Lec17

Thursday, October 29, 2020 9:55 AM

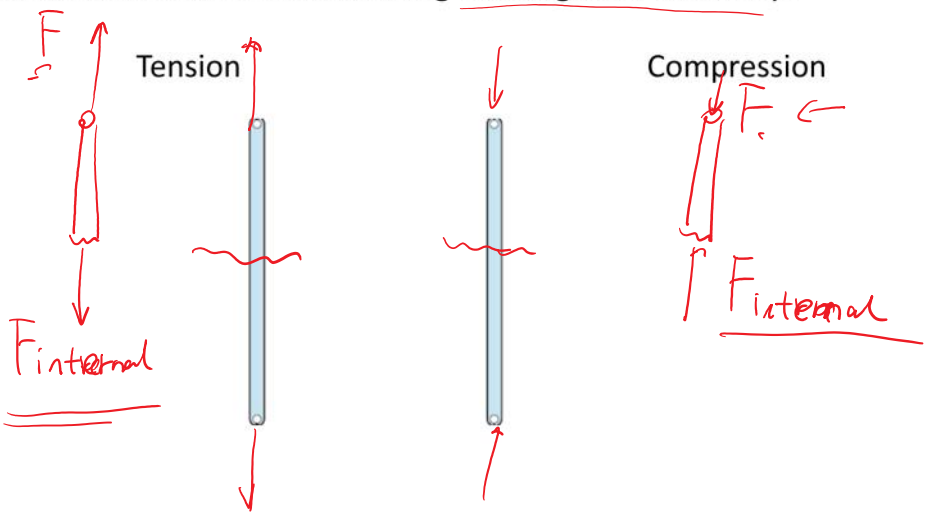
Lecture Objectives

- Truss Analysis – Method of Section
- Frame Analysis

1

Internal forces

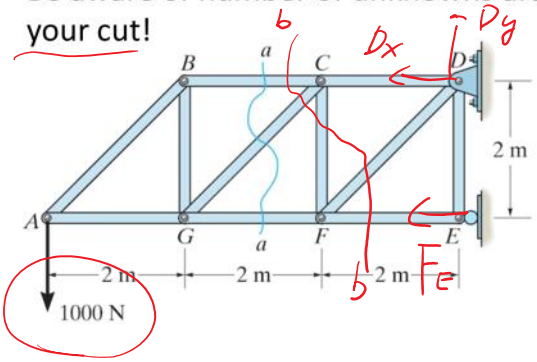
- How are two-force members being held together internally?

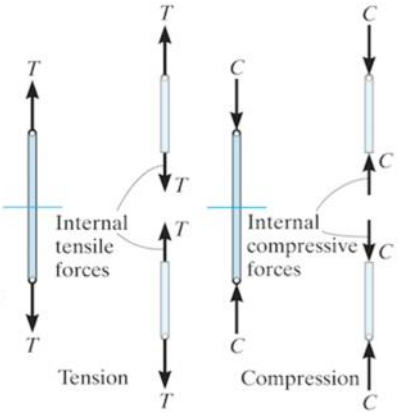


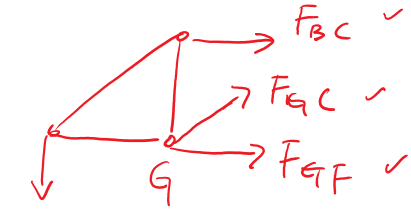
2

Method of sections

- Determine external support reactions
- "Cut" the structure at a section of interest into two separate pieces and set either part into force and moment equilibrium
- Be aware of number of unknowns after your cut!



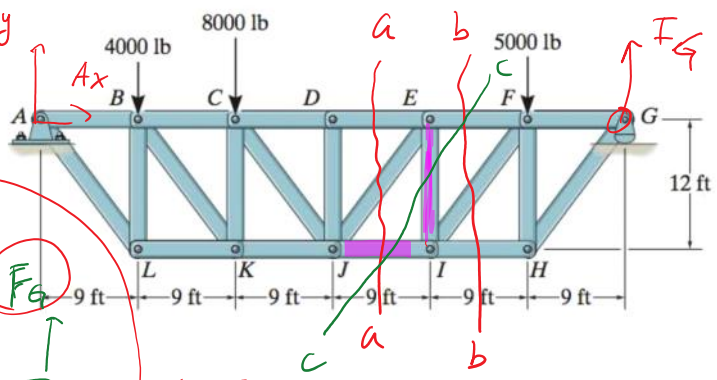




$\sum F_x = 0$
$\sum F_y = 0$
$\sum M_G = 0 \Rightarrow F_{BC}$

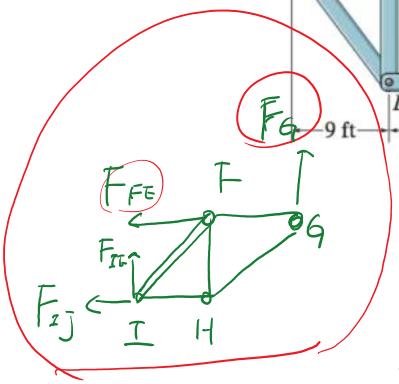
3

Determine the force in members *EI* and *JI* of the truss which serves to support the deck of a bridge. State if these members are in tension or compression.



