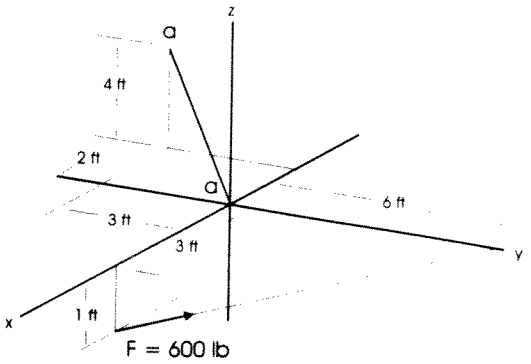
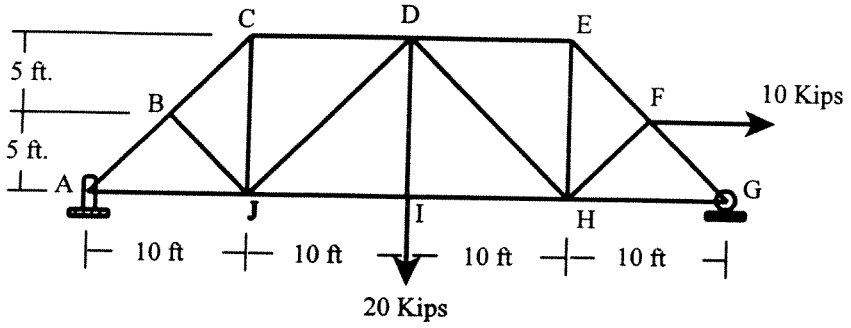
BE SC STATICS FINAL EXAM FALL SEMESTER 1998 DEPT AVG = 71%

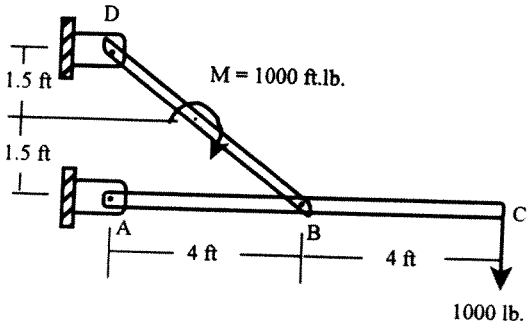
1. Determine the moment of the force **F** about the *aa* axis. Express the result as a Cartesian vector.



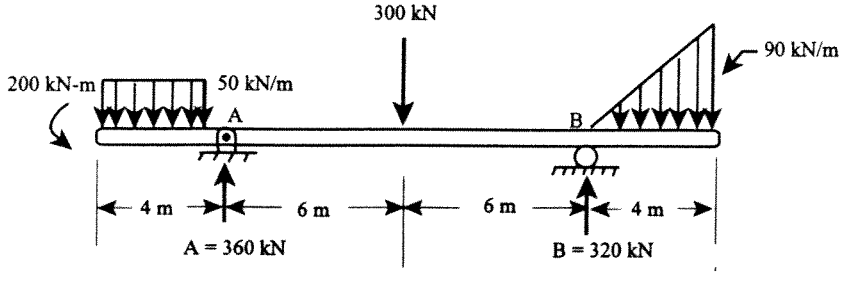
2. Determine the force in members **CD** and **FH** for the pin connected truss loaded as shown. Indicate tension or compression. (1 kip = 1000 lb)



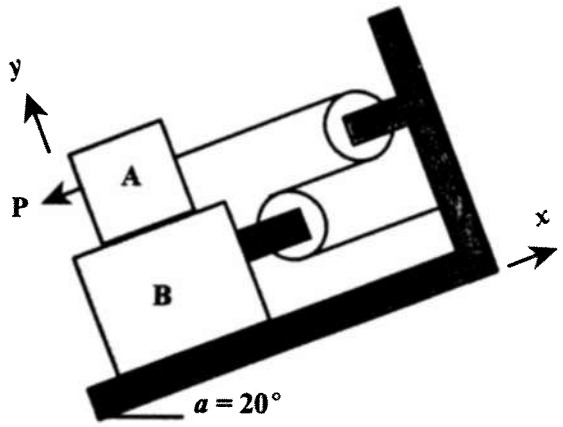
3. Determine the horizontal and vertical components of the force at **B** on member **ABC.**



