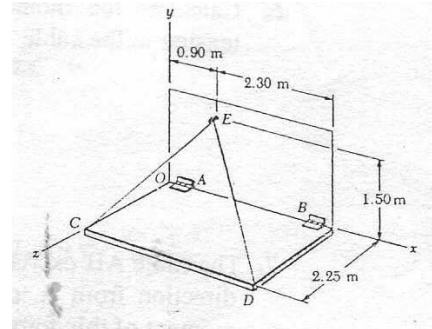


## TUTORIAL SHEET 1

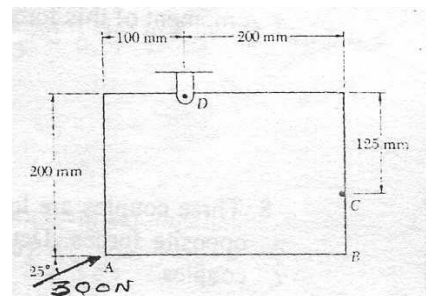
1. The rectangular platform is hinged at A and B and supported by a cable which passes over a frictionless hook at E. Knowing that the tension in the cable is 1349N, determine the moment about each of the coordinate axes of the force exerted by the cable at C.

*Ans: 1598 i + 959j*



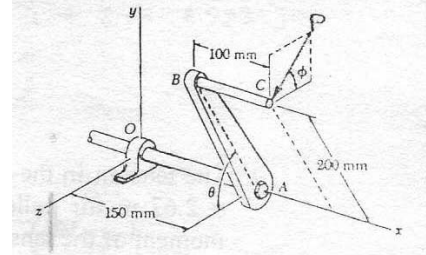
2. A 300 N force is applied at A as shown. Determine (a) the moment of the 300 N force about D, (b) the smallest force applied at B which creates the same moment about D.

*Ans: (a) 41.7 N·m (b) 147.4 N, 45°*



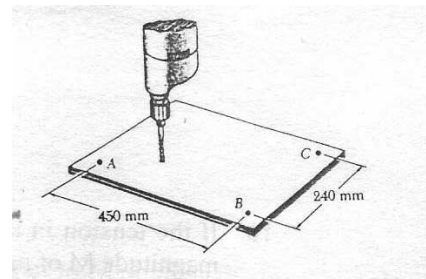
3. A single force P acts at C in a direction perpendicular to the handle BC of the crank shown. Knowing that  $M_x = +20$  N·m,  $M_y = -8.75$  N·m, and  $M_z = -30$  N·m, determine the magnitude of P and the values of  $\phi$  and  $\theta$ .

*Ans:  $\phi = 74^\circ$  and  $\theta = 53^\circ$*



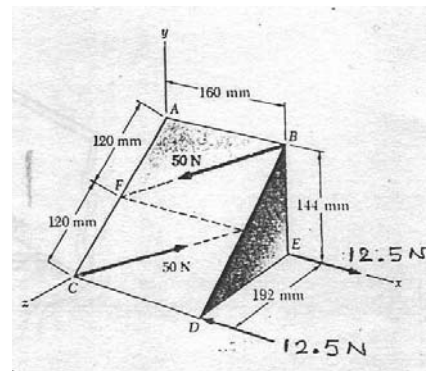
4. A piece of plywood in which several holes are being drilled successively has been secured to a workbench by means of two nails. Knowing that the drill exerts a 12-N·m couple on the piece of plywood, determine the magnitude of the resulting forces applied to the nails if they are located (a) at A and B, (b) at B and C, (c) at A and C.

*Ans: 27N, 50N, 24N*



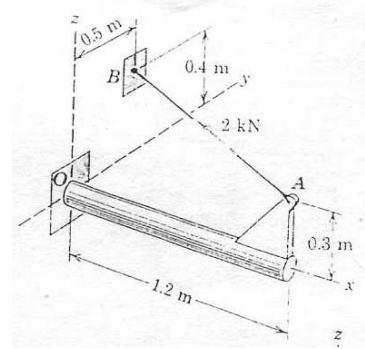
5. Replace the two couples shown by a single equivalent couple, specifying its magnitude and the direction of its axis.

*Ans: 1.44 j + 2.88 k*



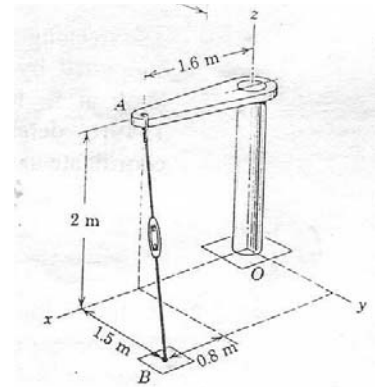
6. Calculate the moment about the z- axis of the 2-kN tension in the cable AB.

*Ans: 0.92 kN m*



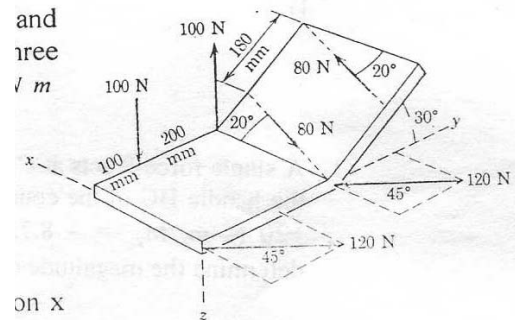
7. The cable AB exerts a force of 1.2 kN on the lever in the direction from A to B. Calculate the magnitude of the moment of this force about point O.

*Ans:  $-1.4i + 2.2j + 1.1 kN m$*



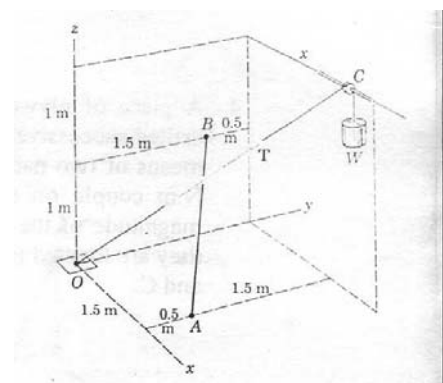
8. Three couples are formed by the three pairs of equal and opposite forces. Determine the resultant  $M$  of the three couples.

*Ans:  $-20i - 6.8j - 37 kN m$*



9. The tension in the cable equals 2 kN. For the position  $x = 2.67$  m for pulley C, calculate the magnitude of the moment of the tension about the axis AB.

*Ans: 0.7 kN m*



10. If the tension in the chain AB is 100 N, determine the magnitude  $M$  of its moment about the hinge axis.

*Ans: 47 N m*