$\sum M_A = 0$

$F_G = ?$



$\sum F_x = 0$
$\sum F_y = 0$
$\sum M_I = 0 \Rightarrow F_{FE} = ?$

4

i-Clicker Time

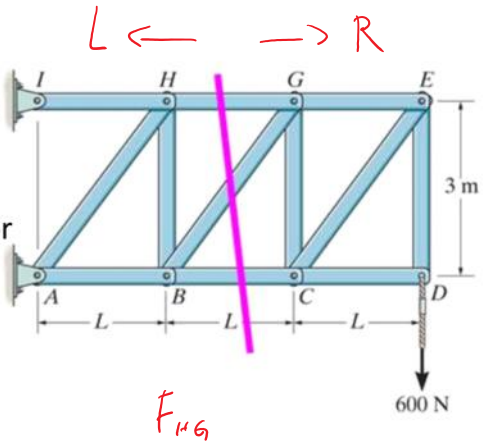
As shown, a cut is made through members *GH*, *BG* and *BC* to determine the forces in them. Which section will you choose for analysis and why?

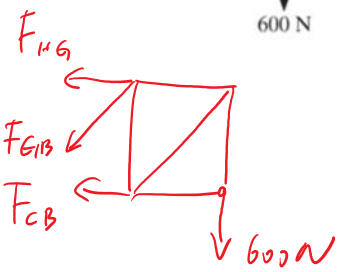
A) Right, fewer calculations.

B) Left, fewer calculations.

C) Either right or left, same amount of work.

D) None of the above, too many unknowns.





5

i-Clicker Time

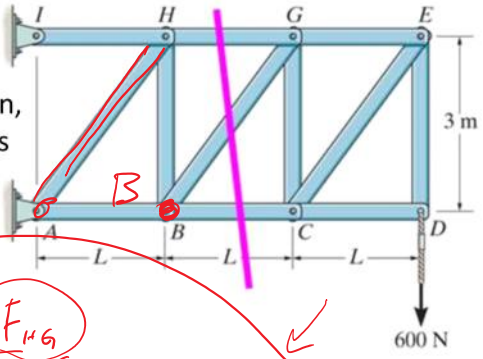
When determining the force in member HG in the previous question, which one equation of equilibrium is the best one to use?

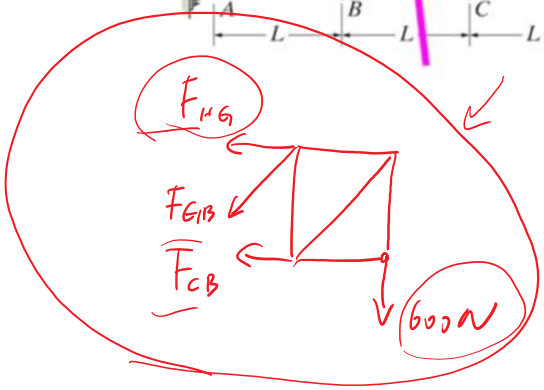
A) $\Sigma M_H = 0$

B) $\Sigma M_G = 0$

C) $\Sigma M_B = 0$

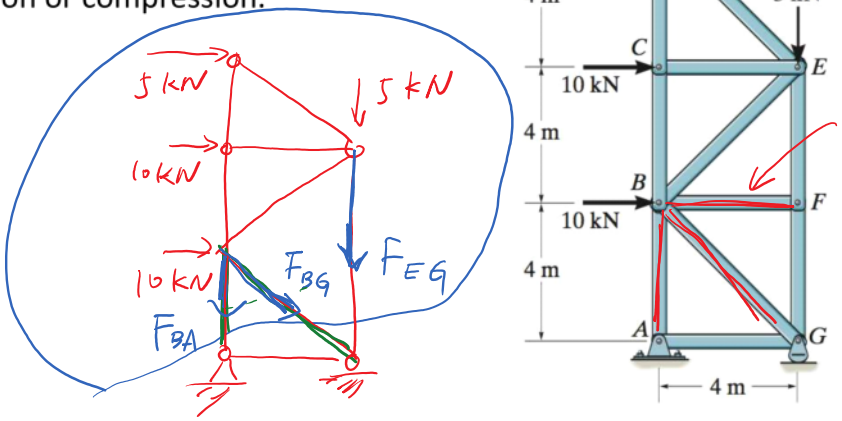
D) $\Sigma M_C = 0$





6

Determine the force in members *BF*, *BG*, and *AB*, and state if the members are in tension or compression.



