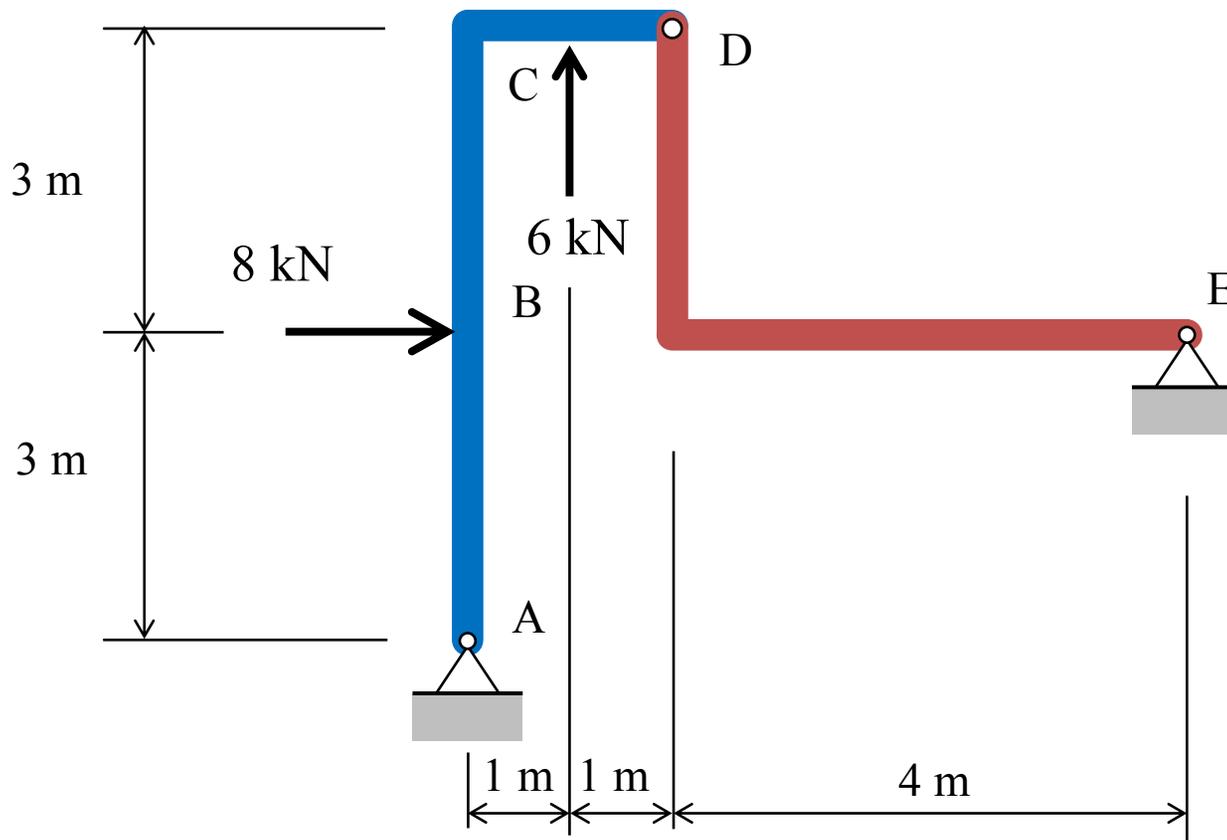


Analysis of a Two-Dimensional Body with a Two-Force Member

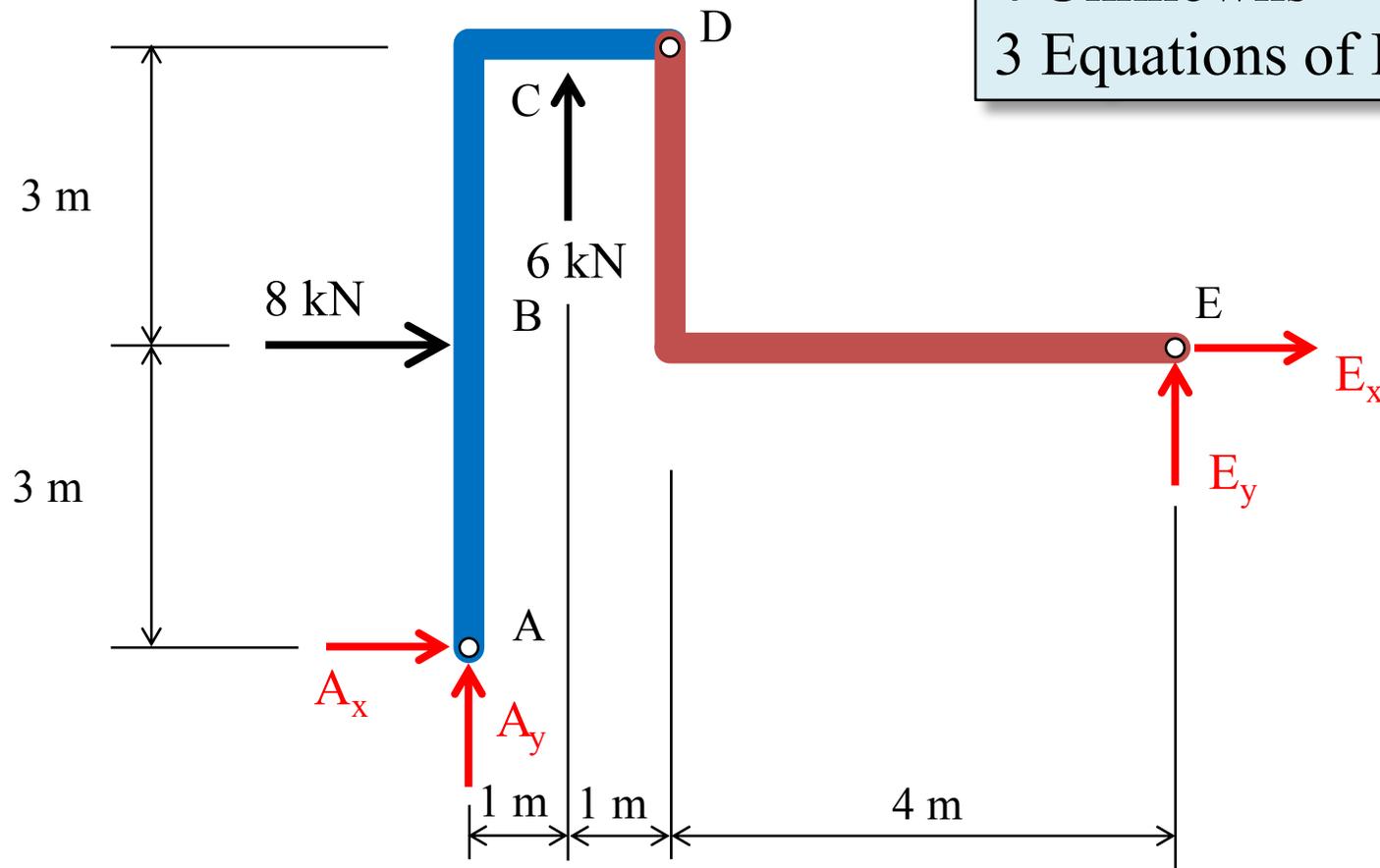
Steven Vukazich

San Jose State University

The structure shown is pin supported at points A and E. Members ABCD and DE are connected by an internal hinge at point D. For the loading shown, find the reaction forces at the pin supports at at points A and E. The weight of the members is negligible.



