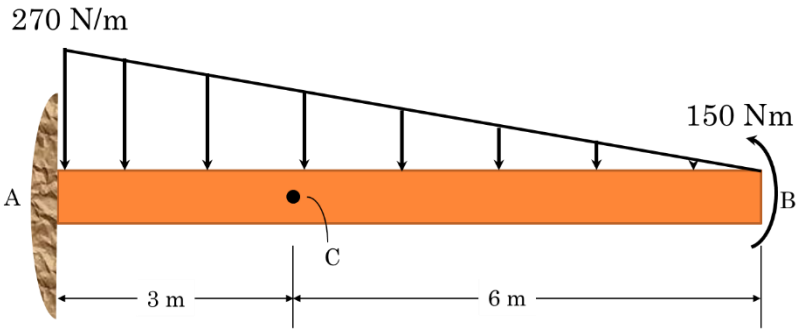
Module 1a Theory

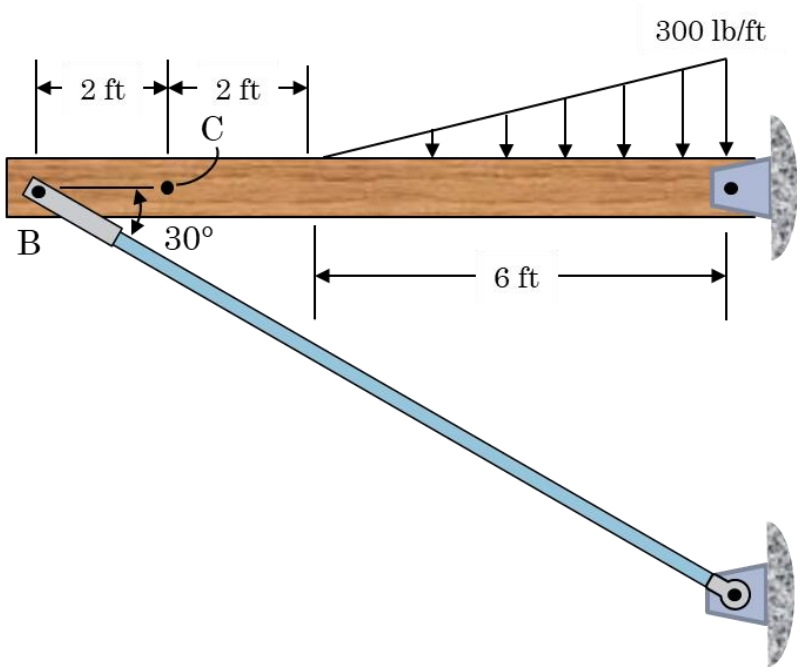
Module 1a Example 1

Determine the resultant internal loadings acting on the cross section at C of the cantilevered beam.



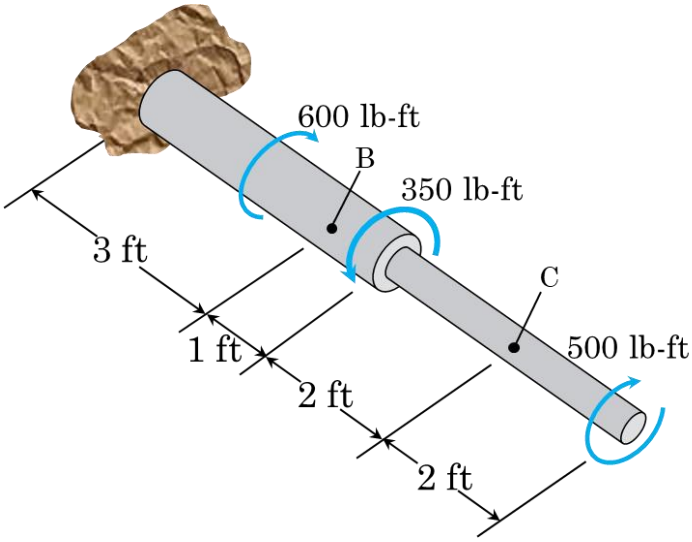
Module 1a Example 2

Determine the resultant internal loadings acting on the cross section at C of the beam shown below.



