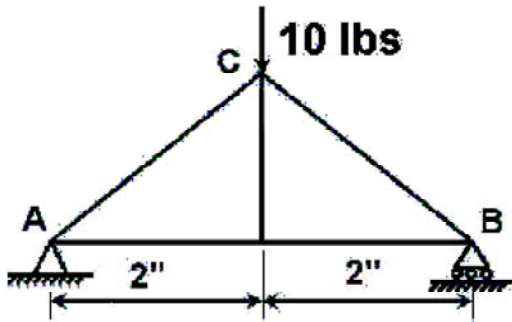


POE Practice Test - Statics & Structures

Multiple Choice

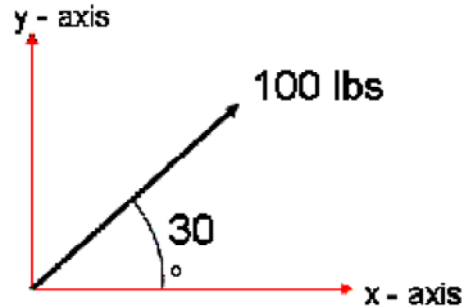
Identify the choice that best completes the statement or answers the question.

1. A quantity that has magnitude and direction is called _____.
 - a. a scalar
 - b. a vector
 - c. tension
 - d. weight
2. According to the figure, what is the value of the reaction force that occurs in the vertical direction at point A.



- a. 10 lbs
 - b. 15 lbs
 - c. 20 lbs
 - d. 5 lbs
 - e. none of the above
3. An angle, whose sin is equal to 5/13, measures _____.
 - a. 67.4°
 - b. 30.0°
 - c. 22.6°
 - d. 65.0°

4. What is the force of the vector in the x direction?



- a. 86.60 lbs
 - b. 115.47 lbs
 - c. 200 lbs
 - d. 50 lbs
 - e. none of the above.
5. Moment of inertia is a cross-sectional property that gives the engineer an indication of the stiffness of a particular shape. Its value can be used to
 - a. calculate the amount of deflection that occurs in structural beams.
 - b. calculate the weight of a structural beam.
 - c. locate the centroidal axis of a structural shape.
 - d. describe the linear relationship between stress and strain.

6. According to the image below answer the following questions. (Angle ACB = 36.86)

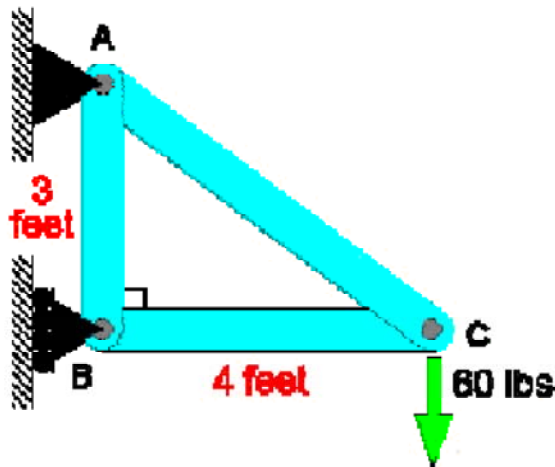


Figure 1

What is the magnitude of the reaction force in the x direction at Point A?

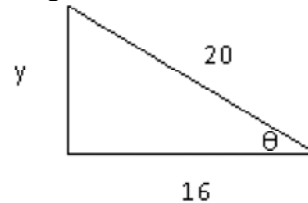
- a. 80 lbs
 - b. 45 lbs
 - c. 60 lbs
 - d. 55 lbs
 - e. none of the above.
7. What is the magnitude of the force on member AC?
- a. 36 lbs
 - b. 75 lbs
 - c. 80 lbs
 - d. 100 lbs
 - e. none of the above.
8. What is the magnitude of the force on member BC?
- a. 80 lbs
 - b. 75 lbs
 - c. 100 lbs
 - d. 36 lbs
 - e. none of the above.

9. A true 2 x 6 beam (the actual dimensions are 2 inches by 6 inches) is standing upright with the shorter side as its base. Find the moment of inertia of the beam.

