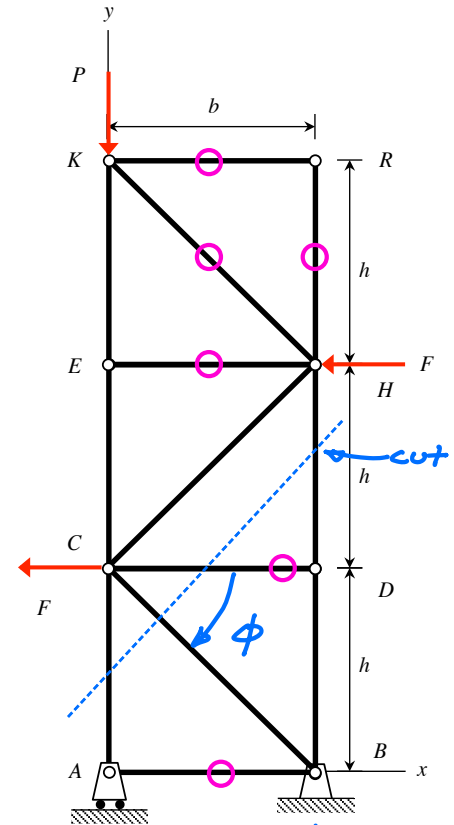


**Given:** Consider the truss shown below with the external loadings shown on joints C, H and K.

**Find:** For this problem:

- Identify all zero-force members in the truss.
- Using the method of sections, determine the loads carried by members DH, BC and AC. Leave your answers in terms of  $F$ . Identify each member as either being in tension, in compression or carrying zero load. You will receive 4 bonus points for successfully solving for these member loads using only a single cut with your method of sections.

For this problem, use the following parameters:  $h = 3b/4$  and  $P = 3F$ .



(a) Consider joints R, E, D and A. From this, the zero-force members are: KH, KR, RH, EH, CD and AB.

(b) Four-step plan:

1. FBD: Make cut shown through members AC, BC, CD and DH. Since CD carries zero load, there are three unknown loads exposed by this cut.

2. Equilibrium:

$$(1) \sum M_C = -F_{DH} b + Fh = 0$$

$$(2) \sum M_B = F_{AC} b + Fh + F(2h) + 3Fb = 0$$

$$(3) \sum F_x = F_{CD} \cos \phi - F - F = 0$$

3. Solvability: 3 eqns / 3 unknowns

4. Solve

$$(1) \Rightarrow F_{DH} = \frac{h}{b} F = \frac{3}{4} F \text{ (T)}$$

$$(2) \Rightarrow F_{AC} = -\frac{3F(h+b)}{b} = -3F\left(\frac{h}{b} + 1\right) = -\frac{21}{4} F \text{ (C)}$$

$$(3) \Rightarrow F_{BC} = \frac{2F}{\cos \phi} = \frac{5}{2} F \text{ (T)}$$

$$\cos \phi = \frac{b}{\sqrt{b^2 + h^2}} = \frac{1}{\sqrt{1 + \left(\frac{h}{b}\right)^2}} = \frac{4}{5}$$

