Final Exam
What Every Engineer Should Know About Structures
Part B – Statics Applications

1. As a practical matter, determining design loads on structural members involves several approximations.
○ a. True
○ b. False

2. Friction in a roller support is a major concern when calculating the magnitude of the reaction.
○ a. True
○ b. False

3. Which is <u>NOT</u> one of the four idealized supports for a beam?
○ a. roller support
○ b. hinged support
○ c. clamped support
○ d. fixed support

4. There are four types of beams that can be solved by the laws of statics alone. Which of the following types of beams can <u>NOT</u> be solved by using the laws of statics alone?
○ a. simple beams
○ b. hinged beams
○ c. cantilever beams
○ d. overhang beams
○ e. indeterminate beams

5. When computing reactions, the first step should be to draw a free-body diagram.
○ a. True
○ b. False

6. When resolving a uniformly distributed load into its single force resultant, <u>both</u> the uniformly distributed load and the single force resultant should be shown with dashed lines.
○ a. True
○ b. False

7. What is the magnitude of the vertical reaction at B?
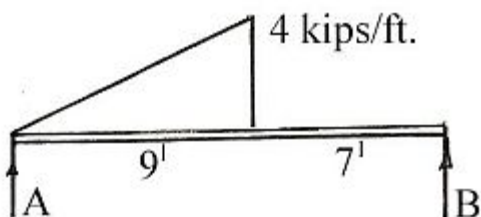
a. 2.25 kips
b. 6.75 kips
c. 13.5 kips
d. 11.25 kips

Use the beam diagram below for questions 8 and 9.
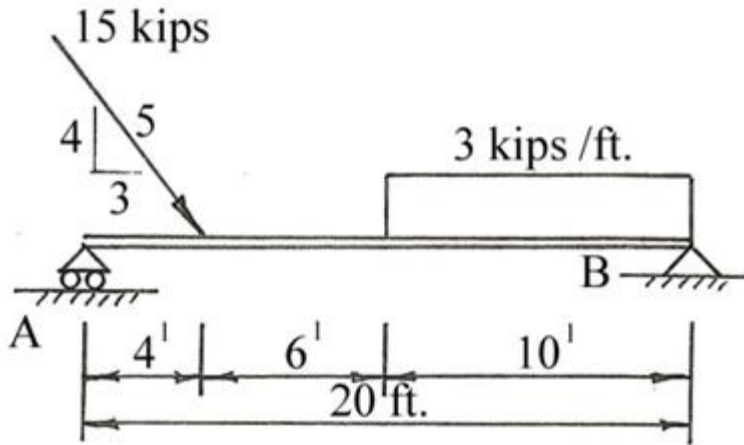
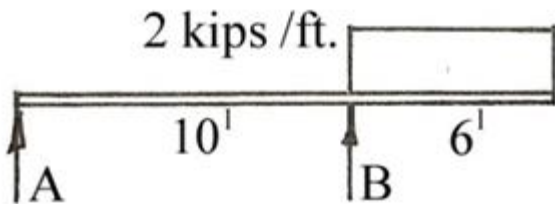8. What is the vertical reaction at A for the beam shown above?
a. 14.7 kips
b. 17.1 kips
c. 19.5 kips
d. 24.9 kips

9. What is the horizontal reaction for the beam shown above?
a. $AH = 9$ kips $\leftarrow$
b. $AH = 9$ kips $\rightarrow$
c. $BH = 9$ kips $\leftarrow$
d. $BH = 9$ kips $\rightarrow$

10. For the overhang beam shown, what is the vertical reaction at A?

a. $Av = -2.4$ kips$\uparrow$
b. $Av = 2.4$ kips $\uparrow$
c. $Av = -3.6$ kips$\uparrow$
d. $Av = 3.6$ kips $\uparrow$

11. A cantilever beam has only one support, and all the reactions must be at that support.
a. True
b. False

12. When setting up to solve for beam reactions, a direction for the components of the reaction is assumed. If the calculated answer is a negative number, it means:
 a. an error was made in the calculation
 b. the calculated answer is a moment rather than a vertical or horizontal component
 c. the wrong direction was assumed
 d. a different equilibrium equation must be used to solve the problem

13. What is the <u>vertical</u> component of the reaction at B for the frame shown below?

1.5 kips /ft.

