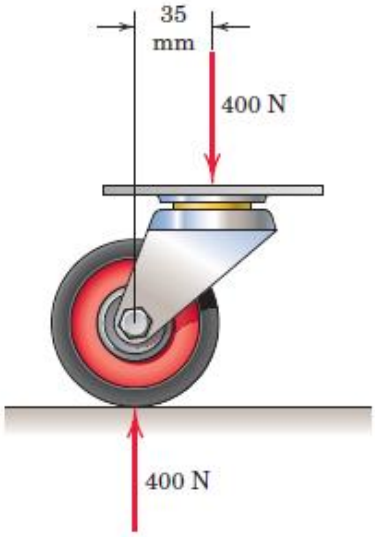
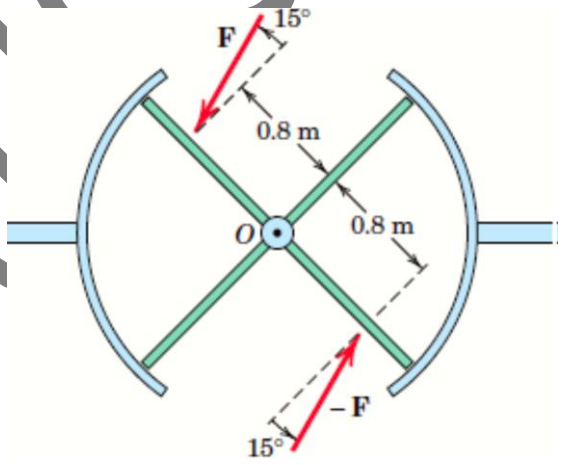
Sheet No (5)

PROBLEMS

1- The caster unit is subjected to the pair of 400-N forces shown. Determine the moment associated with these forces.

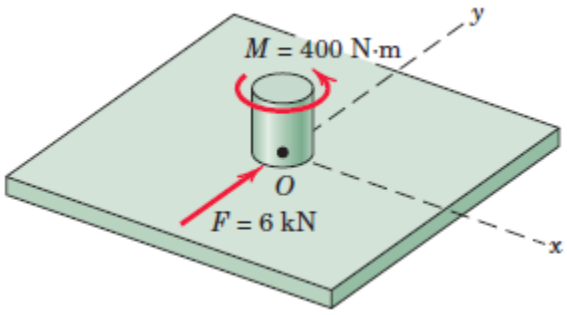


2- The top view of a revolving entrance door is shown. Two persons simultaneously approach the door and exert force of equal magnitudes as shown. If the resulting moment about the door pivot axis at *O* is 25 N-m, determine the force magnitude *F*.

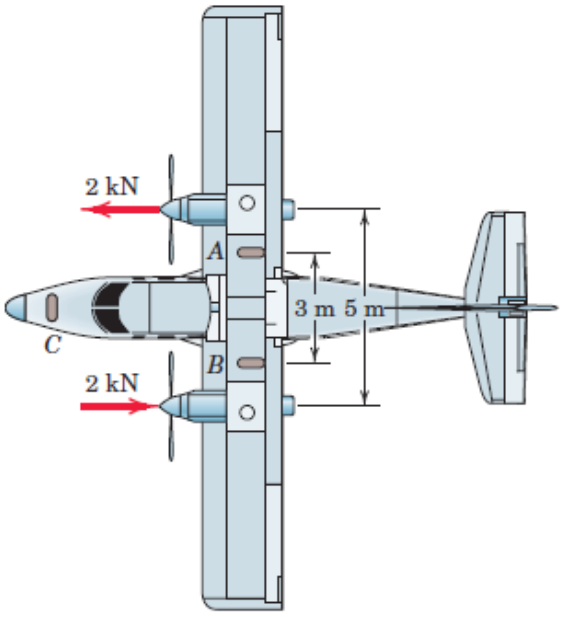


3- The indicated force–couple system is applied to a small shaft at the center of the plate. Replace this system by a single force and specify the coordinate of the point on the *x*-axis through which the line of action of this resultant force passes.

