

# AE333

## Mechanics of Materials

### Lecture 31 - Statically Indeterminate Beams

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## schedule

- 17 Apr - Statically Indeterminate Beams
- 19 Apr - Statically Indeterminate Beams
- 22 Apr - Exam 3 Review, HW 10 Due
- 24 Apr - Exam 3

## outline

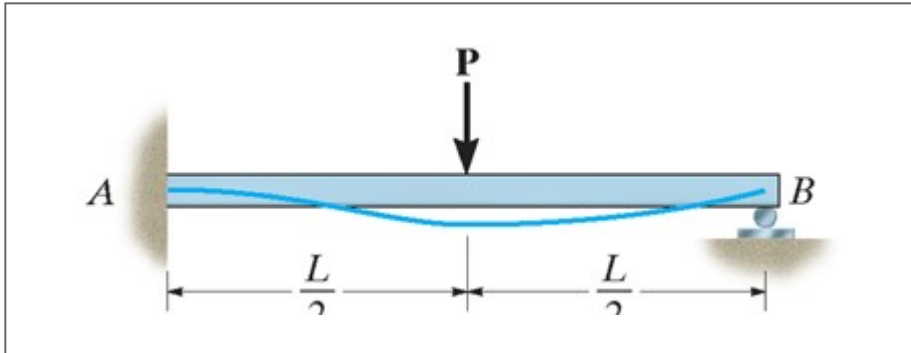
- indeterminate beams -  
superposition
- group problems

# indeterminate beams - superposition

## superposition

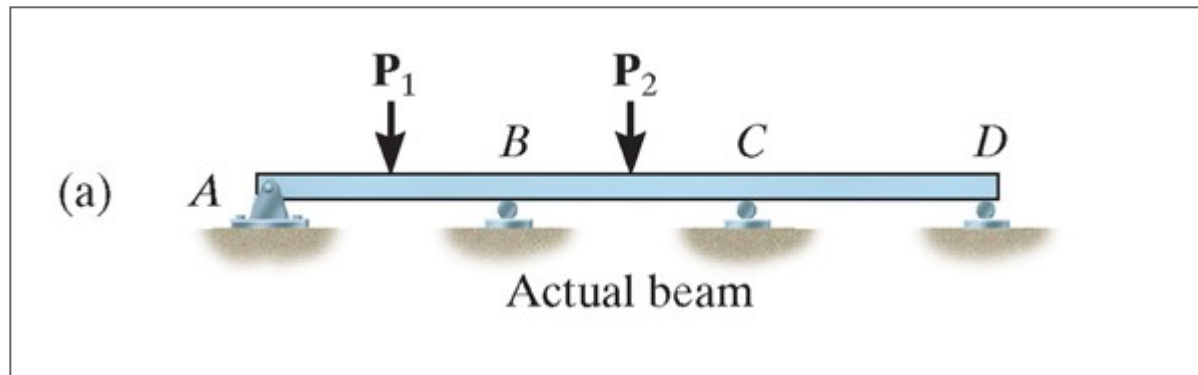
- To use superposition for finding deflection of statically indeterminate beams, we must first identify redundant reactions
- We initially remove these, then superpose them back such that the deflection at that point is 0
- The choice of which reaction(s) is redundant is arbitrary, we can choose whatever we are most comfortable with
- We use Appendix C to find deflection and slope

## superposition



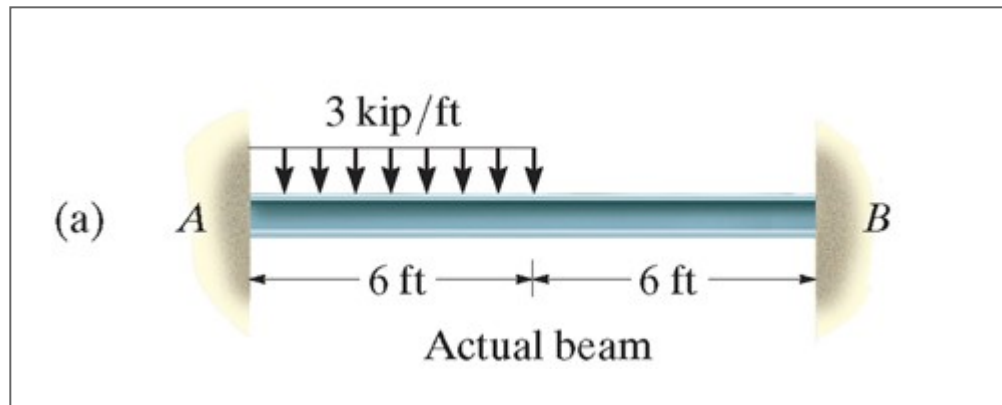
We can consider any reaction to be redundant.

