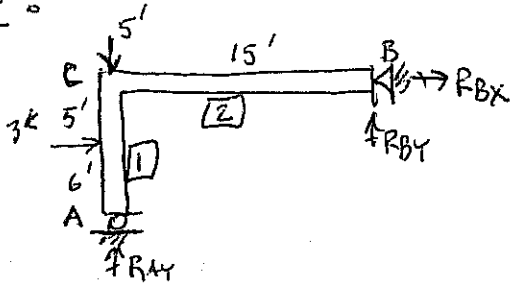


Lesson 8 More Shear and Moment Diagrams

A. Shear AND Moment in Frames

- Find end reactions & loads for individual members and draw diagrams.

Example:



1) First, find reactions

$$\sum F_x = 0 \Rightarrow R_{Bx} + 3k = 0$$

$$R_{Bx} = -3k$$

$$\sum F_y = 0 \Rightarrow R_{By} + R_{Ay} - 5 = 0$$

$$R_{By} = 5 - R_{Ay}$$

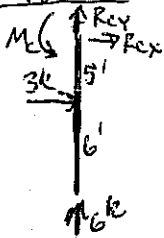
$$\sum M_B = 0 \Rightarrow 5(15) + 3(5) - 15R_{Ay} = 0$$

$$R_{Ay} = 6k$$

$$\therefore R_{By} = -1k$$

2) Now, Break the structure & find internal forces

Member 1



BY INSPECTION

$$M_C = -15kft$$

$$R_{Cx} = -3k$$

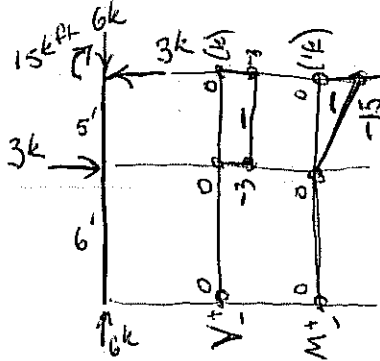
$$R_{Cy} = -6k$$

MEMBER 2

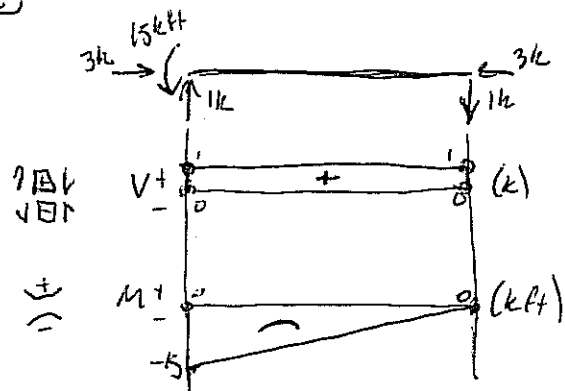


Draw Diagrams

1



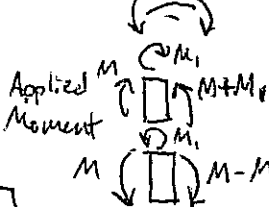
2



10/10/10

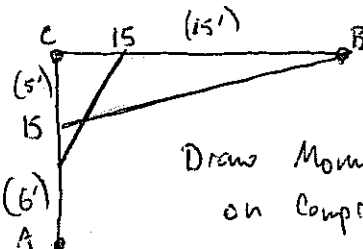
NOTE:

Moment:



moment only

For Concrete Design



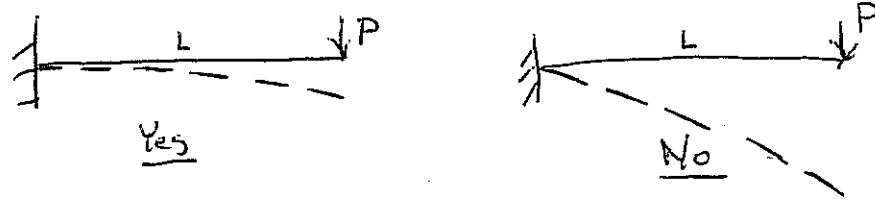
Draw Moments on Compression side

B. Sketching Deflected Shape:

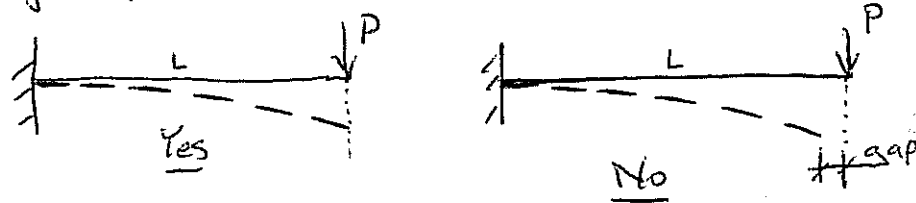
- Provides sanity check

Rules:

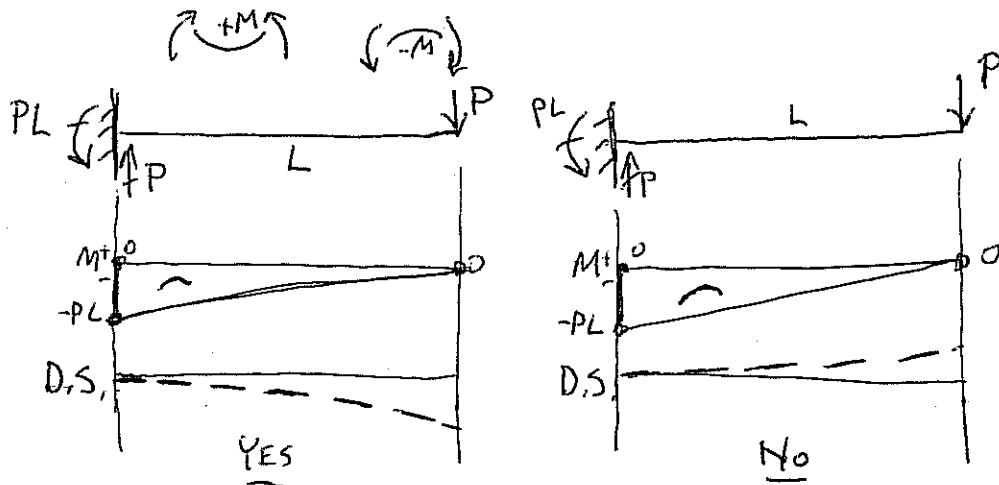
1.) Do not violate Boundary Conditions
(Restrains provided by supports)



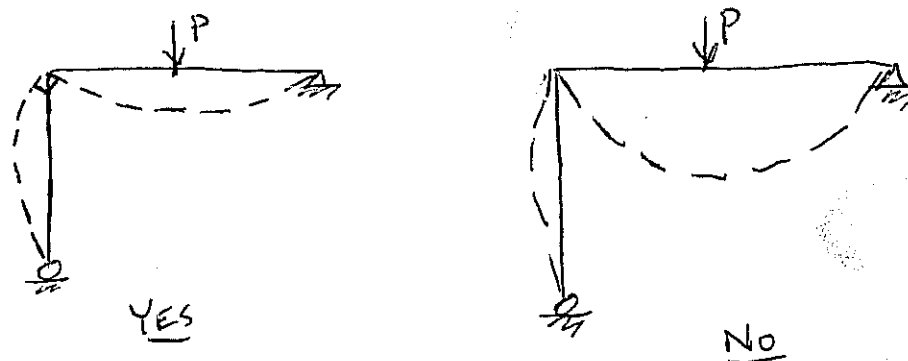
2.) Even though deflection is exaggerated, keep length same
→ Projection



3.) Do NOT VIOLATE CURVATURE / MOMENT Relationship.

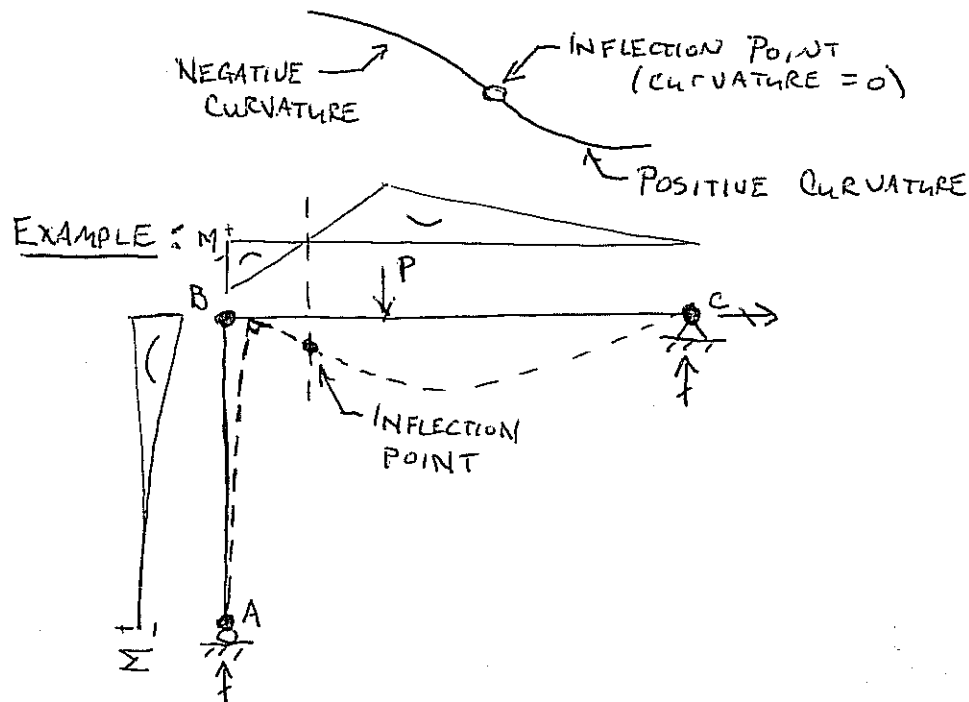


4.) PRESERVE ANGLE IN RIGID JOINTS



- SKETCHING DEFLECTED SHAPES: INFLECTION POINTS

AT POINTS WHERE THE MOMENT CURVE IS ZERO, THERE EXISTS A POINT AT WHICH DIRECTION OF CURVATURE CHANGES: INFLECTION POINT



LESSON 9:

PRINCIPLE OF SUPERPOSITION:

FOR STRUCTURES THAT BEHAVE IN A LINEAR-ELASTIC FASHION, FORCES & DISPLACEMENTS DUE TO A SET OF LOADS ARE EQUAL TO THE SUM OF THE FORCES AND DISPLACEMENTS DUE TO EACH LOAD INDIVIDUALLY