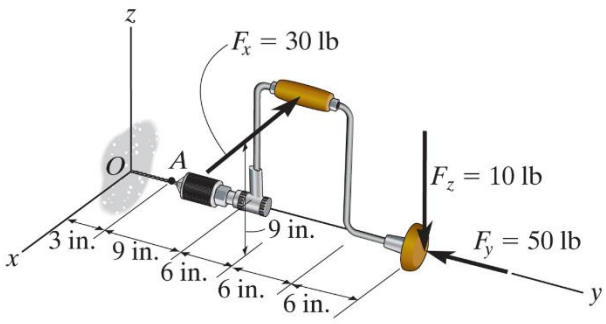
Module 1a Example 3

Determine the resultant internal torque acting on the cross section through points B and C.



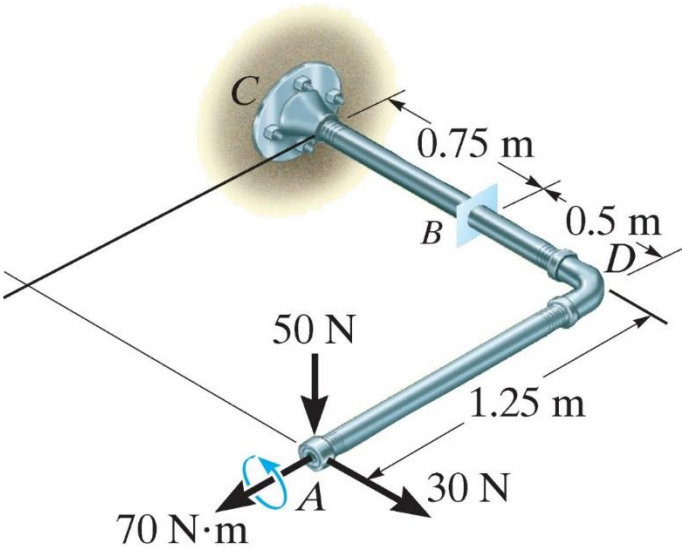
Module 1a Example 4

The brace and drill bit is used to drill a hole at O. If the drill bit jams when the brace is subjected to the forces shown, determine the resultant internal loadings acting on the cross section of the drill bit at A.



Module 1a Example 5

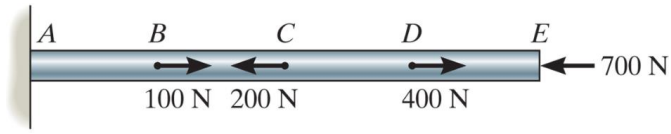
Determine the internal loads at point B.

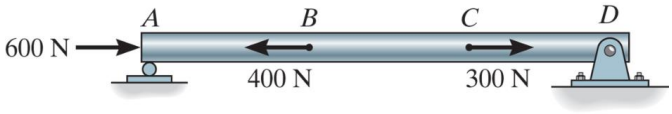


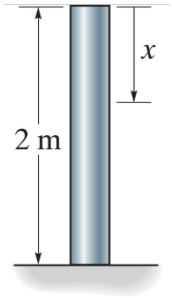
Module 1b Theory

Module 1b Internal Normal Force Calculations: FBD

Calculate the normal internal loadings in each section using free-body diagrams.

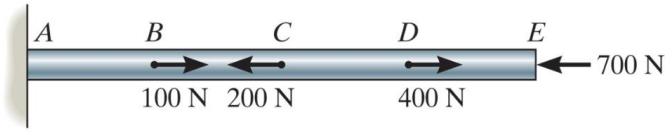


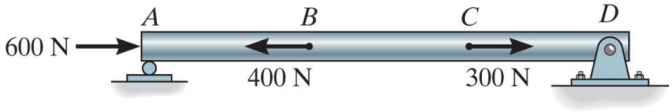




Module 1b Internal Normal Force Diagram

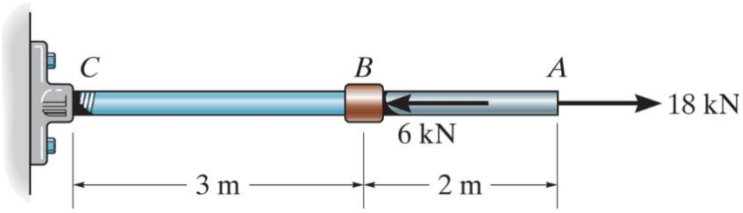
Draw the normal force diagram for the following shafts.