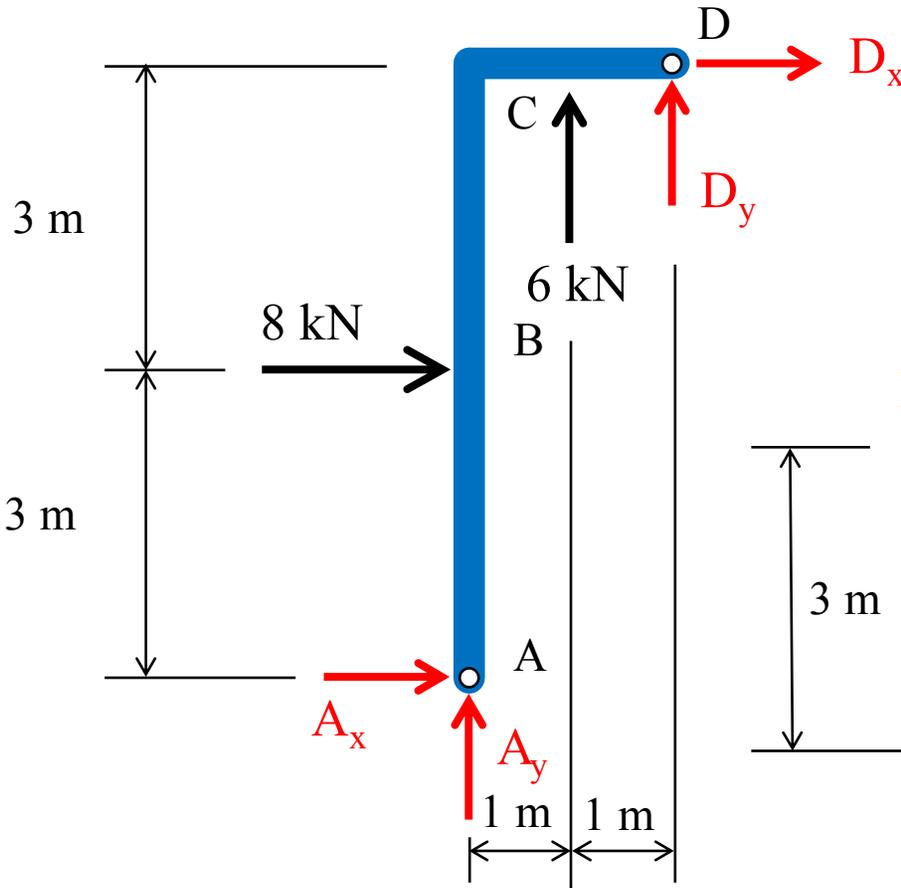
FBD of Entire Structure



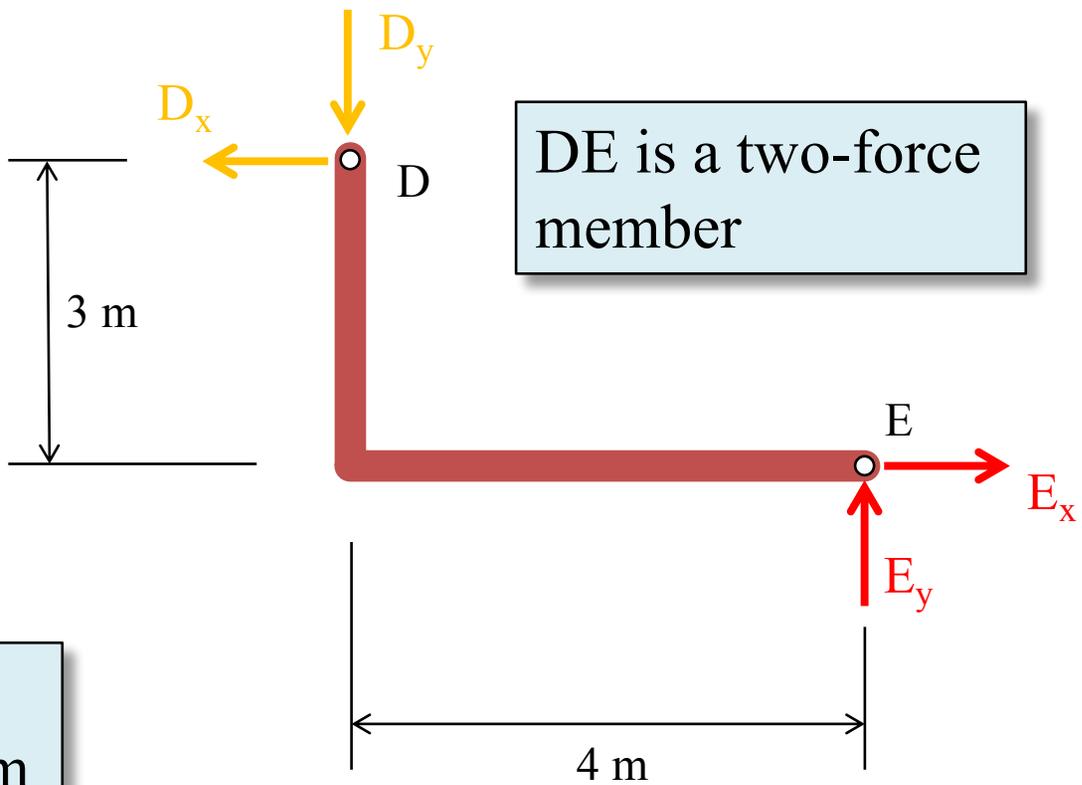
4 Unknowns

3 Equations of Equilibrium

FBDs of ABCD and DE



