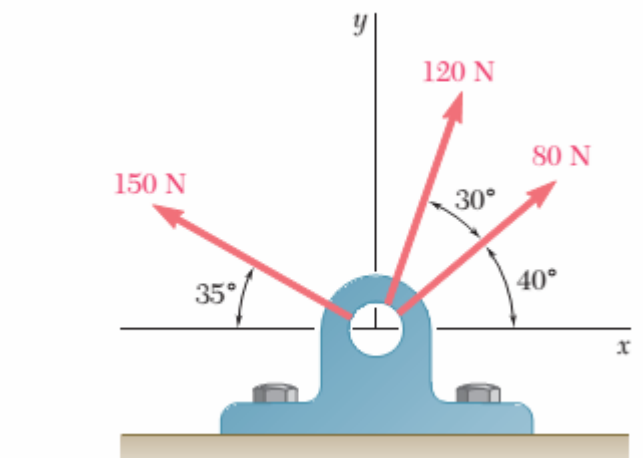
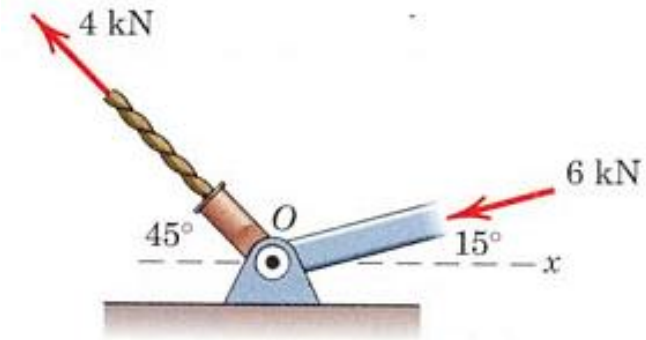
ME 164
Assignment I – Answer all questions except [8]
(To be submitted in hand-writing on foolscap or A4 by 17:00 GMT on the 7th of October, 2014.

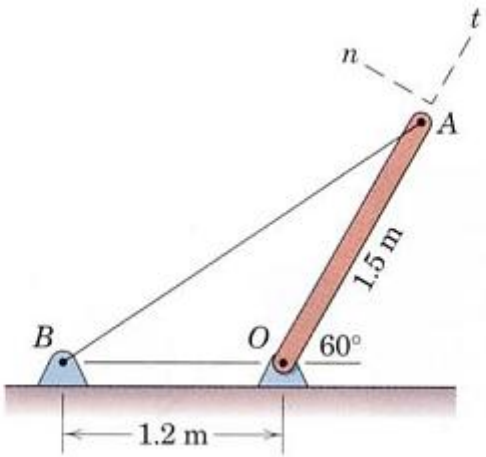
[1] Determine the *x* and *y* components of each of the forces shown and find the resultant of the all three forces.



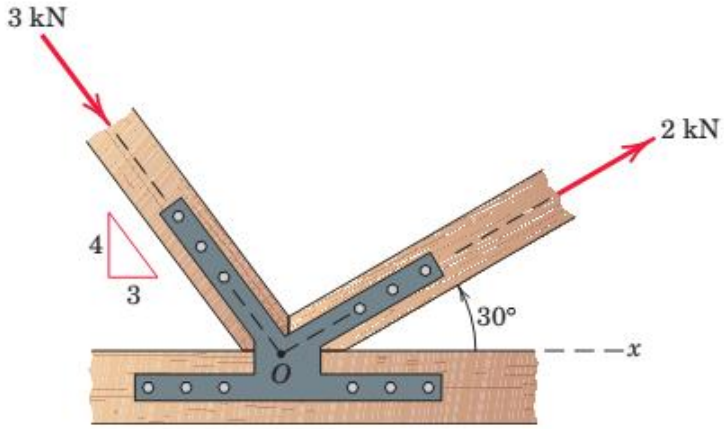
[2] The two structural members, one of which in in tension and the other in compression, exert the indicated forces on joint O. determine the magnitude of the resultant ***R*** of the two forces and the angle ***θ*** which ***R*** makes with the positive ***x***-axis.