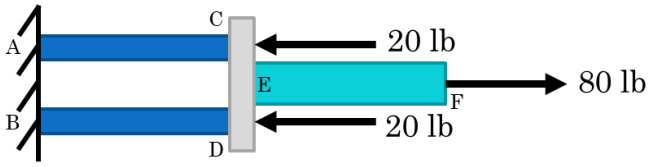
Module 1b Example 1

Draw the normal force diagram for the following shaft.



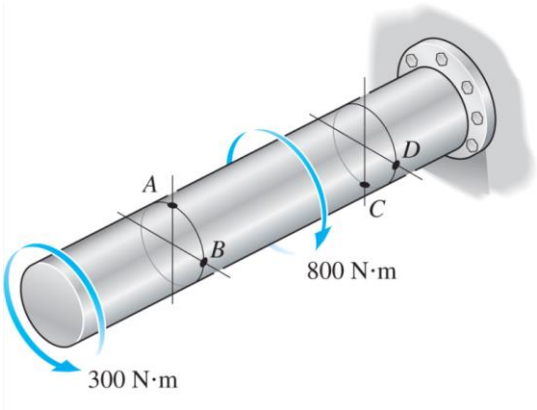
Module 1b Example 2

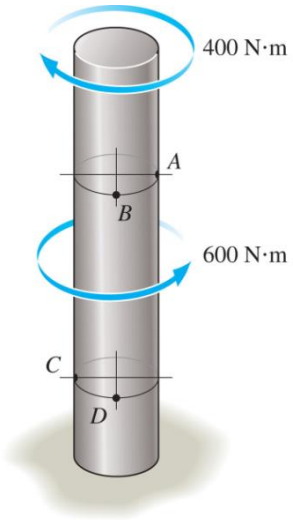
Draw the normal force diagram for the following component. Determine the internal normal force in each member: AC, BD, and EF.



Module 1b Internal Torque Calculations: FBD

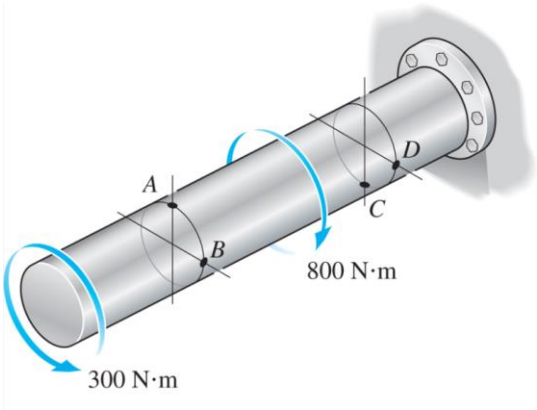
Determine the internal resultant torque at each section.

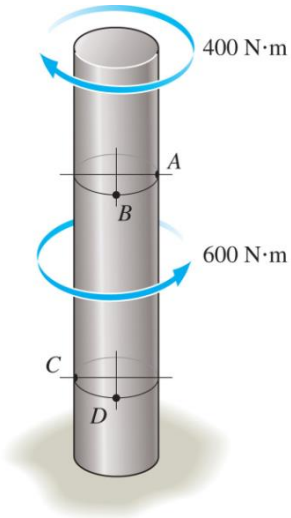




Module 1b Internal Torque Diagram

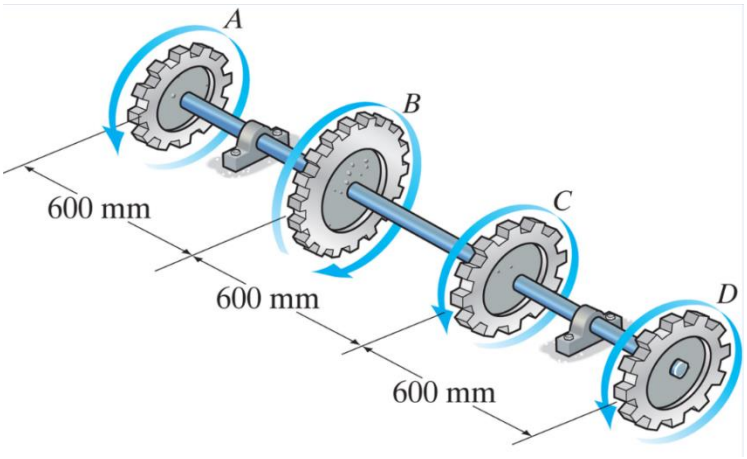
Draw the torque diagram for each shaft.





