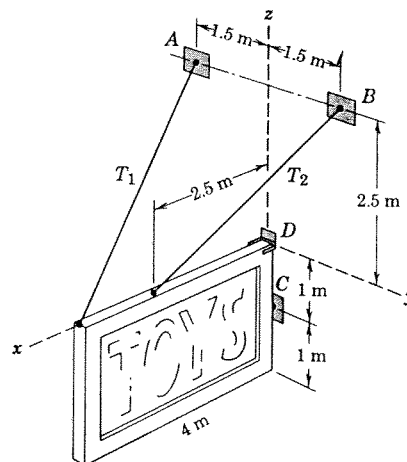
Due: 11:10 a.m., Tuesday, October 15, 2013, stapled and on correct “engineering paper”.

Topics: 3D Equilibrium and 2D Trusses (Method of Joints)

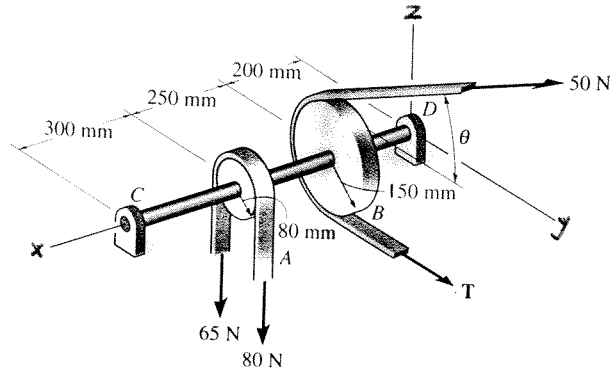
1. A lifting device consists of a boom AE supported by a ball-and-socket at A and by two pin-ended members BC and EF . The connecting collar at B cannot slide along the boom. The lifting device supports a mass of 6000 kg. Calculate the forces in the members BC and EF . The weights of all members are negligible. (*Final exam, December 2000*)



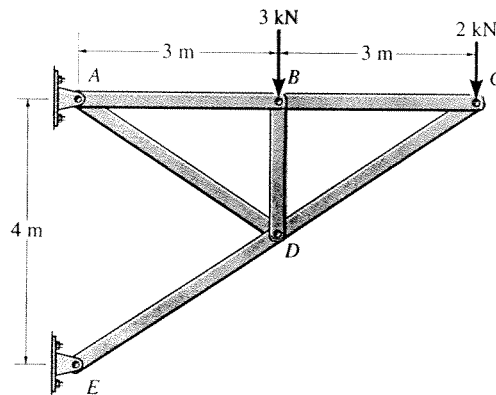
2. A rectangular sign over a store has a mass of 100 kg, with the centre of mass in the centre of the rectangle. The support against the wall at point C may be treated as a ball-and-socket joint. At corner D support is provided in the y -direction only. Calculate the tensions T_1 and T_2 in the supporting wires, the total force supported at C and the lateral force R supported at D .



3. Both pulleys are fixed to the shaft and, as the shaft turns with constant angular velocity, the power of pulley *A* is transmitted to pulley *B*. Determine the horizontal tension *T* in the belt on pulley *B* and the *x*, *y*, *z* components of reaction at bearings *C* and *D* if $\theta = 45^\circ$. The bearing at *C* supports radial load only, whereas the bearing at *D* supports both radial load and axial thrust. The bearings are in proper alignment and exert only force reactions on the shaft.



4. Determine the force in each member of the truss using the method of joints and state if the members are in tension or compression.



5. Determine the force in each member of the truss shown by the method of joints. State whether each member is in tension or compression.