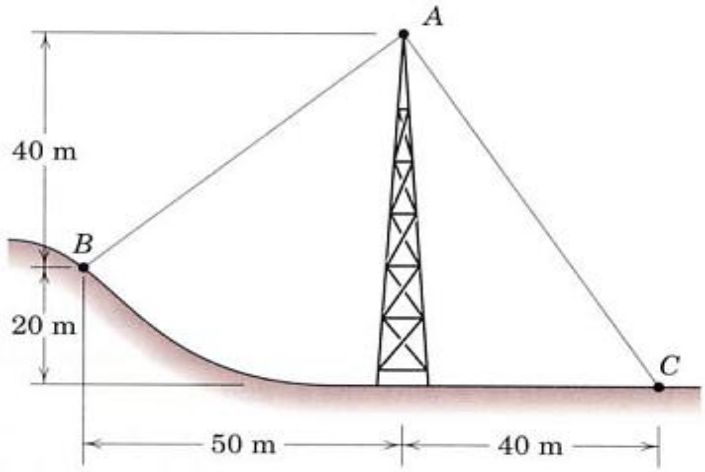
[3] The cable *AB* prevents bar *OA* from rotating clockwise about pivot *O*. if the cable tension is 750 N, determine the ***n*** and ***t*** components of this force acting on point *A*.



[4] The two structural, one of which is in tension and other in compression, exert the indicated forces on joint O. determine the magnitude of the resultant R of the two forces and the angle θ which R makes with the positive x-axis.

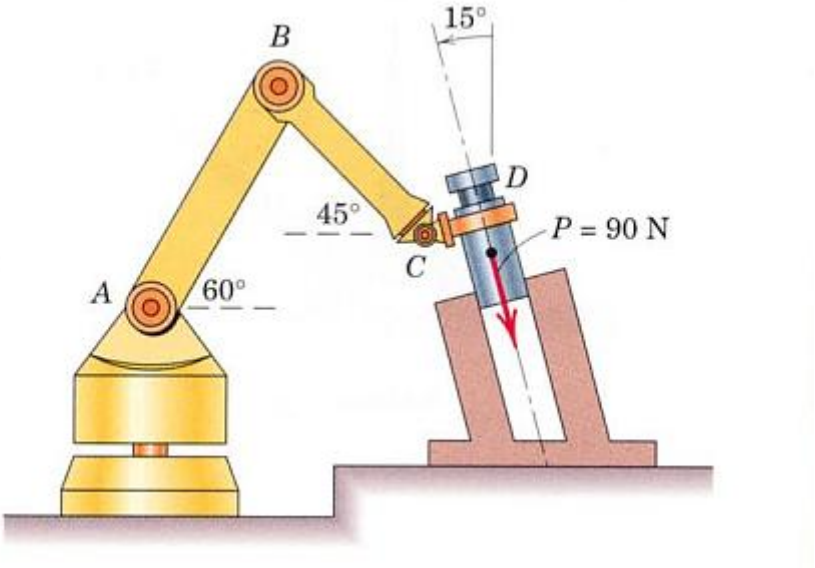


[5] The guy cables AB and AC are attached to the top of the transmission tower. The tension in the cable AC is 8 kN and that of AB is 5 kN. Determine the magnitude R of the resultant of the forces.

