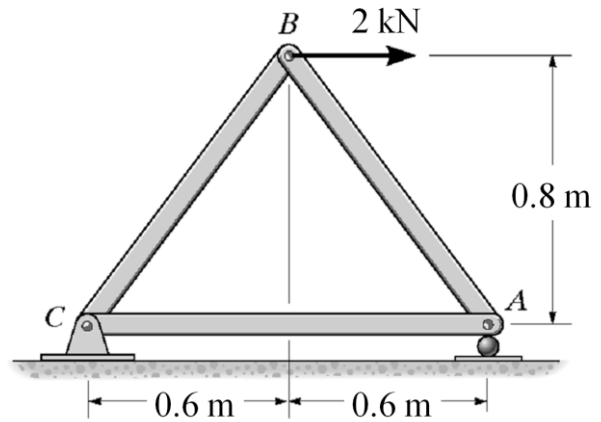


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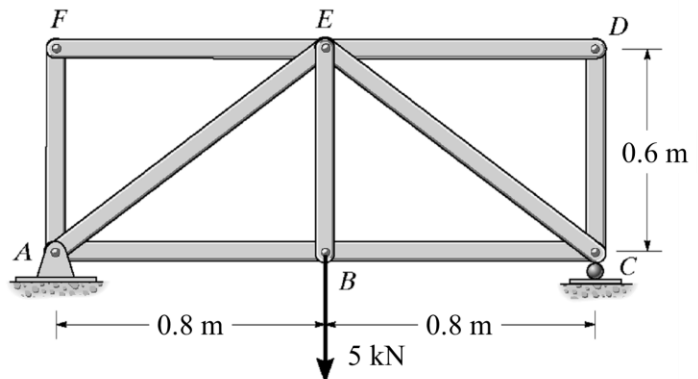
Student ID:

M29: Method of Virtual Forces

1. Determine the vertical displacement of point B using the method of virtual forces. Each steel member has a cross-sectional area of 200 mm^2 . $E_{st} = 200 \text{ GPa}$.



2. Determine the vertical displacement of point E using the method of virtual forces. Each steel member has a cross sectional area of 450 mm^2 . $E_{st} = 200 \text{ GPa}$.

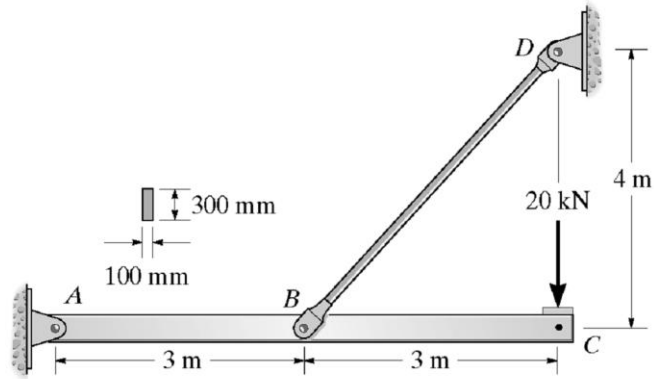


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Student ID:

M29: Method of Virtual Forces

3. Bar ABC has a rectangular cross section of 300 mm by 100 mm. Attached rod DB has a diameter of 20 mm. If both members are made of steel, determine the slope at A due to the loading using the method of virtual forces. Consider only the effect of bending in ABC and axial force in DB . $E_{st} = 200$ GPa.



4. The L-shaped frame is made from two segments, each of length L and flexural stiffness EI . If it is subjected to the uniform distributed load, determine the horizontal displacement of the end C using the method of virtual forces.