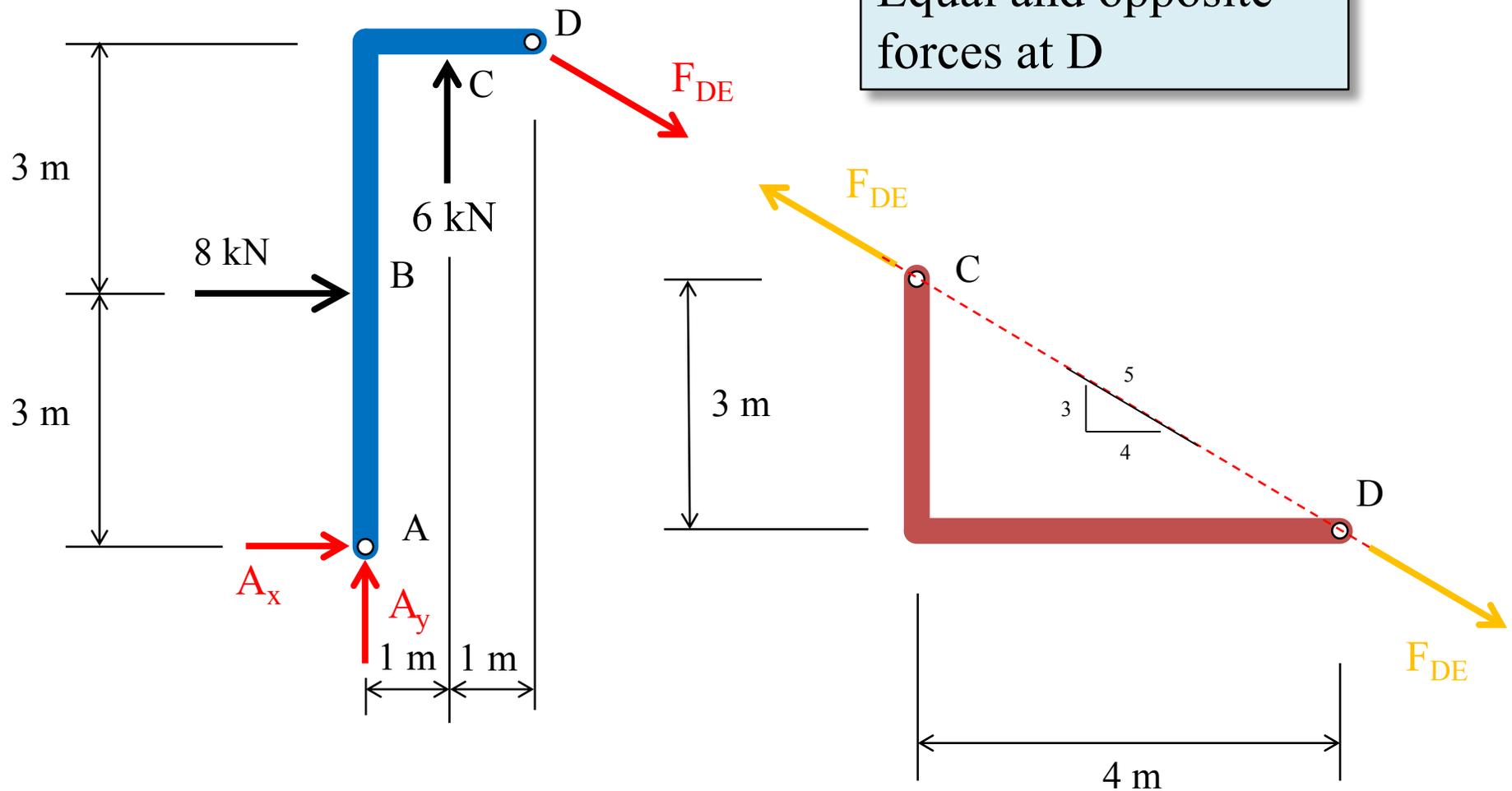
Equal and opposite forces at D



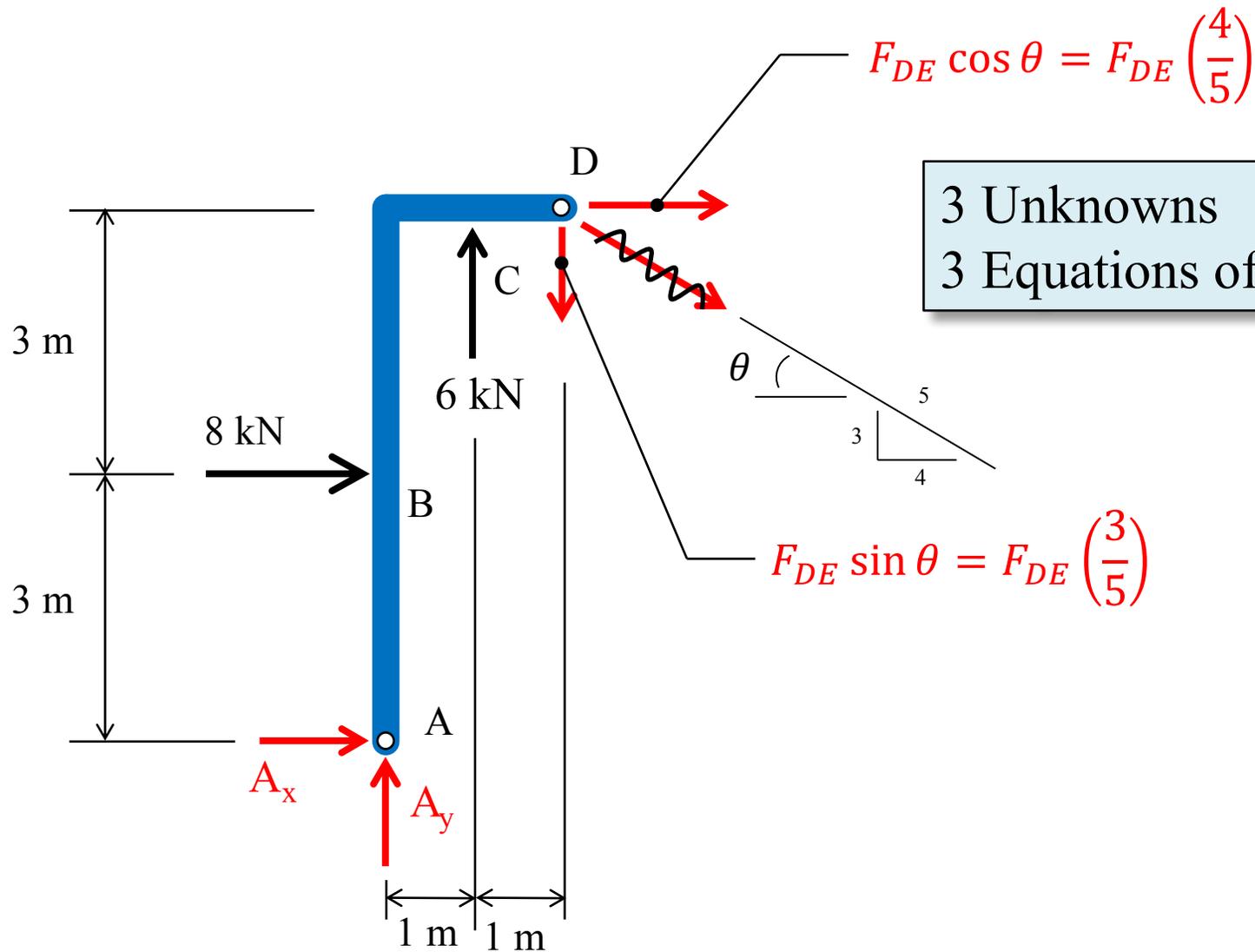
DE is a two-force member

6 Unknowns