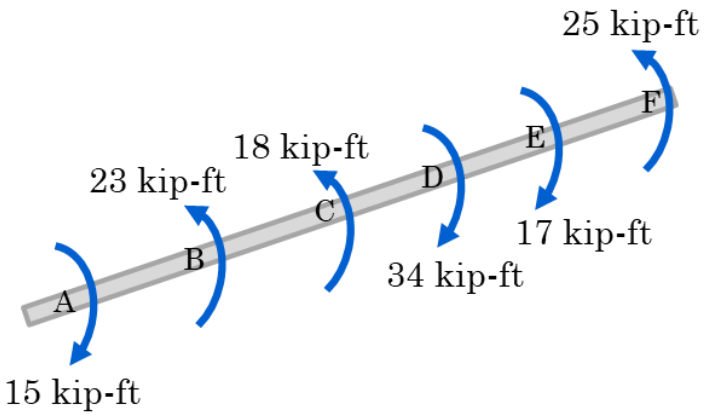
Module 1b Example 3

Draw the internal torque diagram for the shaft. The external torque at A is 50 Nm, at B is 150 Nm, at C is 75 Nm, and at D is 25 Nm.



Module 1b Example 4

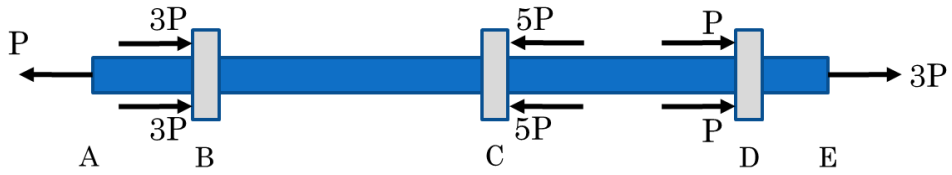
Draw the torque diagram for the shaft.



Module 1 Class Notes

Module 1b Internal Normal Force Challenge

Rank the sections from greatest to least based on the internal normal force in each section.



Greatest 1_____ 2_____ 3_____ 4_____ 5_____ Least

Or, the resultant internal normal force is the same at every point. _____

Please carefully explain your reasoning.

How sure are you of your ranking? (circle one)

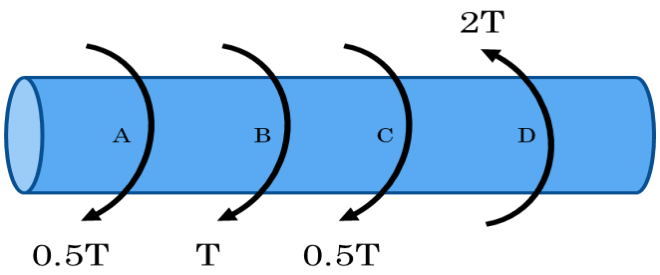
Guessed Sure Very Sure

1 2 3 4 5 6 7 8 9 10

Module 1 Class Notes

Module 1b Internal Torque Challenge

Rank the sections from greatest to least based on the internal torque in each section.



Greatest 1_____ 2_____ 3_____ 4_____ 5_____ Least

Or, the resultant internal torque is the same at every point. _____

Please carefully explain your reasoning.

How sure are you of your ranking? (circle one)

