Homework Chapter 4

Problem 4-1: Determine the magnitude of the resultant force acting at pin *A* of the hand punch.

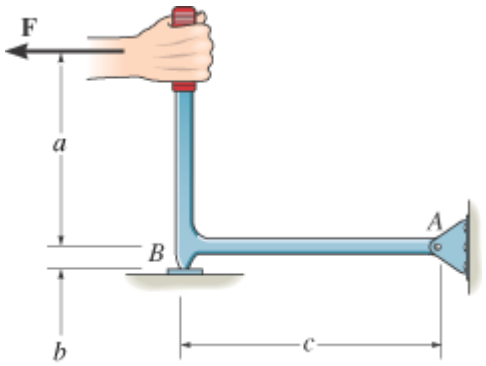
Given:

$F = 40$ N

$a = 0.75$ m

$b = 0.1$ m

$c = 1$ m



Problem 4-2: Determine the magnitude of the reactions on the beam at *A* and *B*. Neglect the thickness of the beam.

Given:

$F_1 = 600$ N

$F_2 = 400$ N

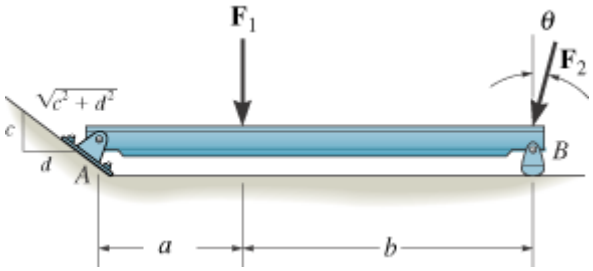
$\theta = 15^\circ$

$a = 4$ m

$b = 8$ m

$c = 3$

$d = 4$



Problem 4-3: Determine the reactions on the bent rod which is supported by a smooth surface at *B* and by a collar at *A*, which is fixed to the rod and is free to slide over the fixed inclined rod.

Given:

$F = 500$ N

$M = 300$ N m

$a = 0.9$ m

$b = 0.9$ m

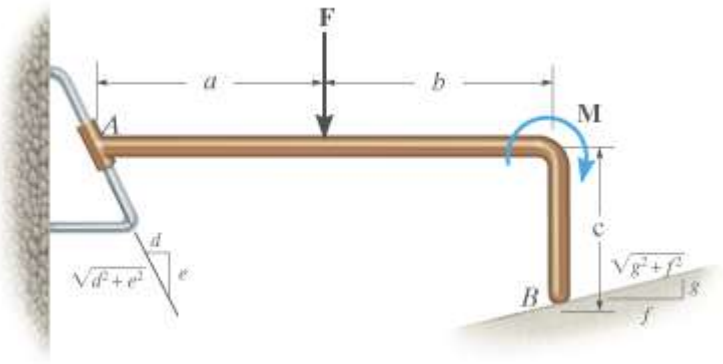
$c = 0.6$m

$d = 3$

$e = 4$

$f = 12$

$g = 5$



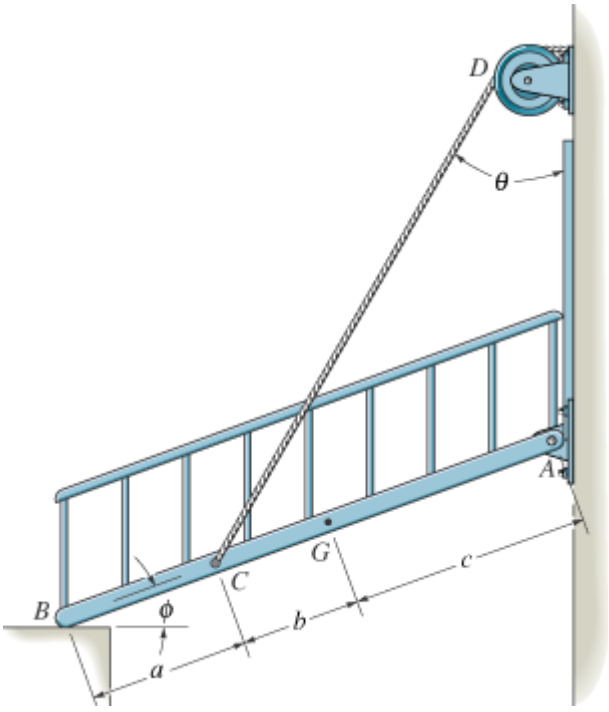
Problem 4-4: The ramp of a ship has a weight of *W* and a center of gravity at *G*. Determine the cable force in *CD* needed to just start lifting the ramp, (i.e., so the reaction at *B* becomes zero). Also, determine the horizontal and vertical components of force at the hinge (pin) at *A*.