B 8^l

16^l

A

20 ft.
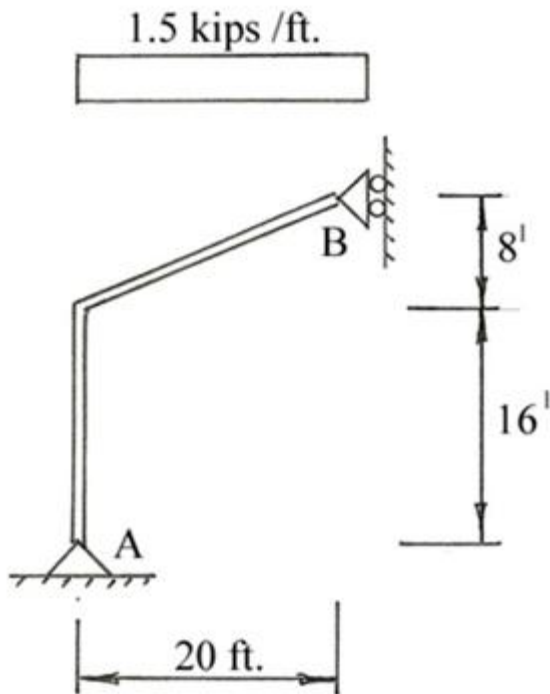
 a. By = 0 kips
 b. By = 12.5 kips
 c. By = 15 kips
 d. By = 30 kips
 e. By = 36 kips

Use the truss diagram below for questions 14 and 15.

10 kips

B   C   E   F

9'

D

A   G

4 @ 12 ft. = 48 ft.
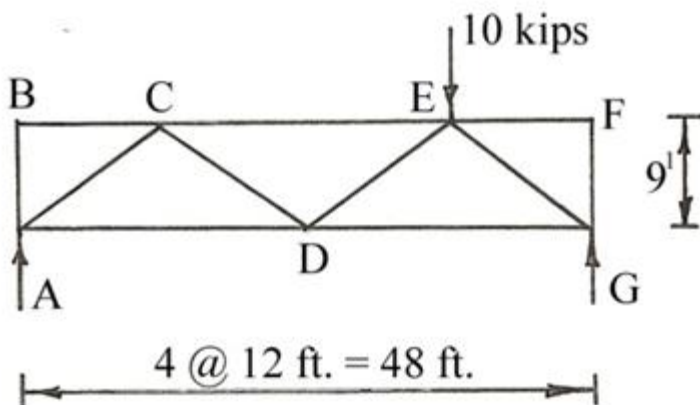
14. What is the magnitude of the reaction at G for the truss shown above?

○ a. 1.9 kips
○ b. 2.5 kips
○ c. 7.5 kips
○ d. 8.1 kips

15. A hinged beam is actually two or more beams connected in a series with a hinge or hinges.
○ a. True
○ b. False

16. Which statement is <u>NOT</u> true?
○ a. The procedure for determining reactions in trusses is exactly the same as for beams.
○ b. Drawing a free-body diagram for a truss is the same as drawing a free-body diagram for a beam.
○ c. When summing moments to determine a reaction of a truss, use the direct line distance from the reaction to the point of application of the load - not the perpendicular distance from the reaction to the loads line of action.

17. Which of the following statements is <u>NOT</u> true?
○ a. A truss is an idealized structural system.
○ b. The joints in a truss are assumed to have no friction.
○ c. Loads to a truss can only be applied at joints.
○ d. The weight of the truss is usually taken into account when determining the reactions.