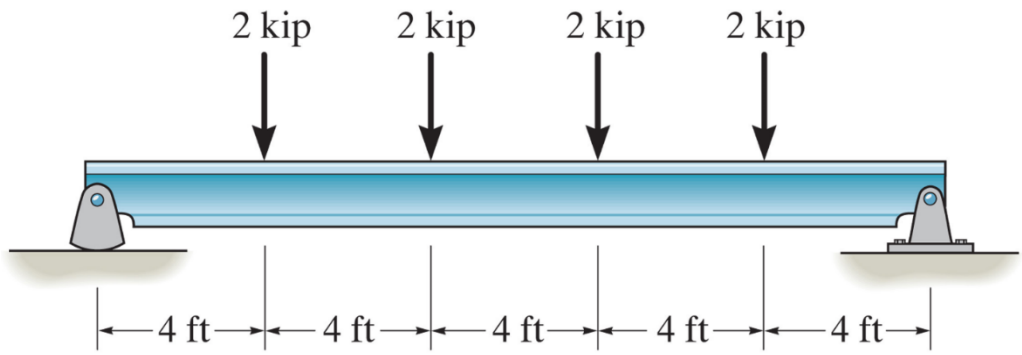
Guessed Sure Very Sure

1 2 3 4 5 6 7 8 9 10

Module 1c Theory

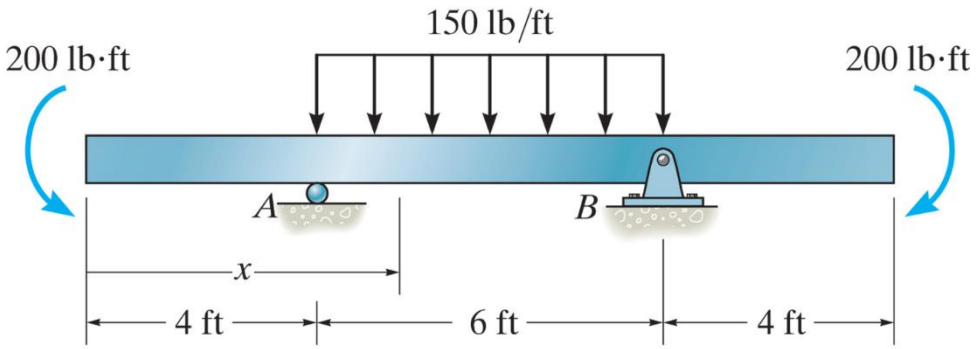
Example 1

Draw the shear and moment diagrams for the beam.



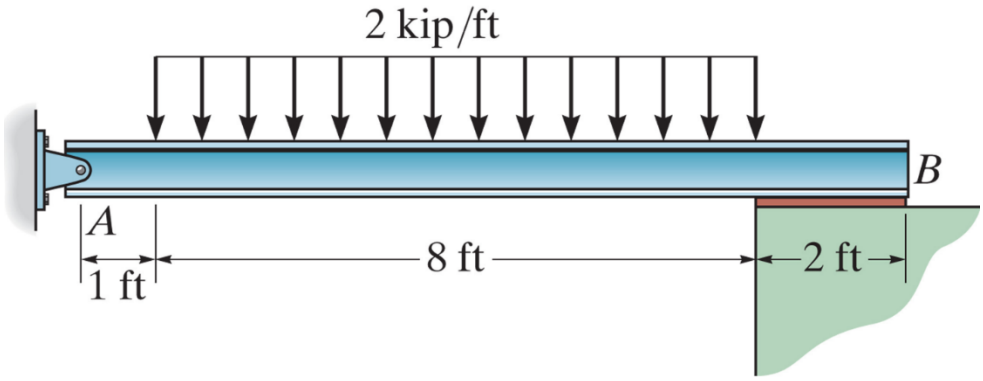
Example 2

Draw the shear and moment diagrams for the beam and determine the shear and moment in the beam as functions of x, where 4 ft < x < 10 ft.



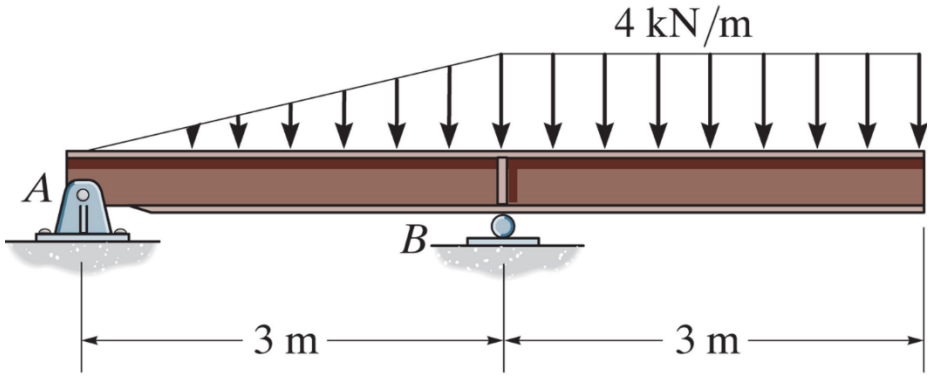
Example 3

The beam is bolted or pinned at A and rests on a bearing pad at B that exerts a uniform distributed loading on the beam over its 2 ft length. Draw the shear and moment diagrams for the beam if it supports a uniform loading of 2 kip/ft.