6 Equations of Equilibrium

FBDs of ABCD and DE
recognizing that DE is a two-force member

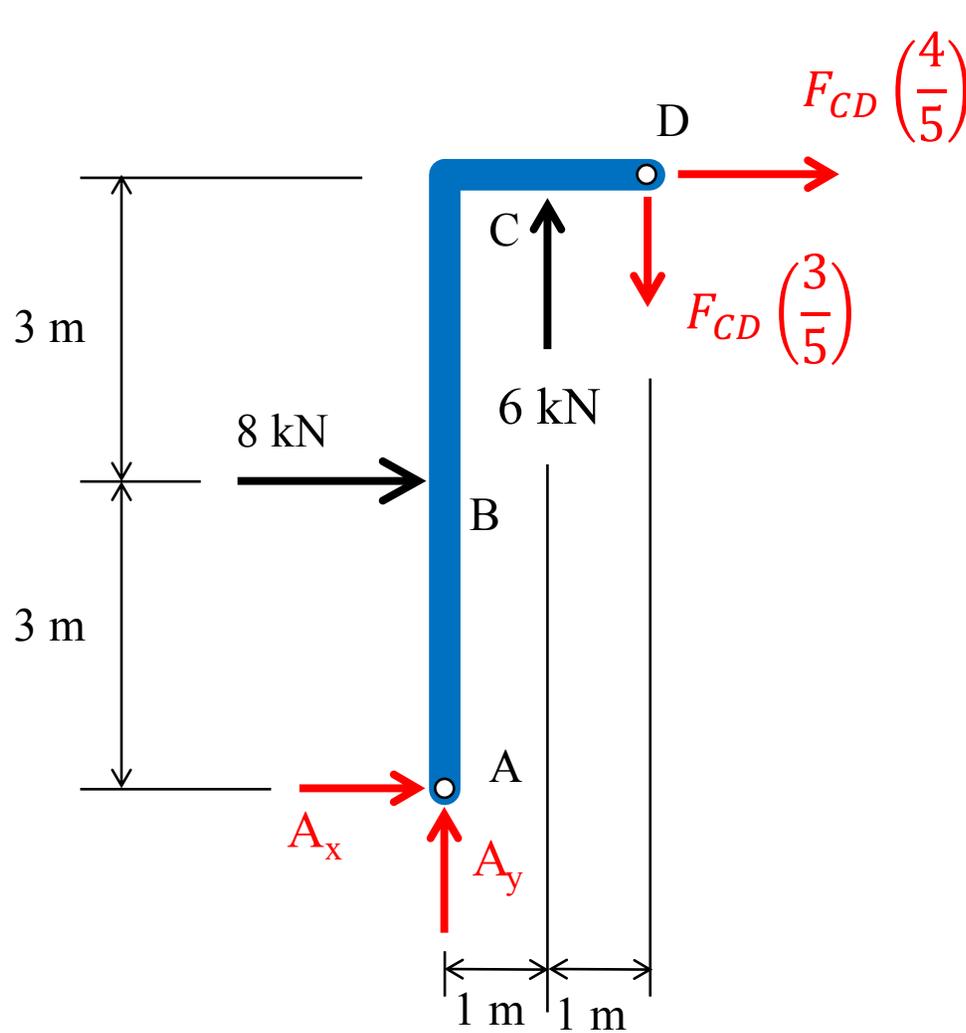


FBD of ABCD



3 Unknowns
3 Equations of Equilibrium

