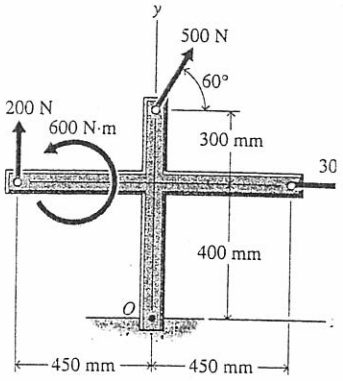
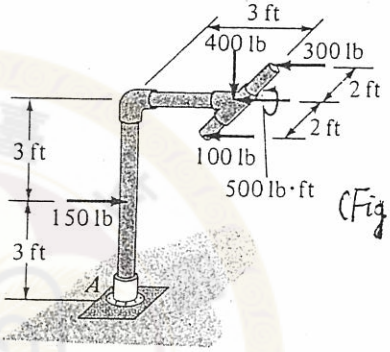
(1) 20% Three forces and a couple are applied to a bracket as shown in (Fig. 1). Determine

a. The magnitude and direction of the resultant. (6%)
b. The perpendicular distance d_R from point O to the line of action of the resultant. (7%)
c. The distance x_R from point O to the intercept of the line of action of the resultant with the x-axis. (7%)



(Fig. 1)

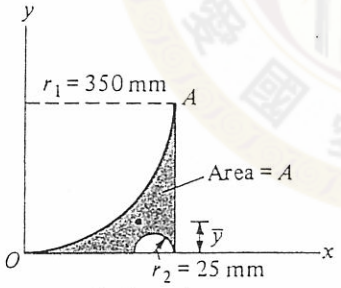
(2) 20% Determine the reactions at the fixed support A for the pipe shown. (Fig. 2)



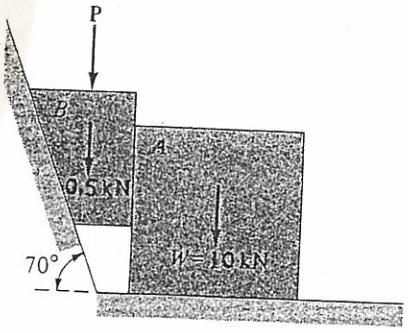
(Fig. 2)

(3) 20% Determine the minimum force **P** required to move block A, which weighs 10 kN. Assume $\mu_s = 0.3$ for all surfaces. (Fig. 3)

(4) 20% The curve OA is a quarter of a circle. If the shaded area A is revolved about the x axis through 360°, what will be the volume of the body generated? (Fig. 4)



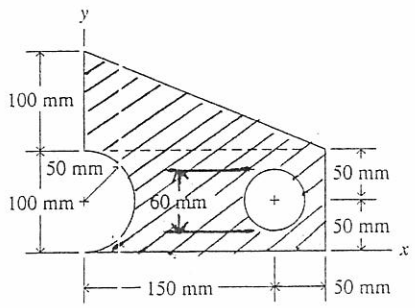
(Fig. 4)



(Fig. 3)

(5) 20% Determine the second moment of the shaded area shown in (Fig. 5) with respect to

a. The x-axis. (6%)
b. The y-axis. (7%)
c. An axis through the origin O of the xy-coordinate system and normal to the plane of the area. (7%)



(Fig. 5)

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