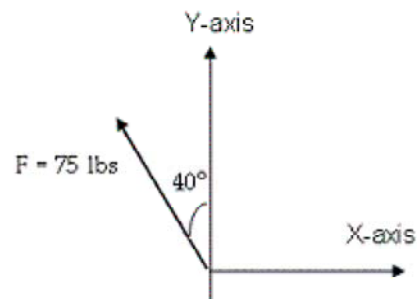
$$I_{xx} = \frac{bh^3}{12}$$



- a. 40 in⁴
 - b. 4 in⁴
 - c. 3.6 in⁴
 - d. 36 in⁴
10. Given the lengths of the sides of the following triangle, what is the value of angle θ ?



- a. 30°
 - b. 36.9°
 - c. 53.1°
 - d. 60°
11. Given the lengths of the sides of the triangle above, what is the value of y?
- a. 18
 - b. 14
 - c. 10
 - d. 12
12. The x-component of the vector below would be _____.

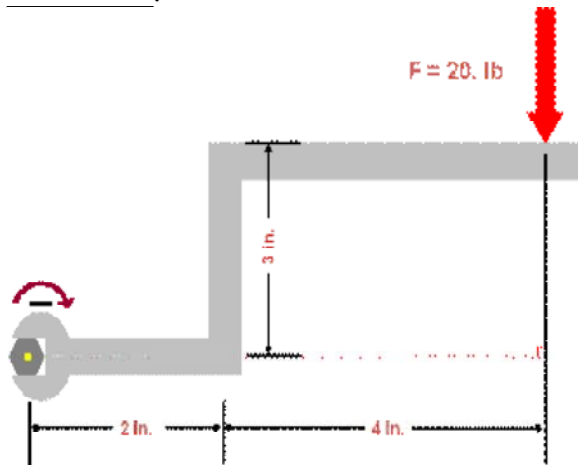


- a. -48.2 lbs
- b. -57.6 lbs
- c. 48.2 lbs
- d. 57.6 lbs

13. The y-component of the vector above would be _____.
- 48.2 lbs
 - 57.6 lbs
 - 48.2 lbs
 - 57.6 lbs

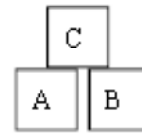
14. If another force of 10 lbs in the positive x-direction were added to the vector above, what would be the x-component of the resultant force?
- 58.2 lbs
 - 47.6 lbs
 - 38.2 lbs
 - 67.6 lbs

15. The moment of the wrench below would be _____.



- 40 lb-in
- 80 lb-in
- 60 lb-in
- 120 lb-in

16. Which of the following is the free body diagram for block A?



-
-
-
-

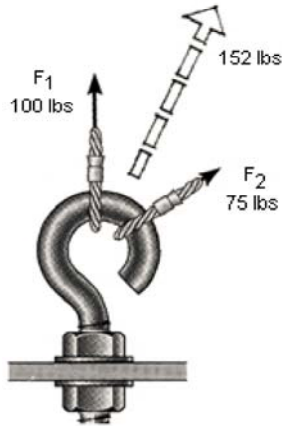
17. Force and velocity are examples of _____.

- vector quantities
- scalar quantities
- mass properties
- moments

18. When the sum of the forces and moments in a structural system equals zero, that system is said to be in a state of _____ equilibrium

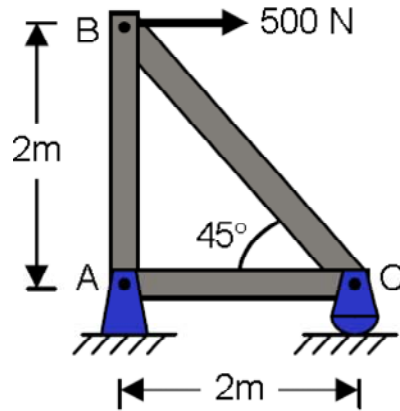
- stressed
- strained
- dynamic
- static

19. As shown in Figure 8, a _____ force has the same effect on a body as two or more forces acting concurrently on that body.