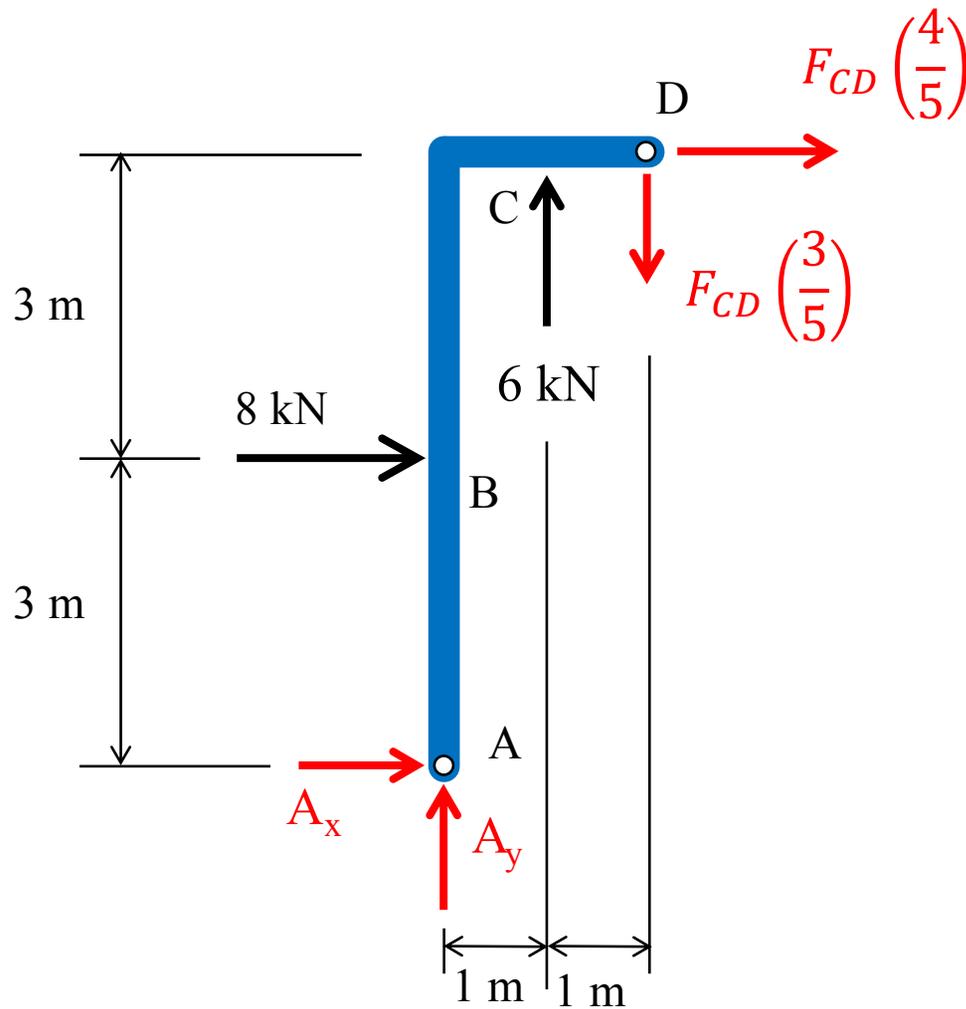
Equilibrium of ABCD



$$\oplus \sum M_A = 0$$

$$F_{CD} = -3 \text{ kN}$$

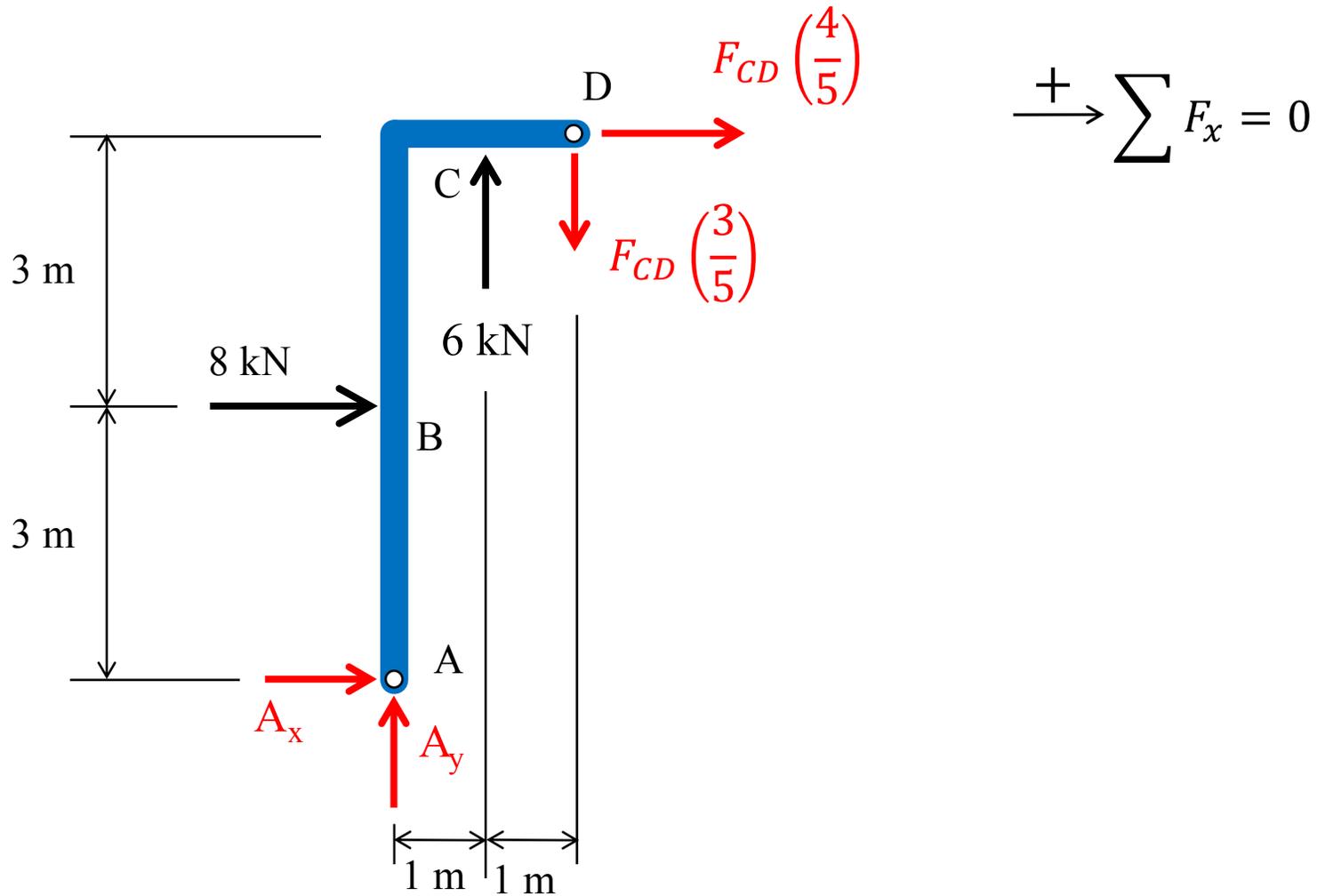