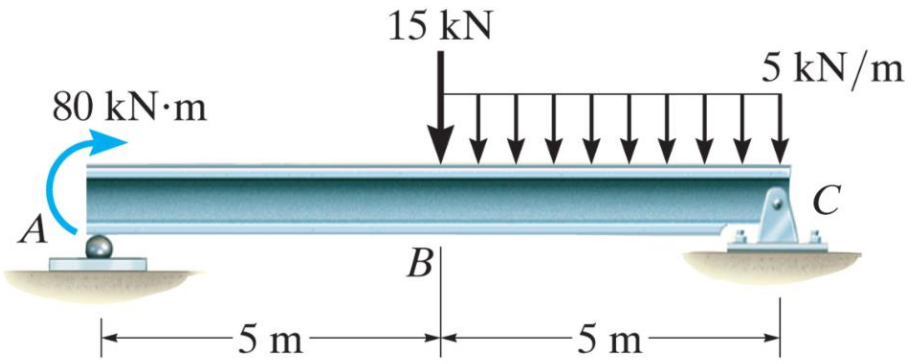
Example 4

Draw the shear and moment diagrams for the overhang beam.



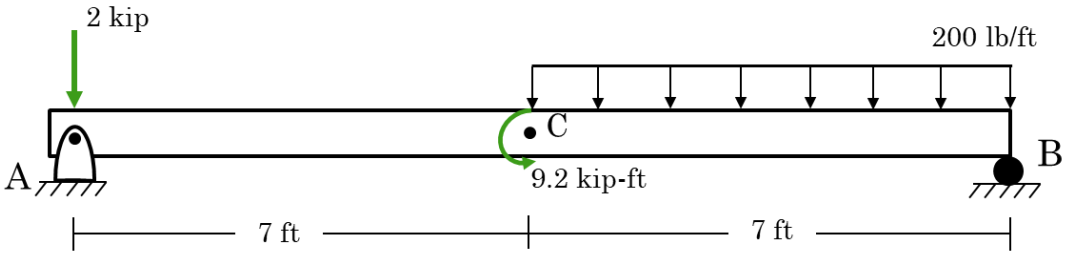
Example 5

Draw the shear and moment diagrams for the beam shown.



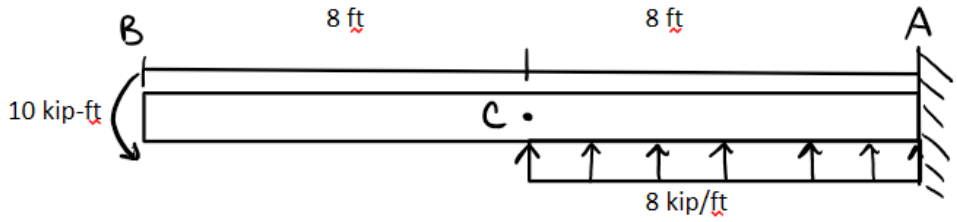
Example 6

Draw the shear and moment diagrams for the beam shown.



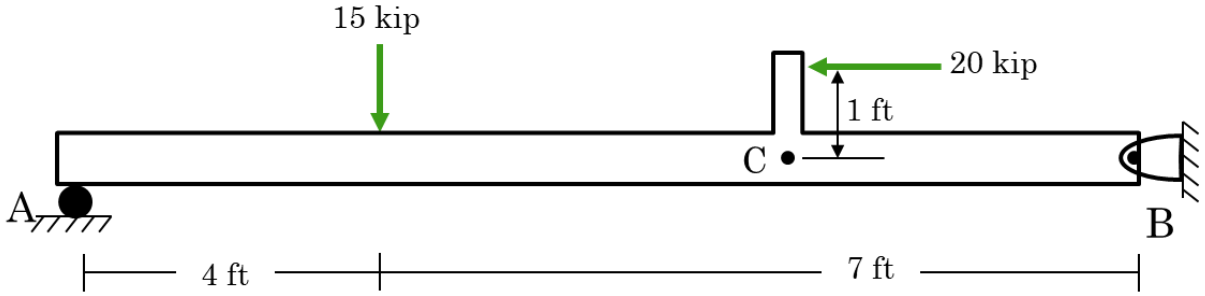
Example 7

Draw the shear and moment diagram for the beam shown.