Sheet No (5)

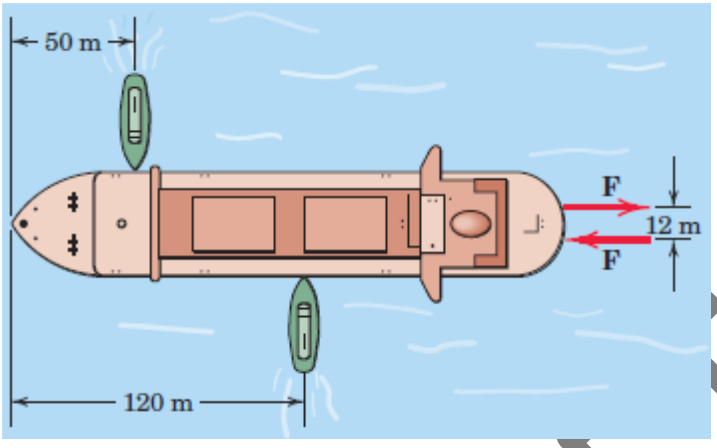


4- As part of a test, the two aircraft engines are revved up and the propeller pitches are adjusted so as to result in the fore and aft thrusts shown. What force *F* must be exerted by the ground on each of the main braked wheels at *A* and *B* to counteract the turning effect of the two propeller thrusts? Neglect any effects of the nose wheel *C*, which is turned 90º and unbraked.

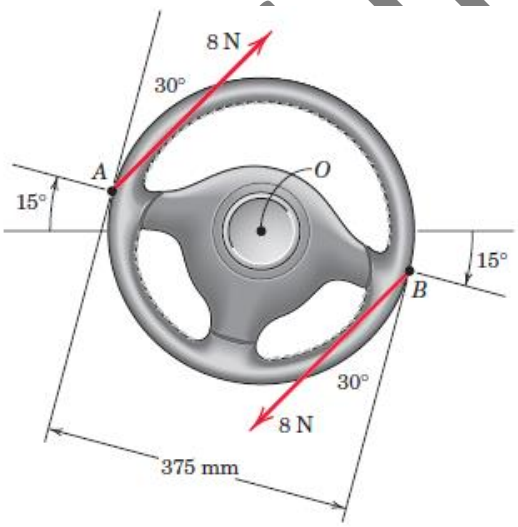


5- Each propeller of the twin-screw ship develops a full speed thrust of 300 kN. In maneuvering the ship, one propeller is turning full speed ahead and the other full speed in reverse. What thrust *P* must each tug exert on the ship to counteract the effect of the ship's propellers?

Sheet No (5)



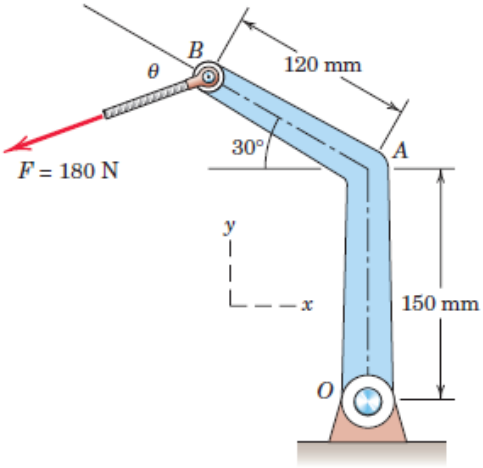
6- During a steady right turn, a person exerts the forces shown on the steering wheel. Note that each force consists of a tangential component and a radially inward component. Determine the moment exerted about the steering column at O.



7- The 180-N force is applied to the end of body *OAB*. If $\theta = 50^{\circ}$, determine the equivalent force–couple system at the shaft axis *O*.

FACULTY OF ENGINEERING
DAMIETTA UNIVERSITY
كلية الهندسة-جامعة دمياط

Sheet No (5)



8- The system consisting of the bar *OA*, two identical pulleys, and a section of thin tape is subjected to the two 180-N tensile forces shown in the figure. Determine the equivalent force–couple system at point *O*.