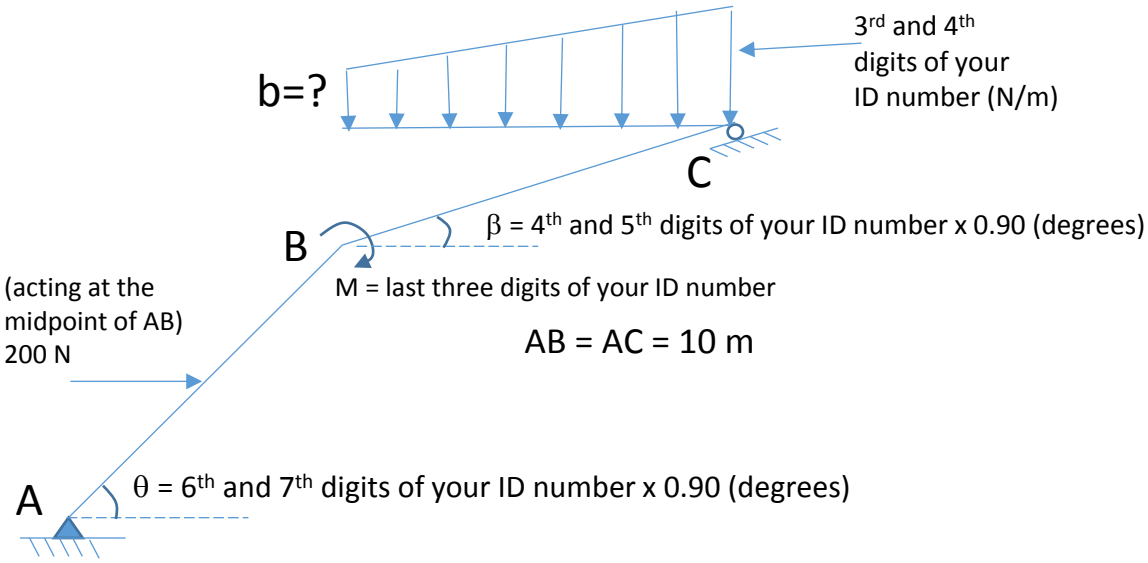
CE 221 Homework 01 (due date 30.03.2015)

Please use your seven digit ID number (see pages 3 and 4 for an example)
No partial credits.

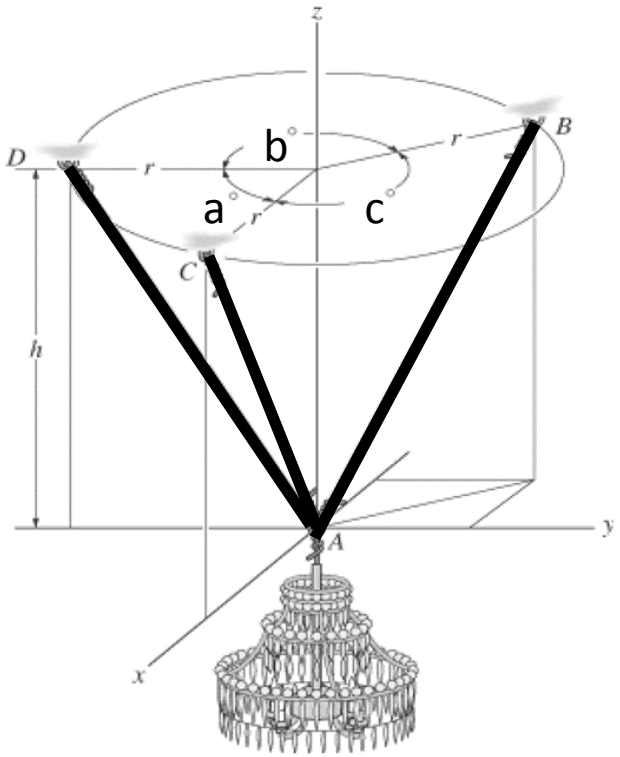
1. The given loading (a concentrated couple moment at *B*, trapezoidal loading along *BC* and a concentrated load) can be replaced by a single force applied at *B*.

a. Find b.
b. Find the support reactions.