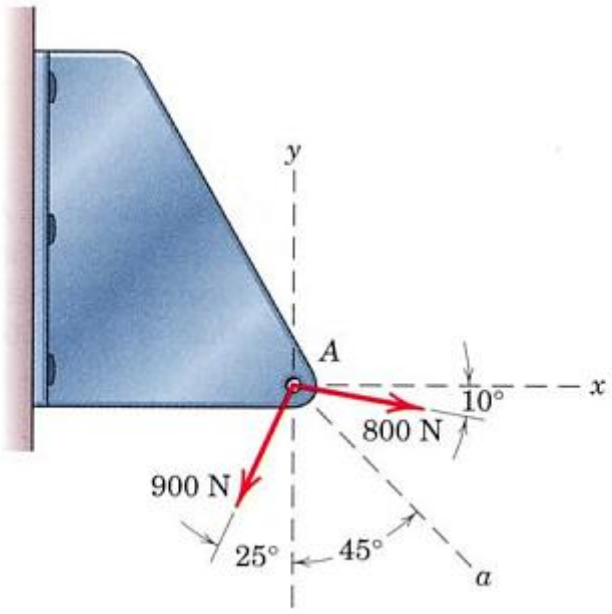


[6] In the design of the robot to insert the small cylindrical part into a close fitting circular hole, the ronot arm must exert a 90 N force *P* on the part paralled to the axis of the hole as shown. Determine the components of the force which the part exerts on the robot along axes;

a) parallel and perpendiclar to the arm *AB*, and
b) parallel and perpendicular to the arm *BC*

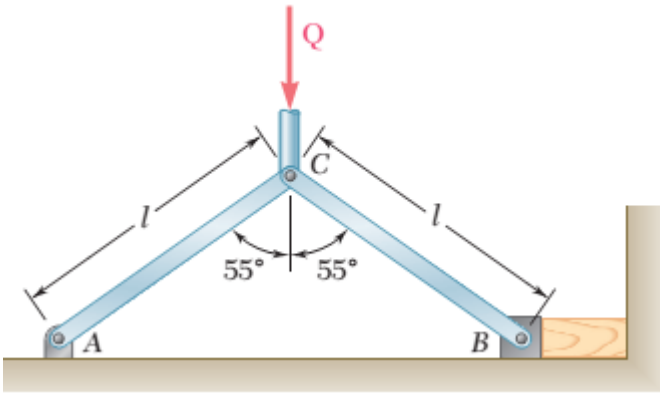


[7] The gusset plate is subjected to the two forces shown. Replace each of the two forces by two components. One along the ***x***-axis and the other along the ***a***-axis.



[8] Member *CB* of the vice shown exerts on block *B* a force *P* directed along line *CB*. Knowing that *P* must have a 1200 N horizontal component, determine

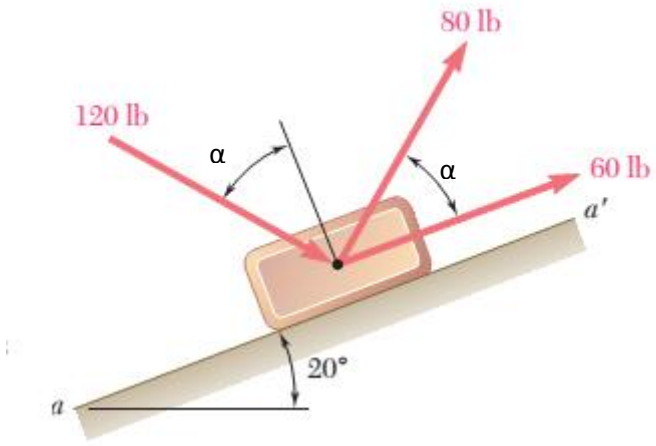
a) the magnitude of force *P*
b) its vertical component.