Equilibrium of ABCD



$$+\uparrow \sum F_y = 0$$

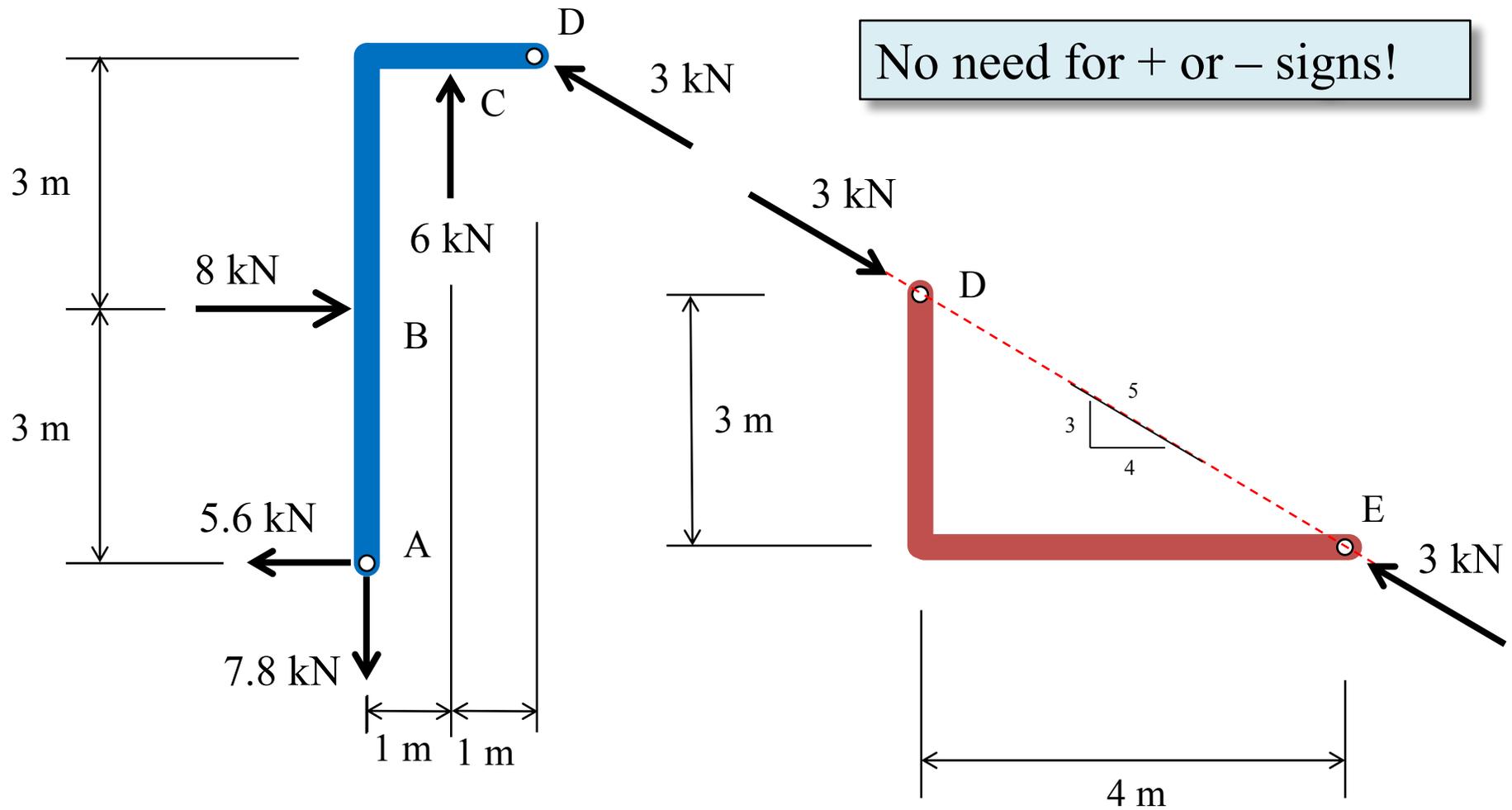
$$A_y = -7.8 \text{ kN}$$

Equilibrium of ABCD



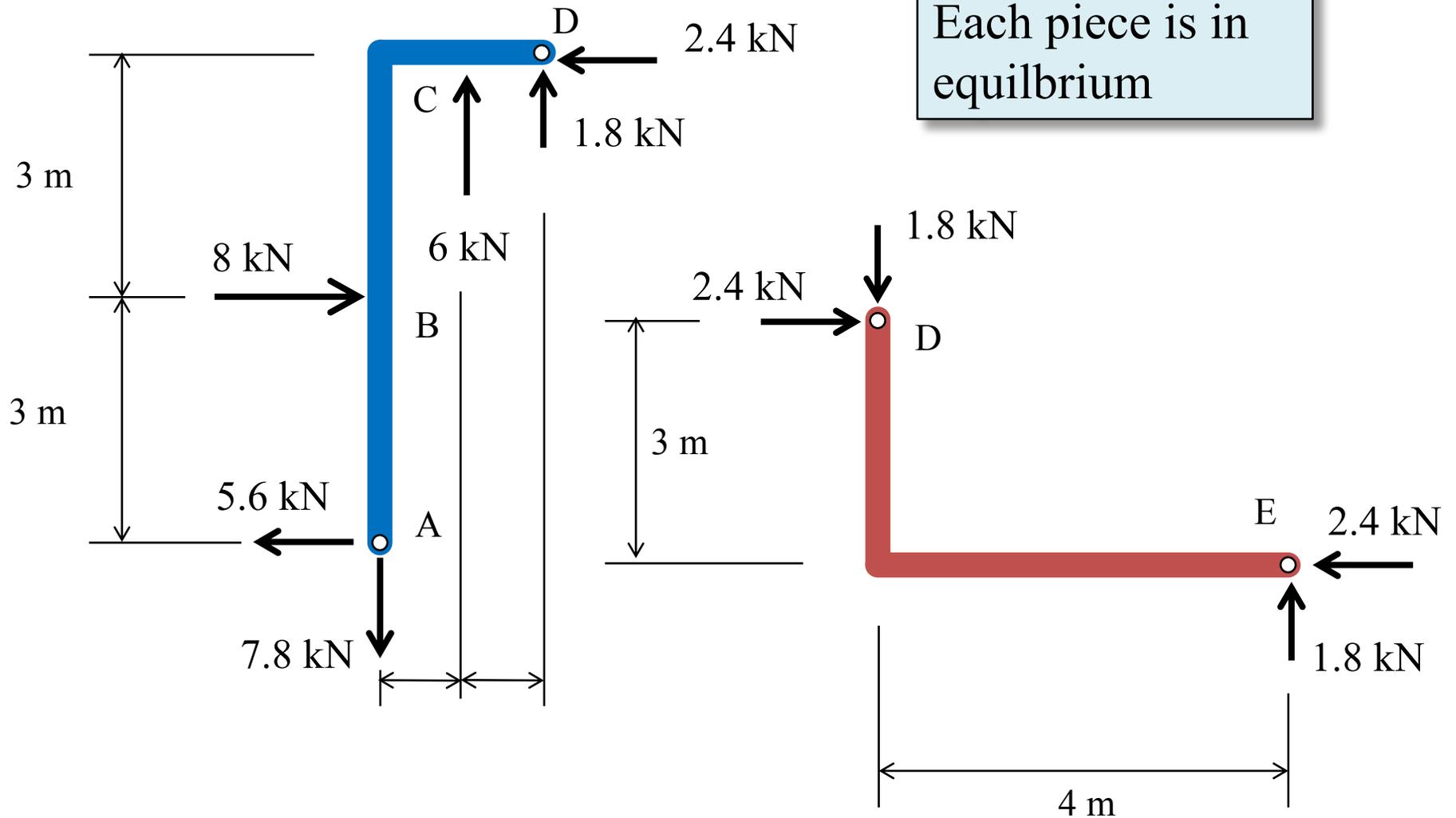
$$A_x = -5.6 \text{ kN}$$

Show results on a FBDs of ABCD and DE



Results in terms of components

Each piece is in equilibrium



FBD of Entire Structure