Given:

$W = 1000$ N $\quad a = 1.2$ m

$\theta = 30$ deg $\quad b = 0.9$ m

$\phi = 20$ deg $\quad c = 1.8$ m



Problem 4-5: The articulated crane boom has a weight W and mass center at G. If it supports a load L, determine the force acting at the pin A and the compression in the hydraulic cylinder BC when the boom is in the position shown.

Given:

$W = 625$ N

$L = 3000$ N

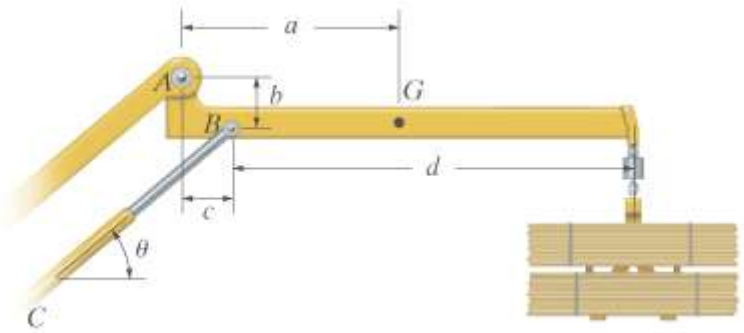
$a = 1.2$ m

$b = 0.3$ m

$c = 0.3$ m

$d = 2.4$ m

$\theta = 40$ deg



Problem 4-6: Determine the x, y, z components of reaction at the fixed wall A. The $\mathbf{F}_2$ force is parallel to the z axis and the $\mathbf{F}_1$ force is parallel to the y axis.

Given:

$F_1 = 200$ N

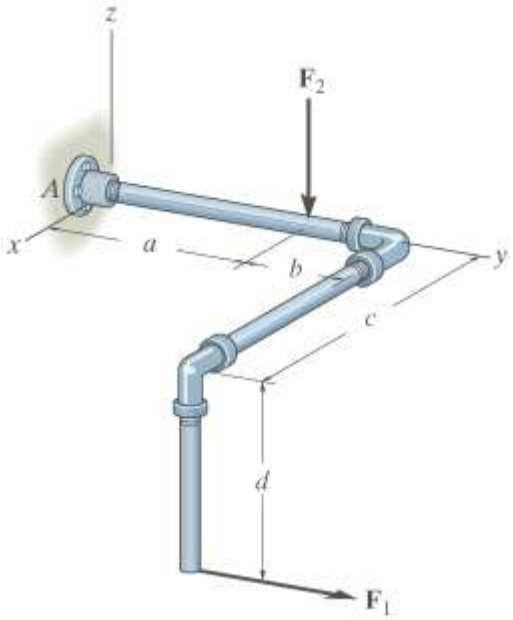
$F_2 = 150$ N

$a = 2$ m

$b = 1$ m

$c = 2.5$ m

$d = 2$ m



Problem 4-7: If the cable can be subjected to a maximum tension **T**, determine the maximum force **F** which may be applied to the plate. Compute the *x, y, z* components of reaction at the hinge *A* for this loading.

