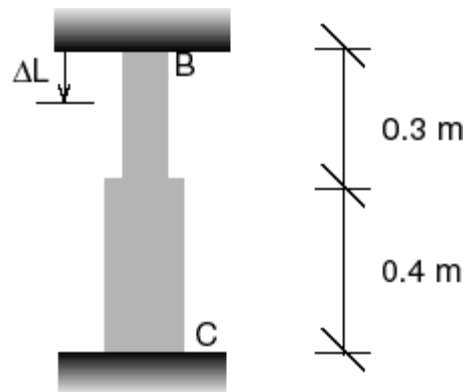


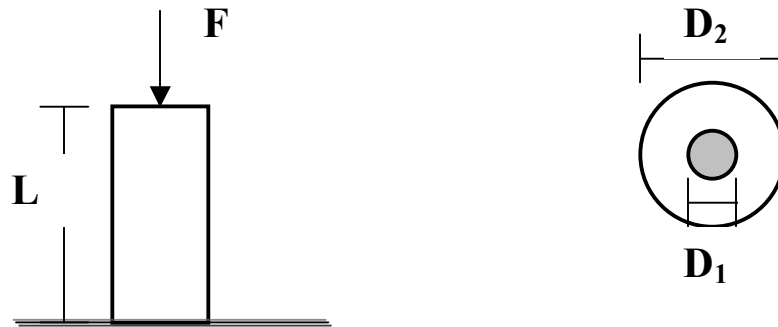
1. The column shown below is initially constructed with zero internal or external forces. After some time, the upper support at B settles (moves downward) by 1 mm ($\Delta L = 1$ mm, as shown in the figure, dimensions not to scale). The support at C does not move.

The elastic modulus of the material is 10 GPa . Cross sectional areas: upper section: 6 cm^2 , lower section: 10 cm^2 . You may ignore horizontal and moment reactions at B and C .

Determine the vertical reactions at B and C after this settlement.



2. Consider the cylindrical rod of length L pictured below. The rod is made of two materials with Young Moduli $E(1)$ and $E(2)$, respectively. The cross section of material 1 is a circle of diameter $D(1)$. The cross section of material 2 is a disc of inner diameter $D(1)$ and outer diameter $D(2)$



- a. Write an expression for the internal force (tension or compression) in each of the materials when the rod is subjected to an external force F . For this part, assume F is known.
- b. Write an expression for the magnitude of the force F that is needed to shorten the rod by $0.01L$.

3. Determine the deflection of the apex A of a homogeneous circular cone of height h , density ρ , and modulus of elasticity E due to its own weight.

