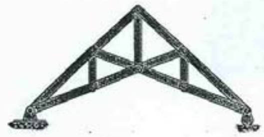
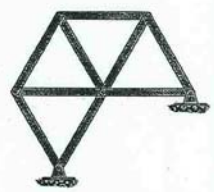
CIVE 311 _ Structures I - HW# 1 - Statics

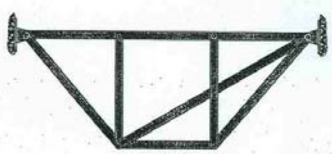
3–5. Classify each of the following trusses as statically determinate, indeterminate, or unstable. If indeterminate, state its degree.



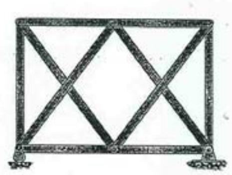
(a)



(b)



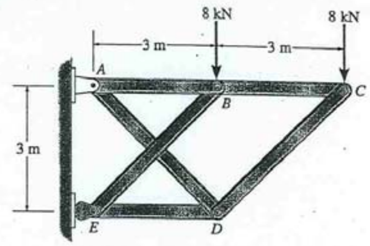
(c)



(d)

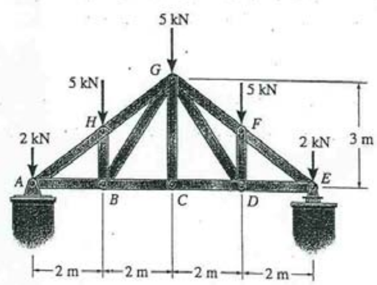
Prob. 3–5

3–6. Determine the force in each member of the truss. State if the members are in tension or compression.



Prob. 3–6

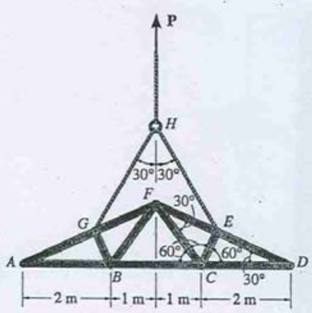
3–7. The *Howe* truss is subjected to the loading shown. Determine the forces in members *GF*, *CD*, and *GC*. State if the members are in tension or compression.



Prob. 3–7

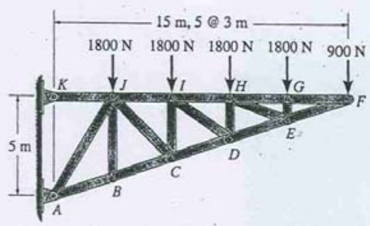
SOURCE: STRUCTURAL ANALYSIS - 5th Ed
by R.C. HIBBELER

*3–8. The members of the truss have a mass of 5 kg/m. Lifting is done using a cable connected to joints E and G. Determine the largest member force and specify if it is in tension or compression. Assume half the weight of each member can be applied as a force acting at each joint.



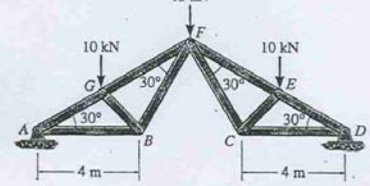
Prob. 3–8

3–9. Determine the force in members CB, BJ, and IJ of the truss. State whether the members are in tension or compression.



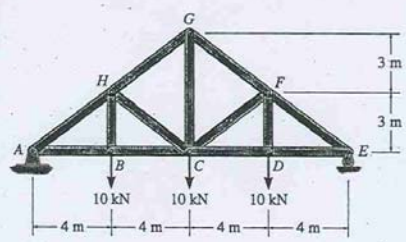
Prob. 3–9

3–10. Determine the force in each member of the roof truss. State if the members are in tension or compression.



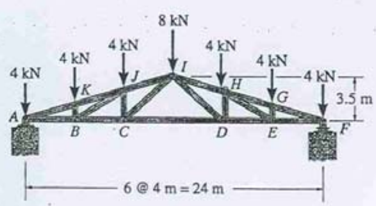
Prob. 3–10

3–11. Determine the force in each member of the roof truss. State if the members are in tension or compression. Assume all members are pin connected.