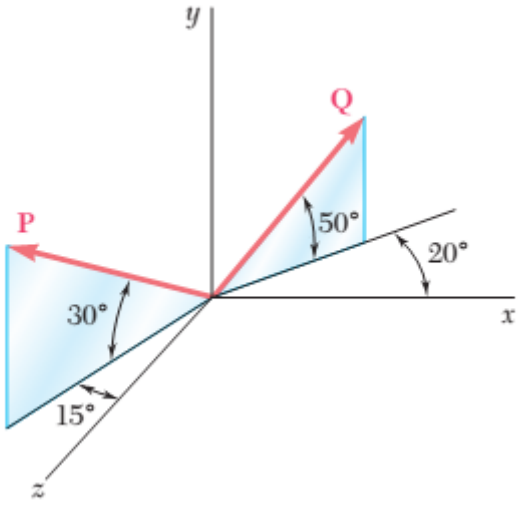
[9] Determine the resultant of the three forces shown when

a) $\alpha = 40^o$

b) $\alpha = 75^o$

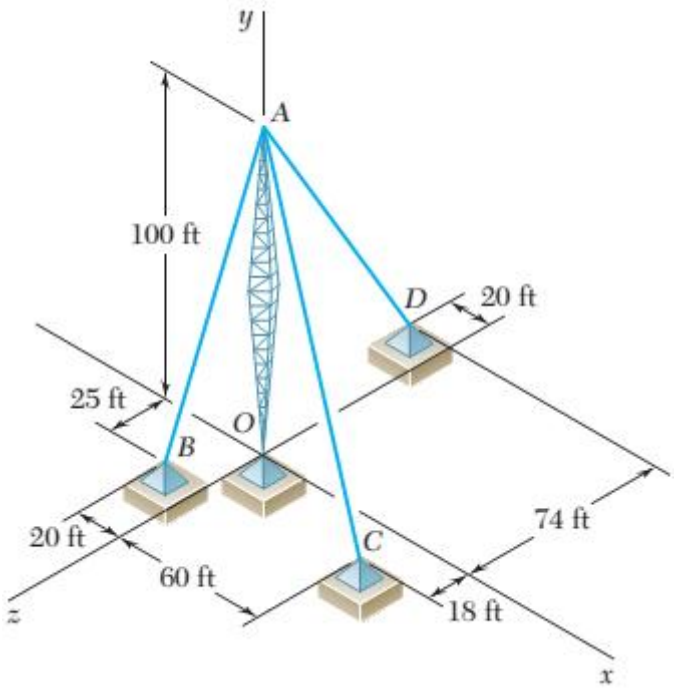


[10] Find the resultant of the forces shown.

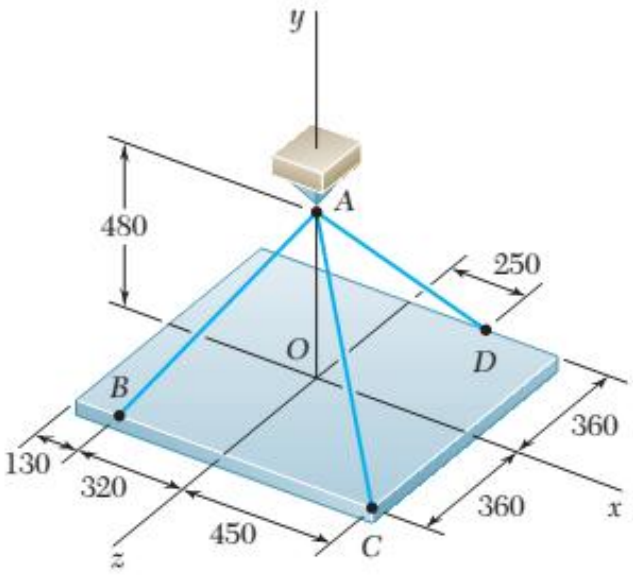


[11] A transmission tower is held by three guy wires anchored by bolts *B*, *C*, and *D*. if the tension in wire *AD* is 315 lb,

a) determine the components of the force exerted by the wire on bolt *D*.
b) if the tension in wires AB and AC are 300 lb and 320 lb respectively, find the resultant tension acting on the transmission tower.



[12] A rectangular plate is supported by three cables as shown. Knowing that the tension in cables AC, AB and AD are 60 N, 80 N and 90 N respectively, determine the components of the force being exerted at C, B and D.



Dimensions in mm