

Manager: _____ Research: _____

Secretary: _____ Reporter: _____

FRAME WORK

Working in groups of four, decide on your roles first. Each group should turn in one Final Report at the beginning of the next class meeting. The Report consists of this page as a cover sheet and separate pages with calculations and answers.

Figure 1 shows a metal frame within a coordinate system. The three feet of the frame lie in the xy plane. We first study the geometry of the frame in Problems 1-3. Then we consider the effect of the indicated force on the frame in Problems 4-6.

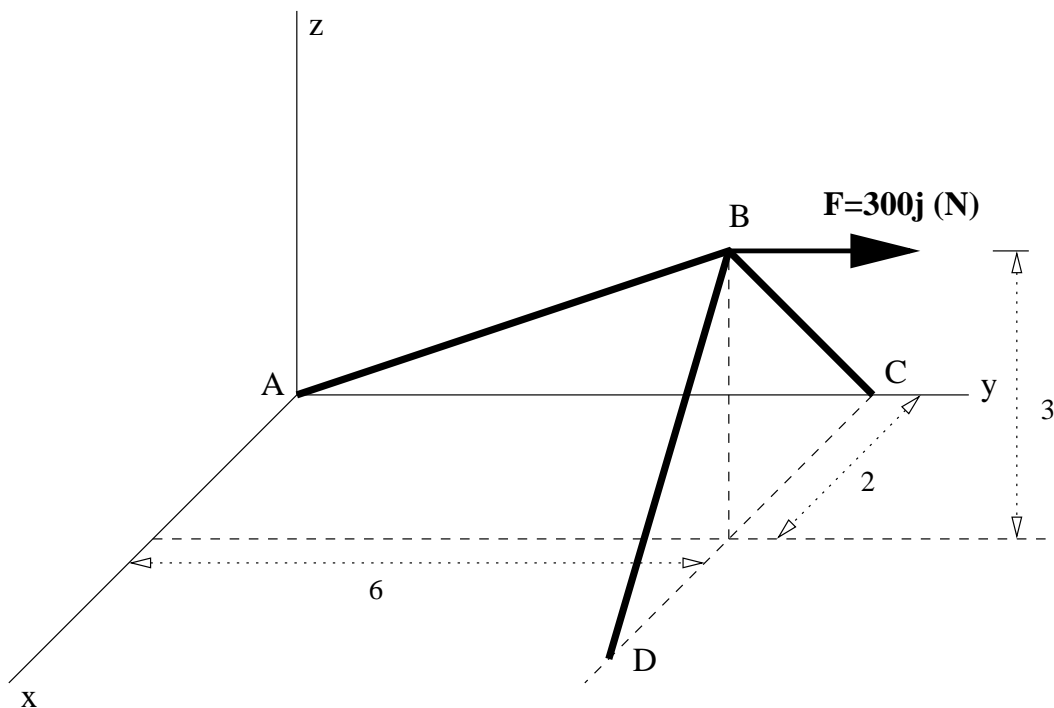


Figure 1: Frame and Loading Force

Problem 1 Find the coordinates of the points A , B , and C .

Problem 2 Express the vectors \vec{BA} and \vec{BC} in components.

Problem 3 Find the degree measure of the angle at B between the strut BA and the strut BC .

The force \vec{F} in Figure 1 has a magnitude of 300 N (newtons) and is applied at the joint B in the positive y -direction. This force can be decomposed as the sum of a vector component \vec{F}_{\parallel} that is parallel to the strut AB and a vector component \vec{F}_{\perp} that is perpendicular to the strut AB .

Problem 4 Calculate the magnitude $|\vec{\mathbf{F}}_{\parallel}|$ of the parallel vector component.

Problem 5 Find a unit vector that points in the direction of the perpendicular vector component $\vec{\mathbf{F}}_{\perp}$.

Problem 6 The loading force $\vec{\mathbf{F}}$ also affects the strut BC . Does the loading force tend to stretch or compress the strut BC ?