

CE 120 – Structural Engineering

Mid-Term Examination No. 1

Instructions:

- Read these instructions. Do not open the exam until instructed to do so.
- Work all problems. Pace yourself so that you have time to work on each problem. Show all relevant work.
- Start solutions alongside or immediately following problem statements. If additional space is required, insert additional sheets. Do not show the work for more than one problem on any given sheet of paper.
- Organize and write solutions neatly. Points will be taken off for messy solutions.
- Indicate units and sign conventions in final solutions. Points will be taken off if units are missing or signs are unclear.
- If you have any questions, or need any paper or other materials, walk to the front of the classroom and ask the instructor. Do not raise your hand to get the instructor's attention, and do not call out questions from your seat.

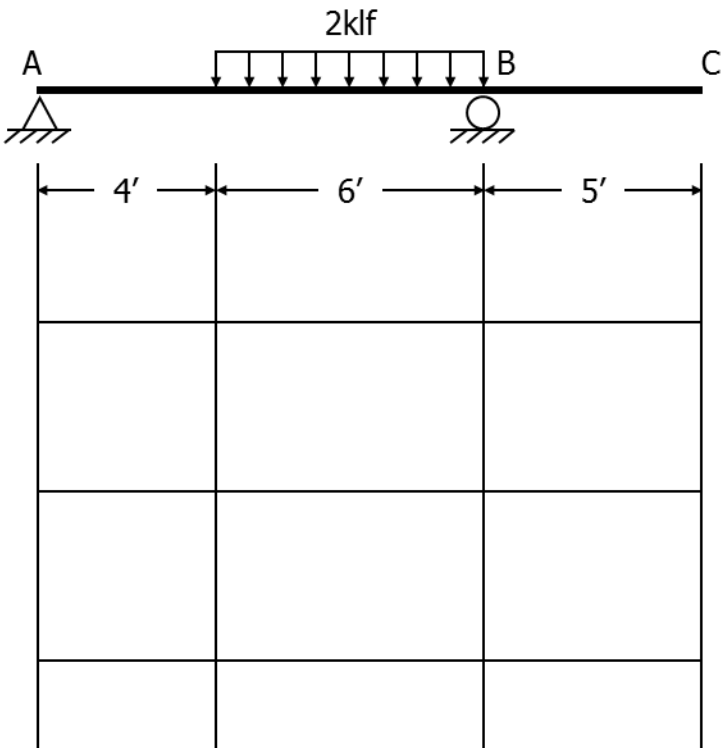
Some potentially useful equations:

$$\Sigma F_x = 0; \Sigma F_y = 0; \Sigma M = 0$$

$$R = 3n; m + r = 2j$$

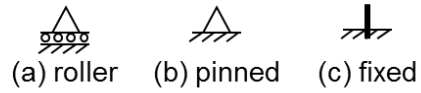
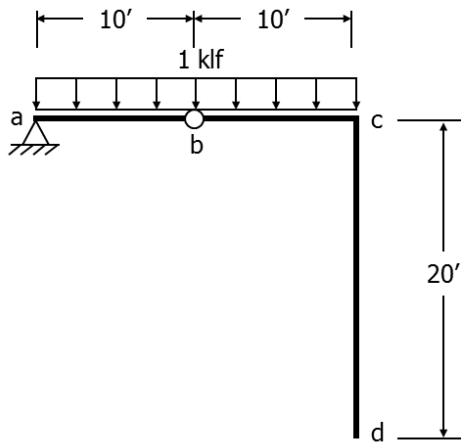
Possible Points	Score	
Problem 1	25	_____
Problem 2	15	_____
Problem 3	30	_____
Problem 4	30	_____
TOTAL	100	_____

**Problem 1** (25 points) – For the beam shown, draw shear and moment diagrams, indicating the peak values, and sketch the deflected shape.