18. Every joint in a truss must be in equilibrium.
○ a. True
○ b. False

19. In some cable systems, the force in the cable can be compression.
○ a. True
○ b. False

20. The magnitude of the <u>horizontal component</u> of the force in a cable is the same from one end of the cable to the other.
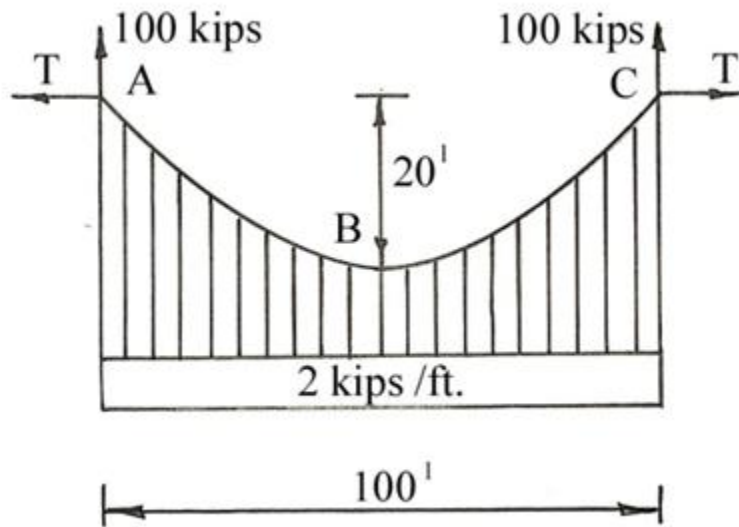○ a. True
○ b. False

21. What is the tensile force in section AB of the cable shown below?

○ a. 201 #
○ b. 306 #

○ c. 1,660 #
○ d. 1,680 #


100 kips
T A

100 kips
C T

20'

B

22.

2 kips /ft.

100'
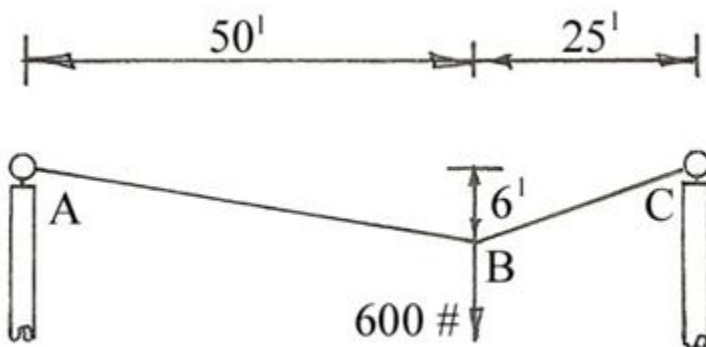
If the sag of 20' shown in the diagram above were increased to 30', the force in the cable would be:
○ a. increased
○ b. decreased
○ c. unchanged

23. A 100 # box is resting on the floor. The coefficient of static friction (μ) between the box and the floor is 0.5. You push on the side of the box trying to slide it across the floor. At what push force will the box begin to move?
○ a. 5 pounds
○ b. 50 pounds
○ c. 100 pounds
○ d. 200 pounds

24. What is the maximum force in the rope of the 2-part line shown below that is lifting a 500 pound load if the coefficient of sheave friction (μ) is 0.04? k = 1 - μ

P

500 #
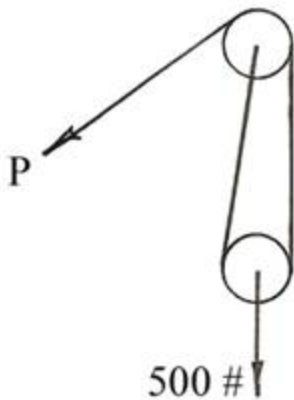
○ a. 167 #
○ b. 235 #
○ c. 250 #
○ d. 266 #

25. Which of the following can be used for an overhaul weight on a crane?

○ a. Generator
○ b. Heavy steel ball
○ c. Air compressor
○ d. All of the above