$\Sigma F_x = 0$
$\Sigma F_y = 0$ $\Rightarrow$ $F_{EG} = ?$
$\Sigma M_B = 0$ $F_{BG} = ?$ $F_{BA} = ?$

7

i-Clicker Time

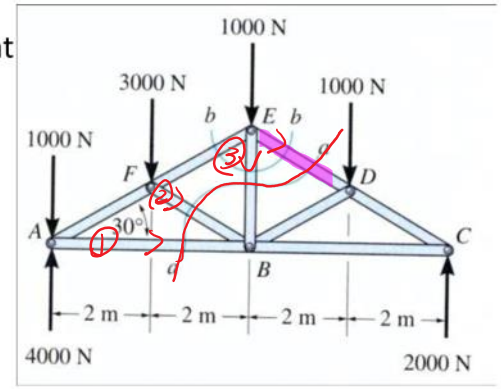
Can you determine the force in member ED by making the cut at section a-a?

A) No, there are 4 unknowns.

B) Yes, using $\Sigma M_D = 0$.

C) Yes, using $\Sigma M_E = 0$.

D) Yes, using $\Sigma M_B = 0$.



$\Sigma M_B = 0$

8

i-Clicker Time

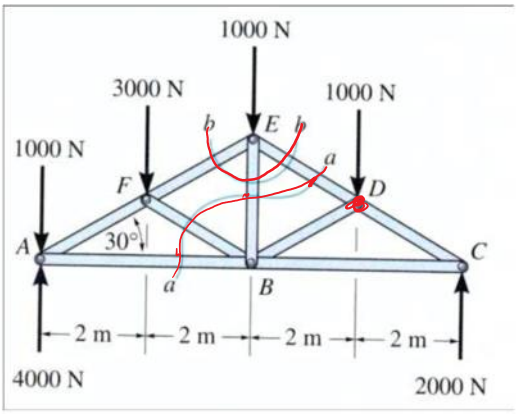
If you know F_{ED}, how will you determine F_{EB}?

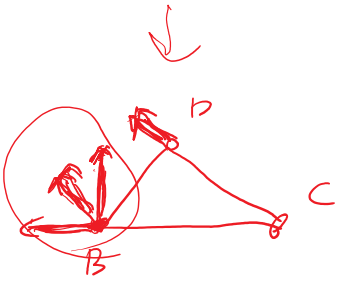
A) By taking section b-b and using $\Sigma M_F = 0$

B) By taking section b-b, and using $\Sigma F_X = 0$ and $\Sigma F_Y = 0$

C) By taking section a-a and using $\Sigma M_B = 0$

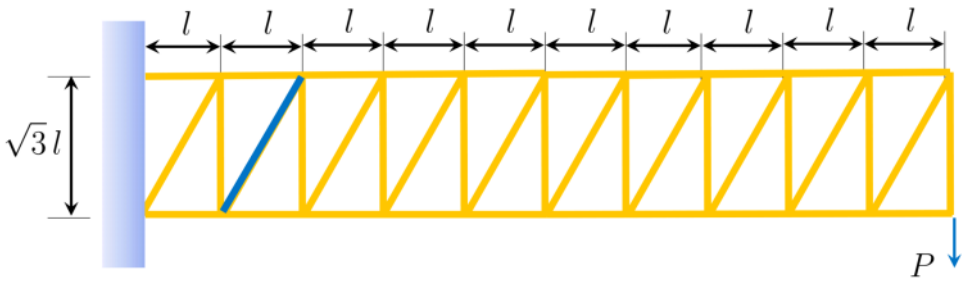
D) By taking section a-a and using $\Sigma M_D = 0$





F_{EF}? F_{ED} ✓ F_{EB}?

9



A) $F = P$

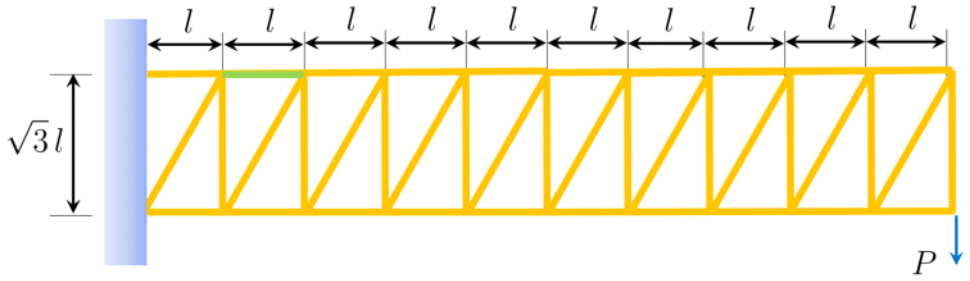
B) $F = -P$

C) $F = \frac{2}{\sqrt{3}}P$

D) $F = -\frac{2}{\sqrt{3}}P$

E) $F = 0$

10



A) $F = 9P$

B) $F = -9P$

C) $F = \frac{9}{\sqrt{3}}P$

D) $F = -\frac{9}{\sqrt{3}}P$

E) $F = 0$

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