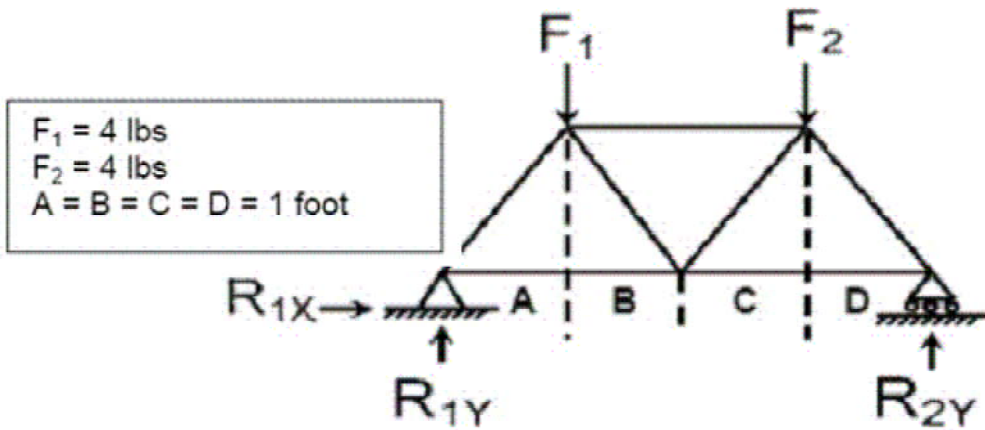
- a. compressive
- b. tensile
- c. resultant
- d. reaction

20. Study the truss system shown in Figure 9. How many reaction forces would replace the roller joint (C) if a free body diagram of the truss system was drawn?



- a. 1
- b. 2
- c. 3
- d. 4

21. According to the figure, what will be the **combined magnitude** of the reaction forces R_{1Y} and R_{2Y} ?



- a. 4 lbs
- b. 8 lbs
- c. 12 lbs
- d. 16 lbs
- e. none of the above.