Prob. 3–11

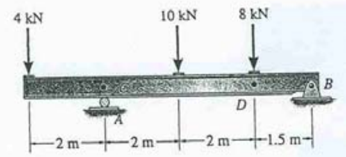
*3–12. Determine the force in each member of the roof truss. State if the members are in tension or compression.



Prob. 3–12

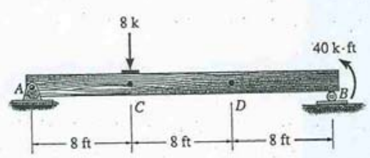
PROBLEMS

4–1. Determine the internal shear, axial load, and bending moment at point C, which is just to the right of the roller at A, and point D, which is just to the left of the 8-kN concentrated force.



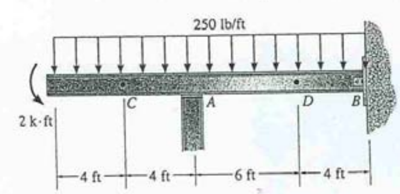
Prob. 4–1

4–2. Determine the internal shear, axial force, and bending moment in the beam at points C and D. Assume the support at B is a roller. Point C is located just to the right of the 8-k load.



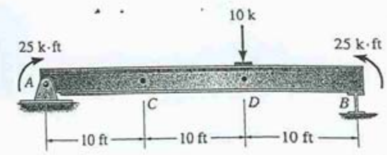
Prob. 4–2

4–3. Determine the internal shear, axial force, and bending moment in the beam at points C and D. Assume the support at A is a roller and B is a pin.



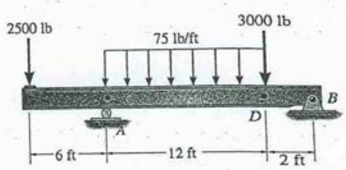
Prob. 4–3

***4–4.** Determine the internal shear, axial force, and bending moment in the beam at points C and D. Assume the support at B is a roller. Point D is located just to the right of the 10-k load.



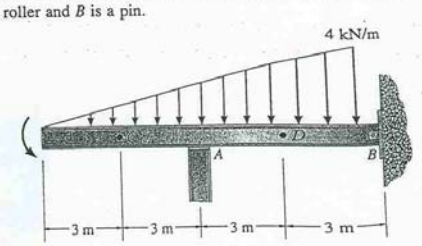
Prob. 4–4

4–5. Determine the internal shear, axial load, and bending moment at point C, which is just to the right of the roller at A, and point D, which is just to the left of the 3000-lb concentrated force.



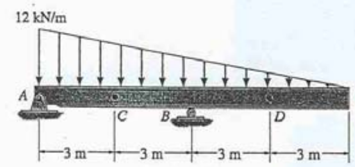
Prob. 4–5

4–6. Determine the internal shear, axial force, and bending moment in the beam at points C and D. Assume the support at A is a roller and B is a pin.



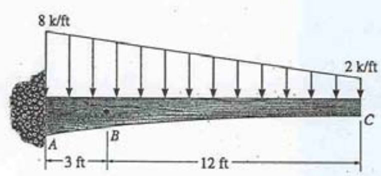
Prob. 4–6

4–7. Determine the internal shear, axial force, and bending moment in the beam at points C and D.



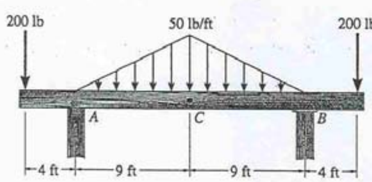
Prob. 4–7

***4–8.** Determine the internal shear, axial force, and bending moment in the beam at point B.



Prob. 4–8

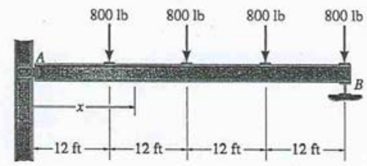
4–9. Determine the internal shear, axial force, and bending moment at point C. Assume the support at A is a pin and B is a roller.



Prob. 4–9

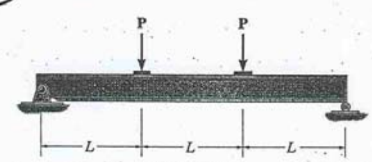
4–10. Determine the shear and moment in the floor girder as a function of x, where $12\text{ ft} < x < 24\text{ ft}$. Assume the support at A is a pin and B is a roller.