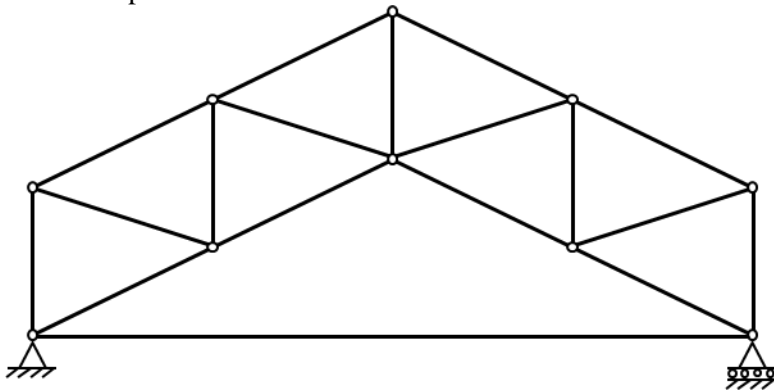
**Problem 2** (15 points) – For the frame structure shown, what is the

(a) What type of support is required at d to make the structure stable and determinate? Choose (a), (b), or (c).

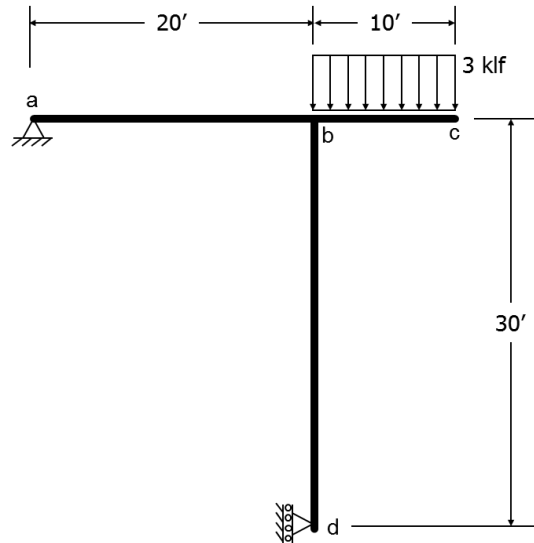


Answer: \_\_\_\_\_

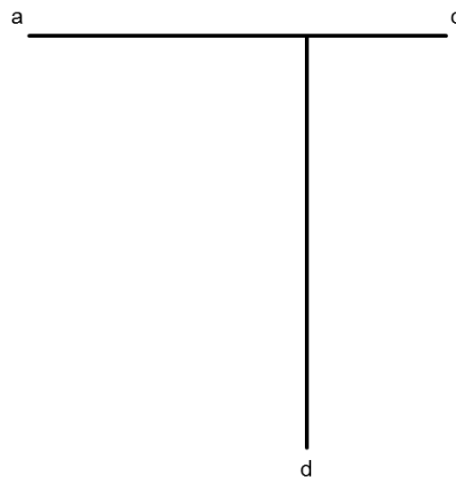
(b) State whether the truss shown is (a) unstable, (b) stable and determinate, (c) stable and indeterminate, or (d) none of the previous.



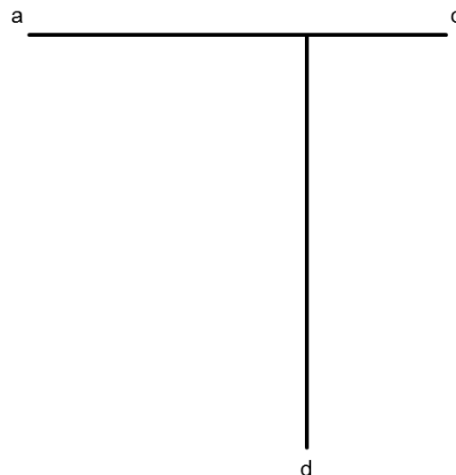
**Problem 3** (30 points) – For the frame shown, determine and show the reactions, then draw the shear and moment diagrams indicating key values and their orientation/sign.



shear



moment



**Problem 4** (30 points)

A weightless cable spans between a weightless truss on the left and a simple support on the right. Points g and h are at the same elevation. Find the force in member ec of the truss.

