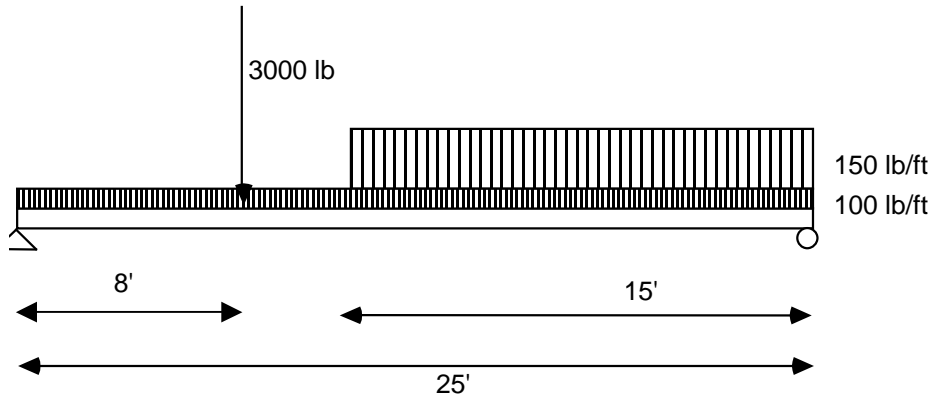


### Beam Deflection

#### Problem No. 1

The figure below illustrates a beam subject to a set of loads.

- Determine the reactions at the supports (neglect the weight of the beam).
- Draw the shearing forces diagram.
- Draw the bending moments diagram.
- Design the beam for bending using a W-shape steel (A36) cross-section (maximum allowable bending stress 24,000 psi. *Do not use safety factors, as they have been incorporated in the calculation of the vertically applied loads.*
- Using the section that you have selected before, determine the deflection of the beam at midspan and the maximum deflection. Provide the ratio of the calculated deflections over the corresponding clear span length. Redesign if any of these ratios exceeds  $L/360$ .
- Determine the maximum bending stress in the beam.



#### Problem No. 2

Determine the maximum length of the simply supported floor beam ( $D_{allow} = 1/360$ ), made of A36 steel ( $f_b = 24,000$  psi,  $f_v = 14,400$  psi,  $E = 29,600,000$  psi) shown below. Consider the maximum length of the beam governed by deflection. How does it compare to the maximum length governed by bending (problem no. 1)?

What would be the maximum length for bending and deflection if the load were 2500 lb/ft?