Problem

22. According to the image below answer the following questions. (Angle ACB = 36.86)

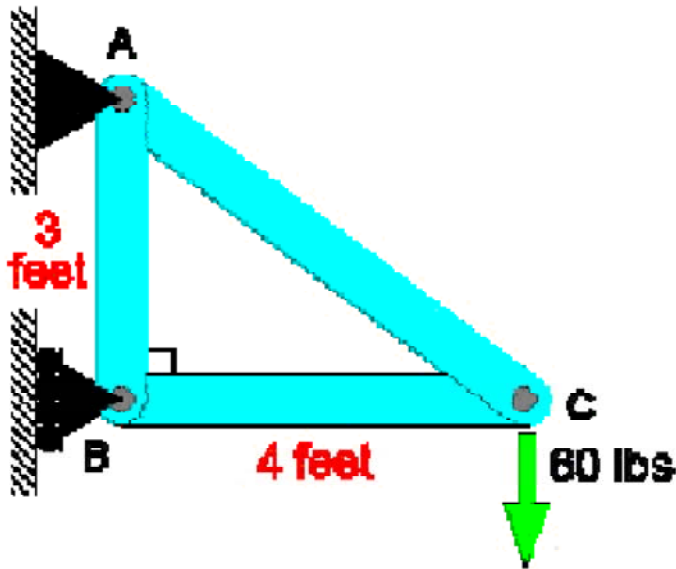


Figure 1

What is the magnitude of the reaction force in the x direction at Point A

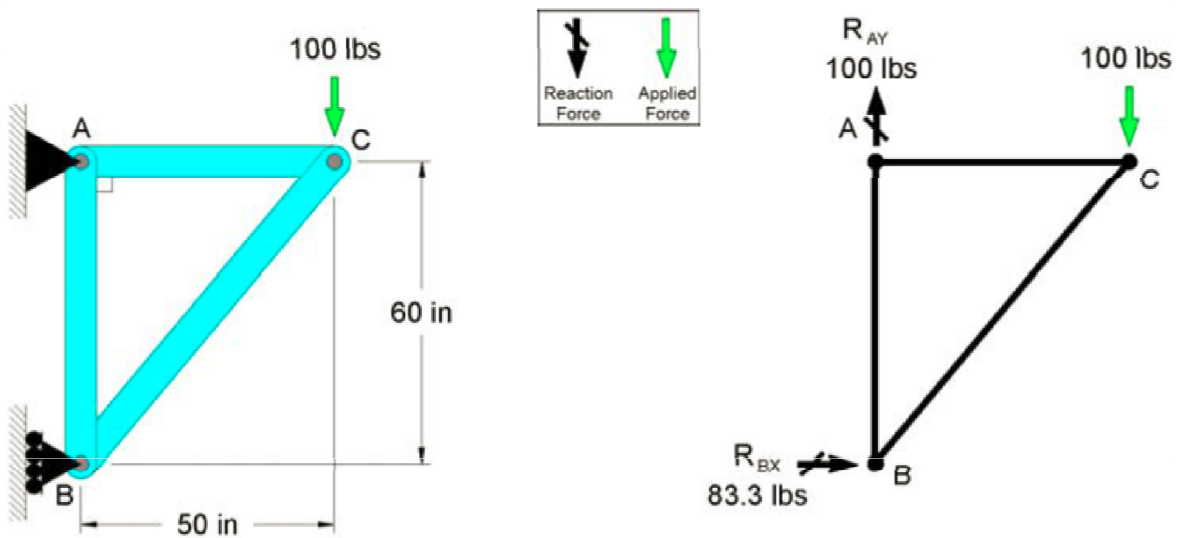


Figure 1

Figure 2

23. Study the truss in Figure 1 and its (incomplete) free body diagram in Figure 2, and answer the following questions.
- Calculate the length of truss member BC. (answer precision = 0.0)
 - Calculate the magnitude and direction of the missing reaction force that occurs at joint A. Then, draw and label that reaction force on Figure 2. (answer precision = 0.0)

24. Study the truss in Figure 1 and its free body diagram in Figure 2, and answer the following questions.

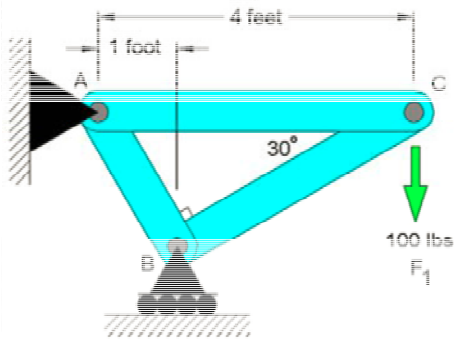


Figure 1

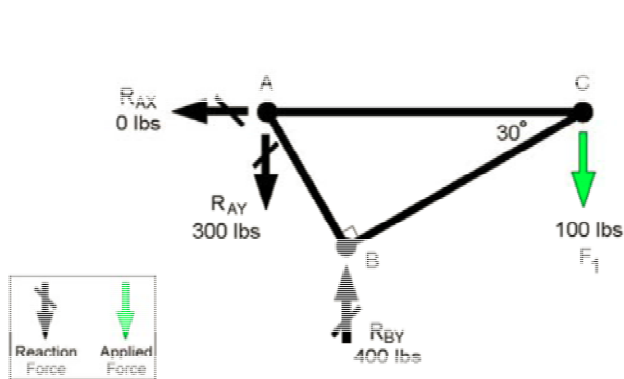
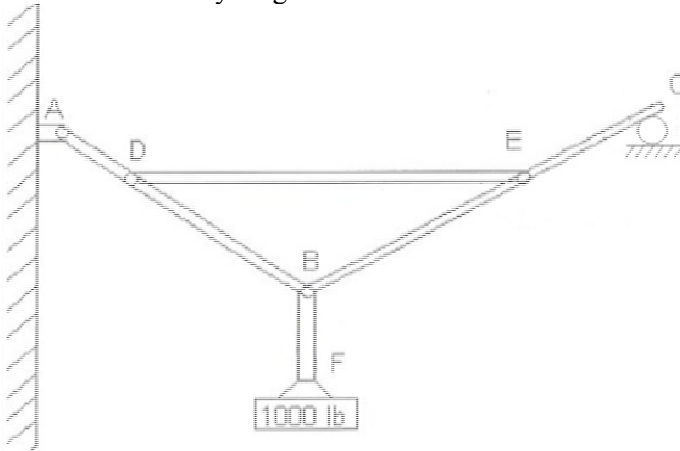