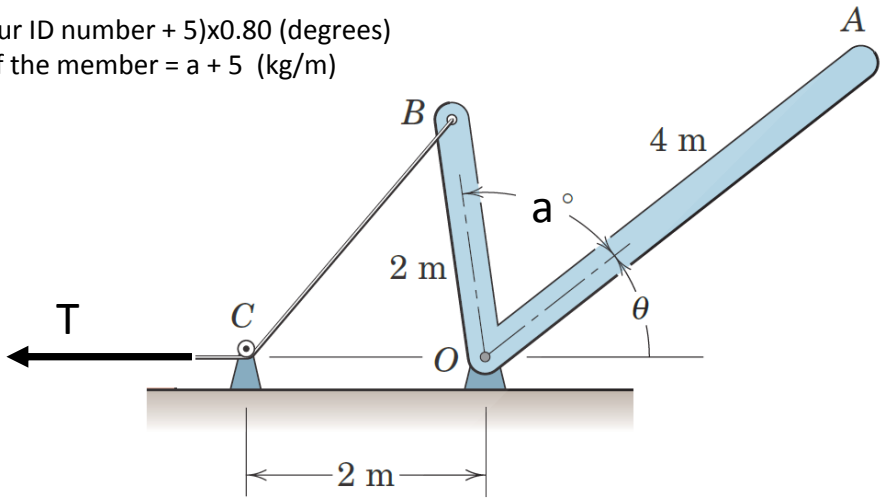
2. Maximum load that can be carried by the bars (AB, AC and AD) is 500 N (both in tension and compression). Find the allowable weight for the chandelier. The chandelier is in equilibrium.

a: 6th and 7th digits of your ID number +5 (degrees)
b: 4th and 5th digits of your ID number +5 (degrees)
r:4th digit of your ID number x 0.1 + 0.5 (meters)
h:r + 4th digit of your ID number x 0.1 (meters)



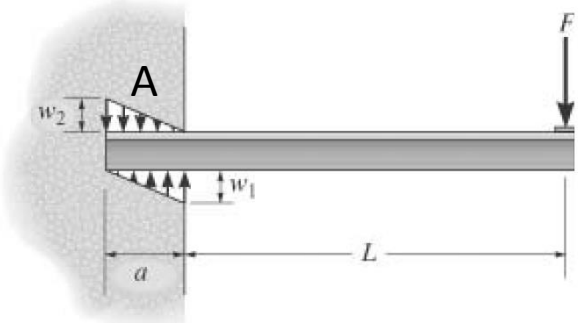
3. **Plot** T as a function of θ so that the BOA is in equilibrium. Use the range $0<\theta<\theta_{max}$, where θ_{max} is the value of θ at which T goes to zero.

a=(last two digits of your ID number + 5)x0.80 (degrees)
Mass per unit length of the member = a + 5 (kg/m)



4. A cantilever beam (in equilibrium) having an extended length L, is subjected to a vertical force F. It is assumed that the wall resists this load with linearly varying distributed loads over the length a of the beam that stays inside the wall. The maximum w_1 and w_2 that the support can take are given below. Given L and F, find a so that sufficient support can be provided at A.

Allowable w_1 and w_2=(last two digits of your ID number+0.5)x10 (kN/m)
F=Last five digits of your ID number (Newton)
L=3 (meters)

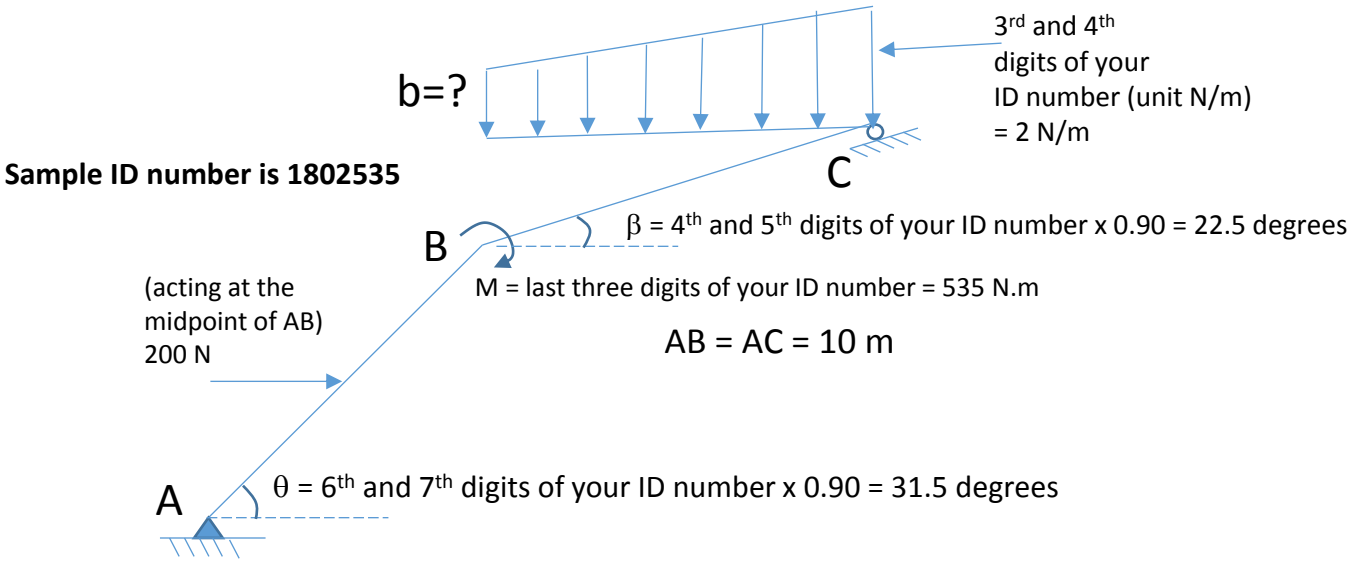


Sample ID number is 1802535

1. The given loading (a concentrated couple moment at *B*, trapezoidal loading along *BC* and a concentrated load) can be replaced by a single force applied at *B*.

a. Find b.