Example 8

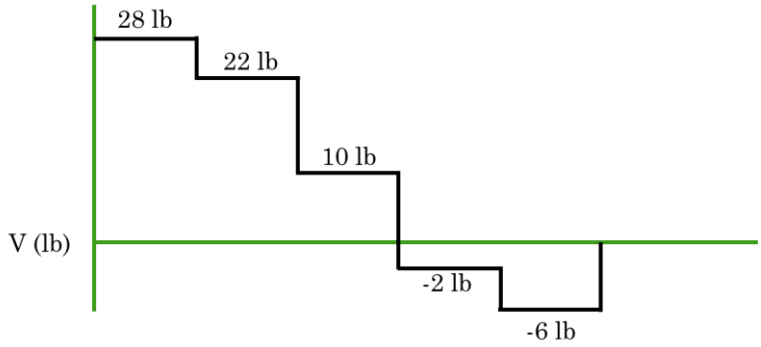
Draw the normal force, shear and moment diagrams for the beam.



Module 1 Class Notes

Shear Force Diagram Challenge

The figure shows is a shear diagram for a simply supported beam with six different external loads applied to it. Draw the beam with all external loads that would create this shear diagram. Then, rank the internal shear force in each section and indicate how sure you are of your drawn beam and internal shear force ranking.



Beam with External Loads:

Greatest 1_____ 2_____ 3_____ 4_____ 5_____ Least

Or, the internal shear force is the same at every point. _____

How sure are you of your ranking? (circle one)

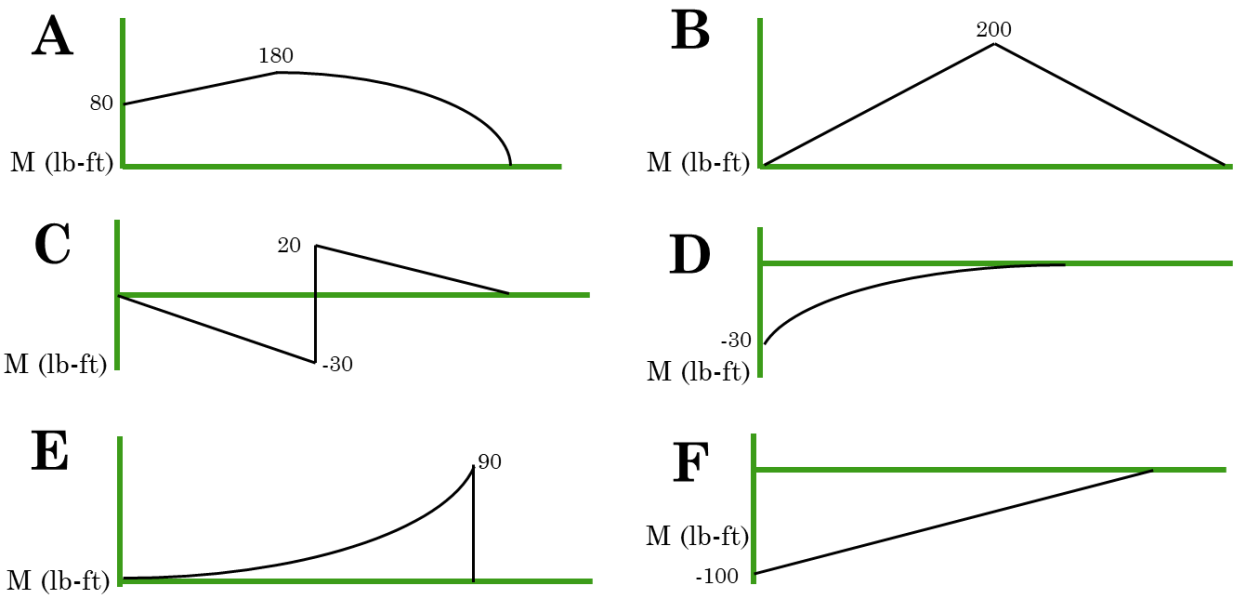
Guessed Sure Very Sure

1 2 3 4 5 6 7 8 9 10

Module 1 Class Notes

Bending Moment Diagram Challenge

From the shown bending moment diagram, rank each one, from greatest to least, on the basis of the absolute maximum internal bending moment. Explain your reasoning. How sure are you of your ranking?



Greatest 1_____ 2_____ 3_____ 4_____ 5_____ Least

Please carefully explain your reasoning.

How sure are you of your ranking? (circle one)

Guessed Sure Very Sure

1 2 3 4 5 6 7 8 9 10