4–11. Draw the shear and moment diagrams of the floor girder in Prob. 4–11. Assume there is a pin at A and a roller at B.



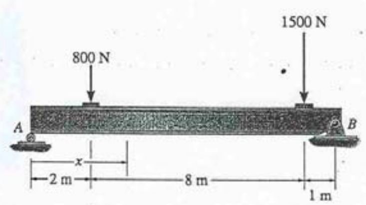
Probs. 4–10/11

***4–12.** Draw the shear and moment diagrams for the beam.



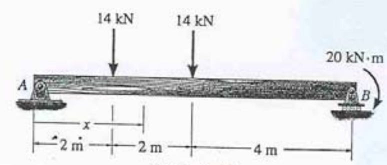
Prob. 4–12

4–13. Draw the shear and moment diagrams for the beam. Also, express the shear and moment in the beam as a function of x within the region $2\text{ m} < x < 10\text{m}$.



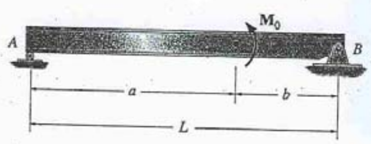
Prob. 4–13

4–14. Determine the shear and moment in the beam as a function of x, where $2\text{ m} < x < 4\text{ m}$.



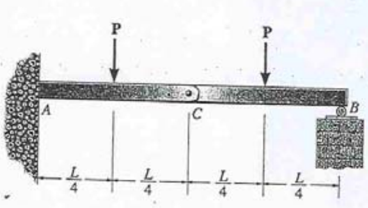
Prob. 4–14

4–15. Determine the shear and moment in the beam as a function of x and then draw the shear and moment diagrams for the beam.



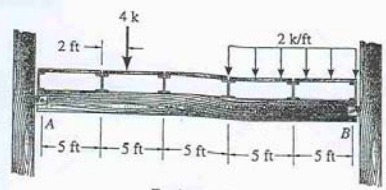
Prob. 4–15

***4–16.** Draw the shear and moment diagrams for the beam. There is a pin at C.



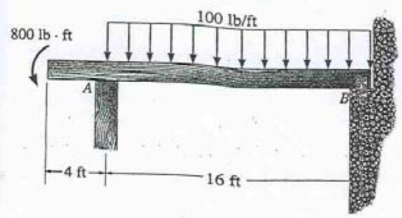
Prob. 4–16

4–17. The flooring system for a building consists of a girder that supports laterally running floor beams, which in turn support the longitudinal simply supported floor slabs. Draw the shear and moment diagrams for the girder. Assume the girder is simply supported.



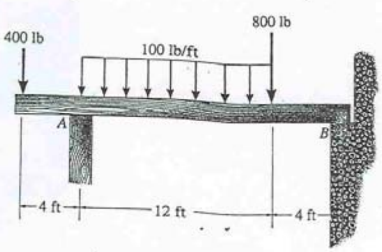
Prob. 4–17

4–18. Draw the shear and moment diagrams of the beam. Assume the support at B is a pin and A is a roller.



Prob. 4–18

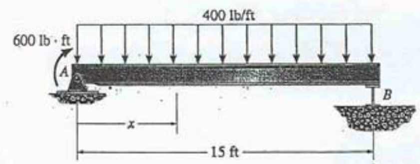
4–19. Draw the shear and moment diagrams of the beam. Assume the support at B is a pin and A is a roller.



Prob. 4–19

***4–20.** Determine the shear and moment in the beam as a function of x. Assume the support at B is a roller.

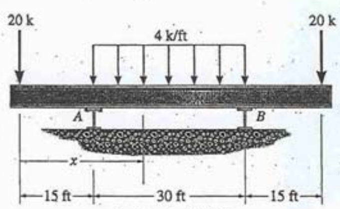
4–21. Draw the shear and moment diagrams for the beam in Prob. 4–20. Assume the support at B is a roller.