Figure 2

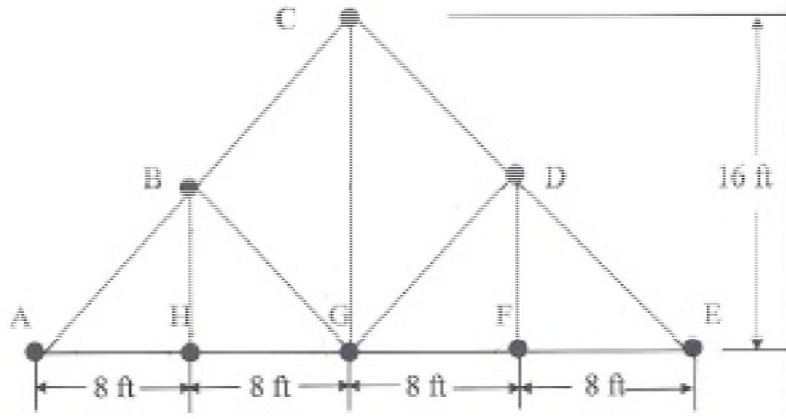
- Draw a point free body diagram for joint C and label all of the given information for that node (assume all member forces are tension).
- Calculate the length of truss member BC. (answer precision = 0.000)
- Using joint C, determine the magnitude and type of force (tension or compression) that is being carried by truss member BC. (answer precision = 0.0)

25. Draw the free body diagram for the frame shown below.

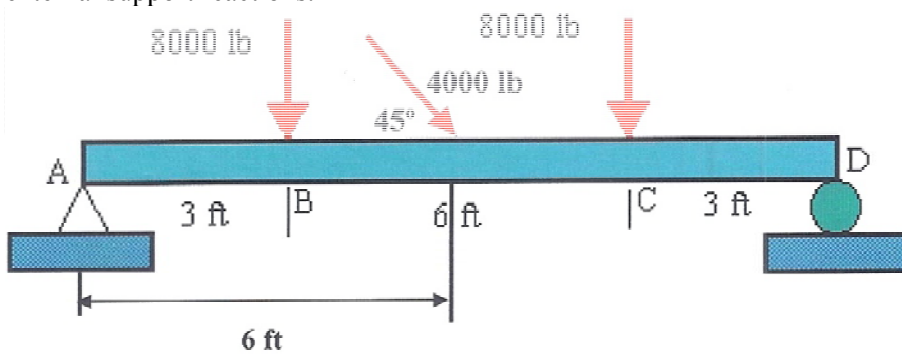


Point A is a Hinge
Point C is a Roller

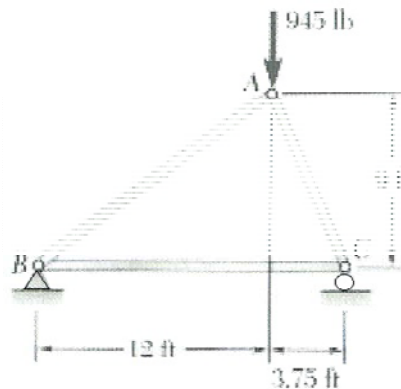
26. The roof truss of a residential structure is shown. The truss is symmetric about the centerline (CG), and the angles AHB, HGC, and GFD are each 90 degrees.
- Find angle ABH in the truss.
 - How many linear feet of lumber are required to fabricate the truss? (Assume the lumber has no volume, only length.)



27. For the loaded, simply supported beam shown in the diagram below, draw a free body diagram, and determine the external support reactions.



28. Study the image below and answer the following questions.



- What are the three different sets of equations that are considered while solving the truss?
- Draw the free body diagram showing the reaction forces at joints B and C.
- Calculate the force (compressive or tensile) in each of the members of the truss. Show all work including the equation and substitution with units.