Given:

$a = 0.9$ m

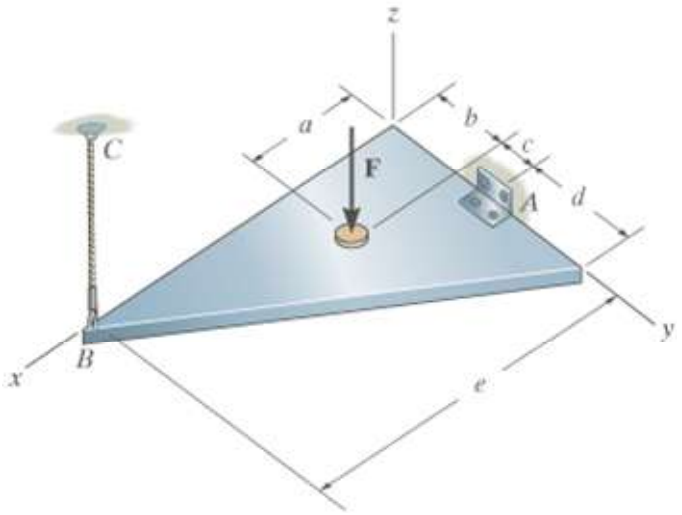
$b = 0.6$ m

$c = 0.3$ m

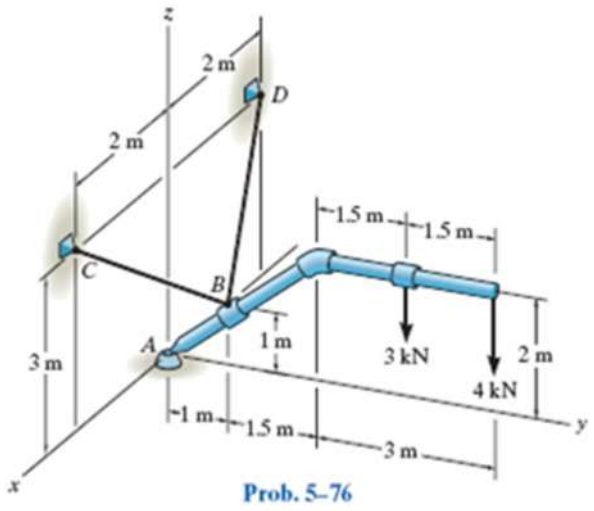
$d = 0.9$ m

$e = 2.7$ m

$T = 1500$ N



Problem 4-8: The pipe assembly supports the vertical loads shown. Determine the components of reaction at the ball-and-socket joint A and the tension in the supporting cables BC and BD.



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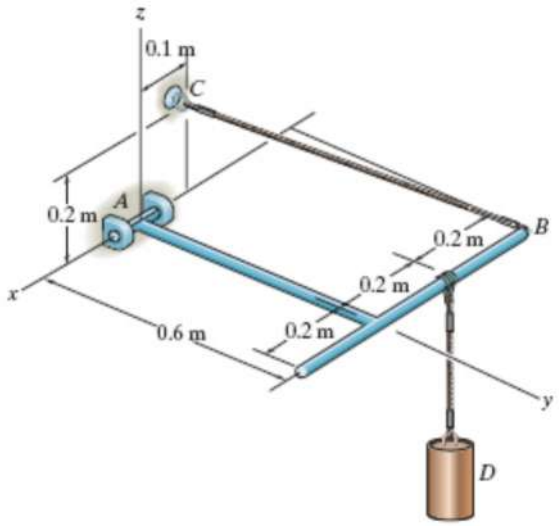
Problem 4-9: The member is supported by a pin at *A* and a cable *BC*. If the load at *D* is *W*, determine the *x, y, z* components of reaction at these supports.



Problem 4-10: The member is supported by a square rod which fits loosely through a smooth square hole of the attached collar at *A* and by a roller at *B*. Determine the *x, y, z* components of reaction at these supports when the member is subjected to the loading shown.