Method of Sections

- If the forces in only a few members of a truss are to be determined, the ***method of sections*** is generally the most appropriate analysis procedure.
- The method of sections consists of passing an *imaginary line* through the truss, cutting it into sections.
- Each imaginary section must be in equilibrium if the entire truss is in equilibrium.

$$\sum F_x = 0 \quad \sum F_y = 0 \quad \sum M_z = 0$$

Method of Sections

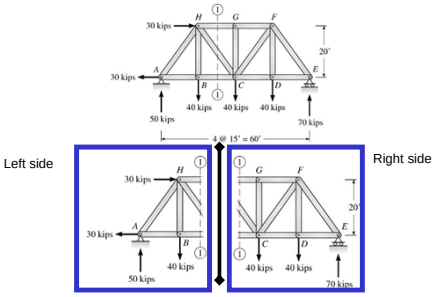
Procedure for analysis - the following is a procedure for analyzing a truss using the method of sections:

1. First, if necessary, determine the support reactions for the entire truss.
2. Next, make a decision on how the truss should be "cut" into sections and draw the corresponding free-body diagrams.
3. Try to apply the three equations of equilibrium such that simultaneous solution **is not** required.

   Moments should be summed about points that lie at the intersection of the lines of action of two unknown forces, so that the remaining force may be determined.

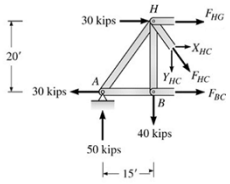
Method of Sections

Imagine cutting a structure into two sections about line 11



Method of Sections

- Typically the section with the fewest forces or with section with the most convenient geometry is selected.
- In this example the left-hand side.



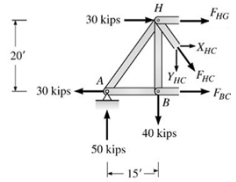
- Apply the three equations of equilibrium to the section.
- If possible, attempt to develop an equation in just one unknown.
- Look for points where the lines of action of several forces are concurrent.

Method of Sections

$\sum M_H = 0 \quad = F_{BC}(20\,\text{ft.}) - 30k(20\,\text{ft.}) - 50k(15\,\text{ft.})$ → F_{BC} = 67.5 *k*

$\sum M_C = 0 \quad = -F_{HG}(20\,\text{ft.}) - 30k(20\,\text{ft.}) - 50k(30\,\text{ft.}) + 40k(15\,\text{ft.})$

F_{HG} = -75 *k*



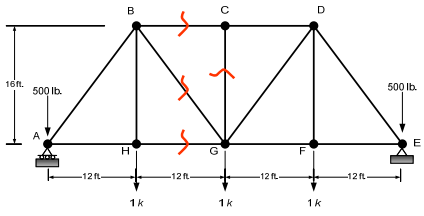
$\sum F_y = 0 \quad = -\frac{4}{5}F_{HC} - 40k + 50k$

F_{HC} = 12.5 *k*

F_{BC} = 67.5 *k* (T) F_{HG} = 75 *k* (C) F_{HC} = 12.5 *k* (T)

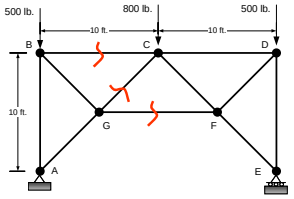
Method of Sections

Example: Determine the forces BC, BG, HG, and CG in the following truss.



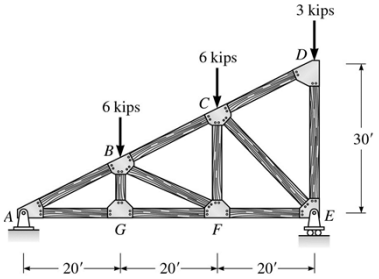
Method of Sections

Example: Determine the forces BC, CG, and GF in the following truss.



Method of Sections

Example: Determine the forces in all bars of the truss



End of Trusses - Part 3

Any questions?