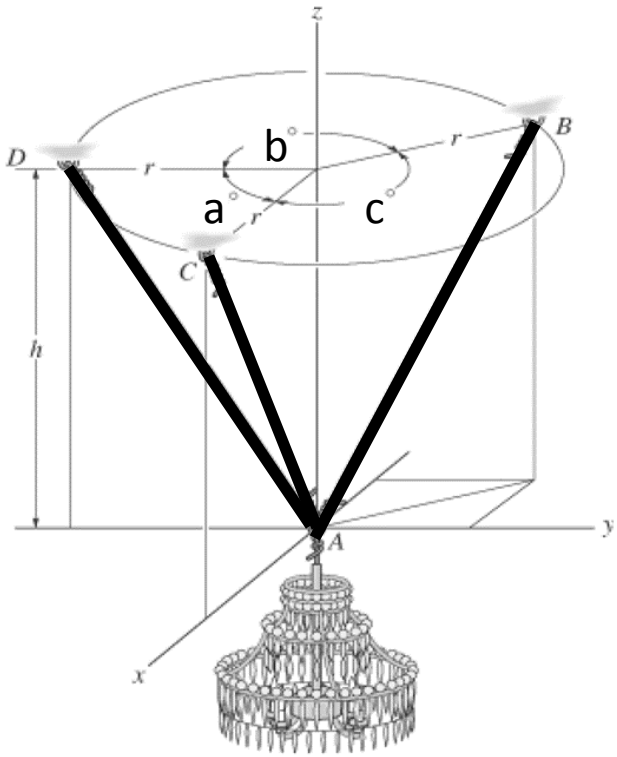
b. Find the support reactions.



2. Maximum load that can be carried by the bars (AB, AC and AD) is 500 N (both in tension and compression). Find the allowable weight for the chandelier. The chandelier is in equilibrium.

a: 6th and 7th digits of your ID number (degrees) +5 = 40 degrees
b: 4th and 5th digits of your ID number (degrees) +5 = 30 degrees
r:4th digit of your ID number x 0.1 +0.5 m = 0.7 m
h:r + 4th digit of your ID number x 0.1 = 0.9 m

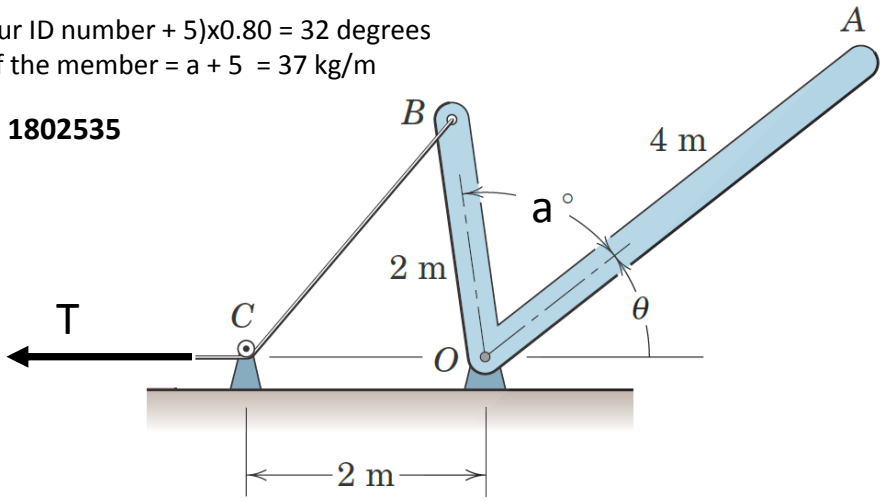
Sample ID number is 1802535



3. **Plot** T as a function of θ so that the BOA is in equilibrium. Use the range $0<\theta<\theta_{max}$, where θ_{max} is the value of θ at which T goes to zero.

a=(last two digits of your ID number + 5)x0.80 = 32 degrees
Mass per unit length of the member = a + 5 = 37 kg/m

Sample ID number is 1802535



4. A cantilever beam having an extended length L, is subjected to a vertical force F. It is assumed that the wall resists this load with linearly varying distributed loads over the length a of the beam that stays inside the wall. The maximum w_1 and w_2 that the support can take are given below. Given L and F, find a so that sufficient support can be provided at A.

Allowable w_1 and w_2=(last two digits of your ID number+0.5)x10 = 355 kN/m
F=Last five digits of your ID number (unit: N) = 2535 N
L=3 m

Sample ID number is 1802535