## higher order indeterminacy



We need to treat each reaction separately to match Appendix C.

## example 12.22

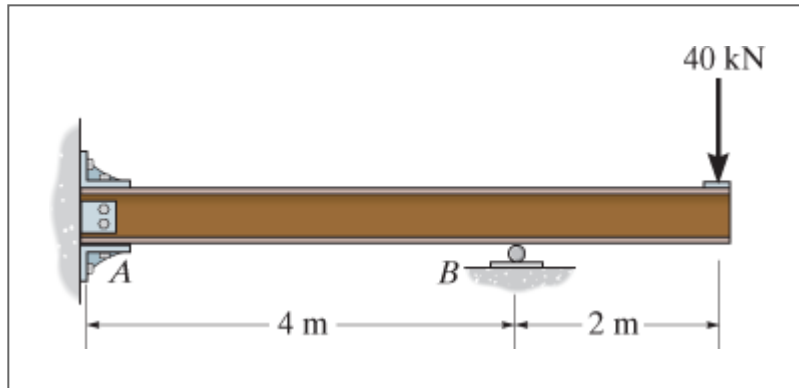


Determine the moment at B.



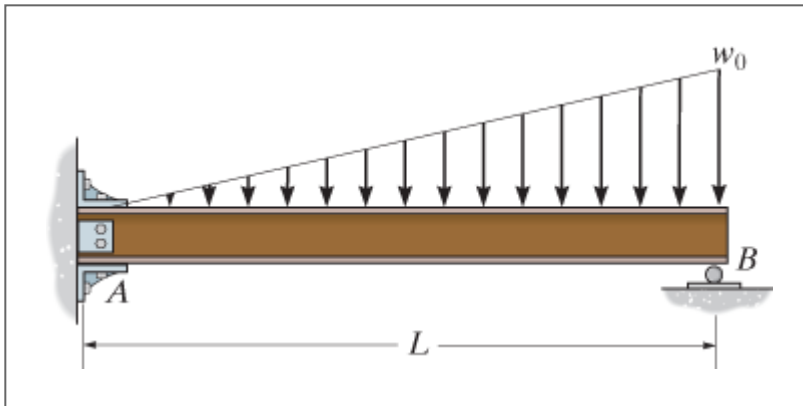
# group problems

group one



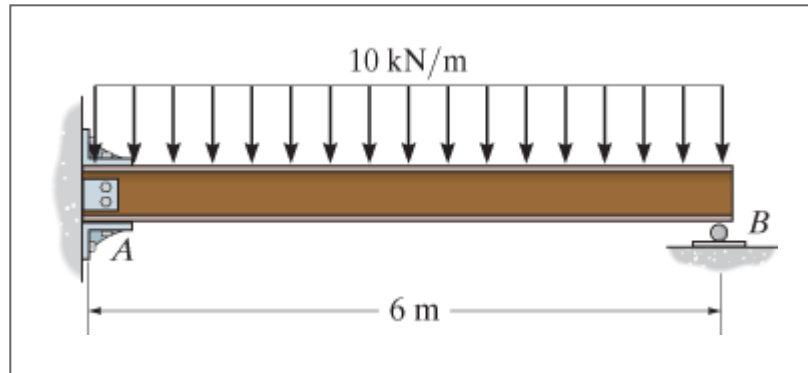
Determine the reactions at A and B ( $EI$  is constant).

group two



Determine the reactions at A and B ( $EI$  is constant).

## group three



Determine the reactions at A and B. The support at B settles 2 mm.  $E = 200 \text{ GPa}$ ,  $I = 65.0(10^{-6})\text{m}^4$ .