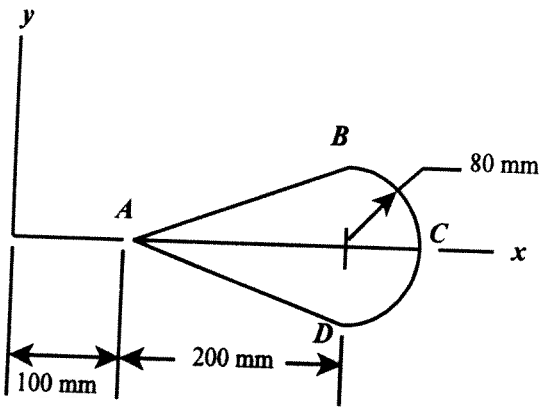
4. Draw the shear and bending moment diagrams for the beam loaded as shown. Label all pertinent points on each diagram. Note: All non-zero reactions are given.



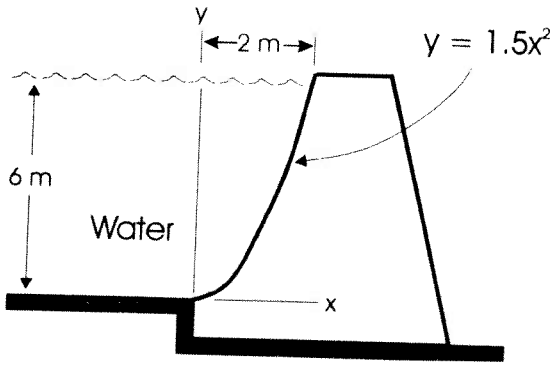
5. Determine the force **P** required to initiate motion of block **B** up the incline. Block **A** has a mass of 25 kg and block **B** has a mass of 50 kg. The coefficient of static friction between blocks **A** and **B** is 0.4, and between block **B** and the inclined surface is 0.3. Assume frictionless pulleys. You must draw separate free body diagrams for block A and block B.



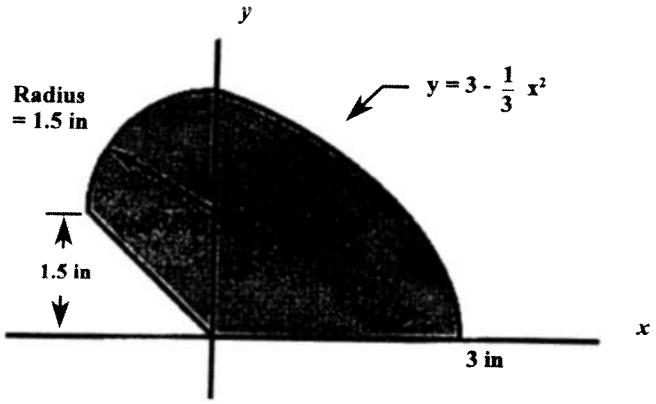
6. Determine the surface area generated by revolving the lines ABCDA about the *y* axis.



7. Determine the magnitude of the resultant hydrostatic force acting on a 1 meter section of the sea wall: $\gamma_w = \rho_w g = 9810\ N/m^3$.



8. For the shaded region below, determine the area moment of inertia about the *y* axis.



FALL Semester 1998

1. $\bar{M}_{aa} = -366\,\hat{i} - 549\,\hat{j} + 732\,\hat{k}$ Lb-ft

2. CD = 8.75 kips (C)
   FH = 7.07 kips (T)

3. $B_x = 3000$ Lb ← on ABC
   $B_y = 2000$ Lb ↑ on ABC

4. Partial Answers
   $M_0 = -200$ kN·m
   $M_4 = -600$ "
   $M_{10} = 360$ "
   $M_{16} = -480$ "

5. $P = 242$ N

6. $A_s = 1.0955\,(10^6)\ mm^2$

7. $F_V = 78480$ N ; $F_H = 176580$ N
   $F_R = 193,234.6$ N

8. $I_y = 12.22\ in^4$