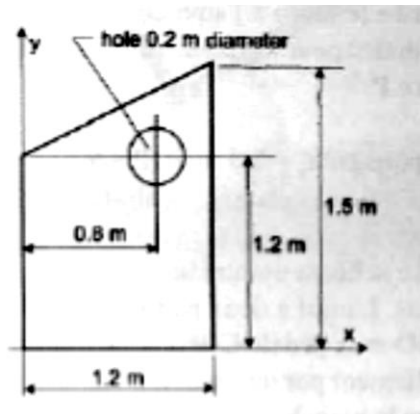


GNG 1105 – Engineering Mechanics

Final Assignment, due on December 2nd (during DGD)

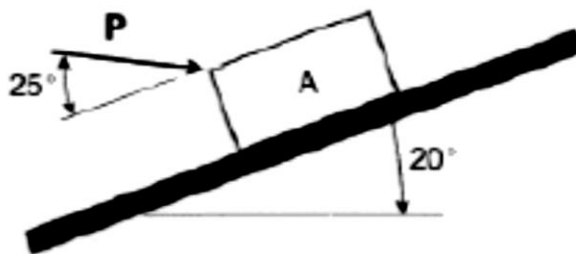
Question 1 (10 pts)

Determine the centroid of the given shape with respect to the given coordinate system



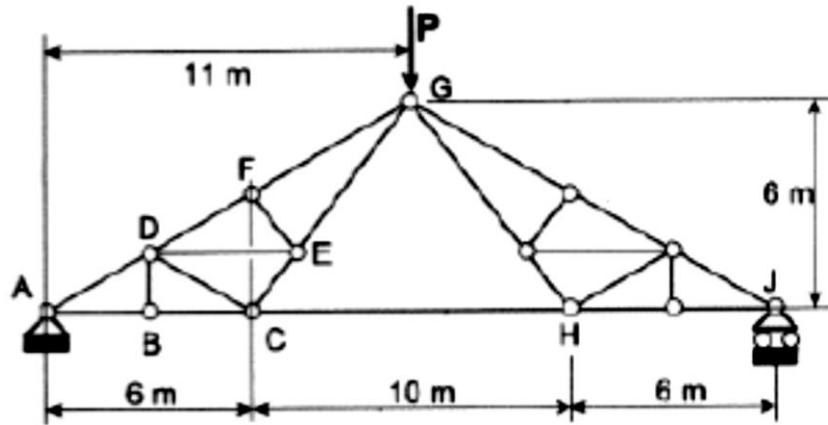
Question 2 (15 pts)

A block weighing 300 N slides downwards on the angled surface shown at an initial velocity of 2.5 m/s. At $t = 0$, a force P with the given orientation is applied until the block stops. Knowing that it took 5 seconds for the block to stop and that the coefficient of kinetic friction $\mu_k = 0.1$, determine the magnitude of P



Question 3 (15 pts)

If $P = 16 \text{ kN}$, determine the forces in members FG , EG and CH . Please note that the horizontal distance between A and B is 3 m .



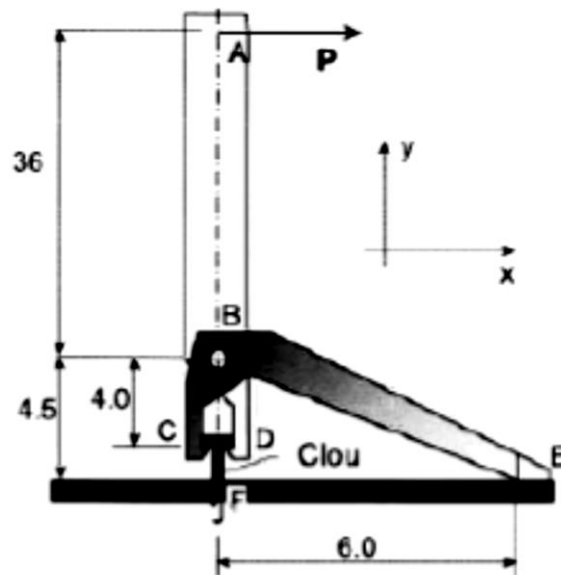
Question 4 (25 pts)

This schematic shows a tool used for removing nails from wood planks. A frictionless pivot joint at B holds the bar ABD to the bracket CBE. The nail is fully constrained in the ground at F and the nail is pulled up by the vertical and horizontal forces at C and D. The given distances are in cm. Supposing that:

- 1) $C_y = D_y$ (but $C_x \neq D_x$)
- 2) The horizontal distance separating C and D is negligible (they are both located directly underneath B)
- 3) The contact at E is equivalent to a roller reaction

Determine:

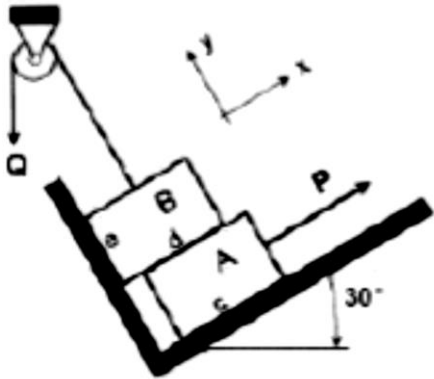
- a) The FBD of both parts of this mechanism
- b) The forces acting at C and D knowing that $P = 60 \text{ N}$



Question 5 (15 pts)

The forces P and Q are applied to block A and B, respectively. The weight of block A is 300 N and the weight of block B is 200 N. The static friction coefficient $\mu_s = 0.2$.

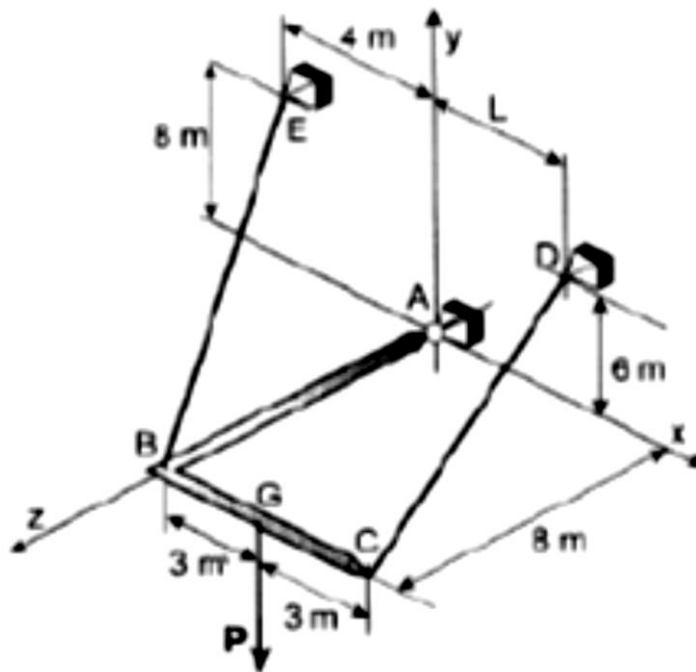
- If $Q = 0$, determine P for imminent movement of block A (hint: if $Q = 0$, there is no friction with the wall at point e)
- If $Q = 0$, verify that motion IS NOT imminent for block B
- If $Q > 0$, where will A move? (Do not perform calculations, only an answer with an explanation is required)



Question 6 (20 pts)

The bracket ABC (of negligible weight) is hung by cables BE and CD and a ball and socket joint at A. This structure is loaded at G by a force $P = 5 \text{ kN}$. Determine:

- The vectorial forms of the tensions BE and CD
- The distance L for the system to be in equilibrium.



GOOD LUCK!