Probs. 4–20/21

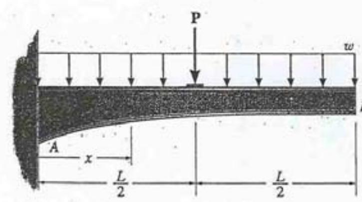
4–22. Determine the shear and moment in the beam as a function of x, where 15 ft $< x <$ 45 ft. Assume the support at A is a pin and B is a roller.

4–23. Draw the shear and moment diagrams of the beam in Prob. 4–22. Assume the support at A is a pin and B is a roller.



Probs. 4–22/23

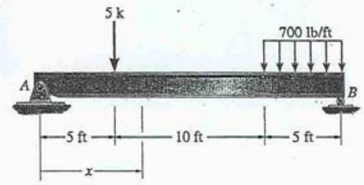
***4–24.** Determine the shear and moment in the tapered beam as a function of x, where $0 \leq x < L/2$.



Prob. 4–24

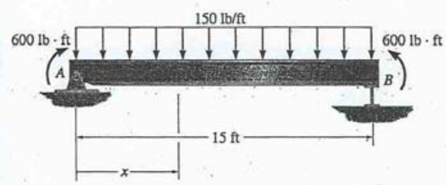
4–25. Determine the shear and moment in the beam as a function of x over its entire length.

4–26. Draw the shear and moment diagrams for the beam in Prob. 4–25.



Probs. 4–25/26

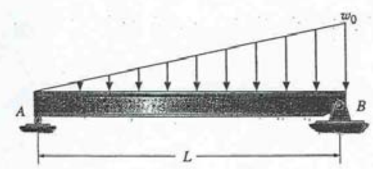
4–27. Determine the shear and moment in the beam as a function of x. Assume the support at B is a roller.



Prob. 4–27

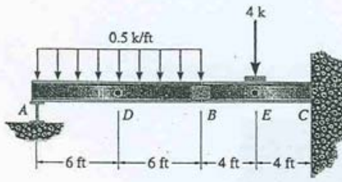
***4–28.** Determine the shear and moment in the beam as a function of x.

4–29. Draw the shear and moment diagrams for the beam.



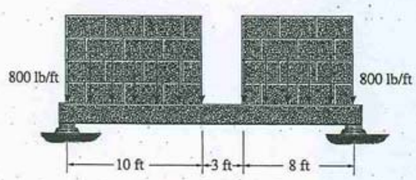
Probs. 4–28/29

*4–36. Determine the internal shear, axial load, and bending moment in the beam at points D and E. Point E is just to the right of the 4-k load. Assume A is a roller, the splice at B is a pin, and C is a fixed support.



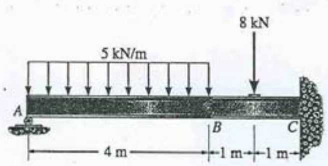
Prob. 4–36

4–37. The concrete beam supports the wall, which subjects the beam to the uniform loading shown. The beam itself has cross-sectional dimensions of 12 in. by 26 in. and is made from concrete having a specific weight of $\gamma = 150\ \text{lb/ft}^3$. Draw the shear and moment diagrams for the beam and specify the maximum and minimum moments in the beam. Neglect the weight of the steel reinforcement in the beam.



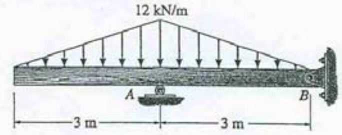
Prob. 4–37

4–38. Draw the shear and moment diagrams for the compound beam. The segments are connected by a pin at B.



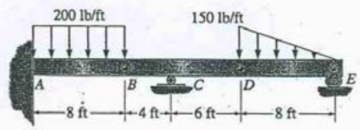
Prob. 4–38

4–39. Draw the shear and moment diagrams for the beam.



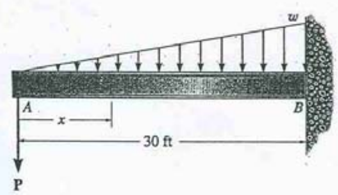
Prob. 4–39

*4–40. Draw the shear and moment diagrams for the compound beam. The segments are connected by pins at B and D.



Prob. 4–40

4–41. Determine the shear and moment in the beam as a function of x.



Prob. 4–41