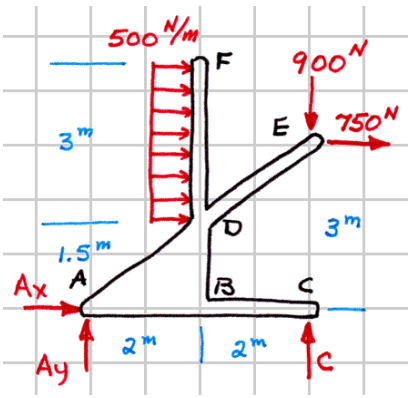
1-36

From an overall free-body diagram, the equations of equilibrium give



$$\rightarrow \Sigma F_x = 0: \qquad A_x + (500 \times 3) + 750 = 0$$

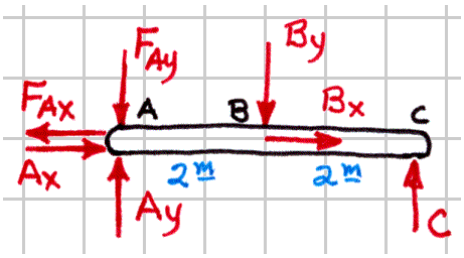
$$\uparrow \Sigma F_y = 0: \qquad A_y - 900 + C = 0$$

$$\circlearrowleft \Sigma M_A = 0: \qquad 4C - (3 \times 500)(3) - 4(900) - 3(750) = 0$$

$$C = 2587.50 \text{ N}$$

$$A_x = -2250 \text{ N} \qquad A_y = -1687.50 \text{ N}$$

Next, draw a free-body diagram of the bar *ABC*. Note that the forces A_x and A_y are the forces exerted on bar *ABC* by the support (the same forces that are shown on the overall free-body diagram) and that the forces F_{Ax} and F_{Ay} are the forces exerted on bar *ABC* by the bar *ADE*. The equations of equilibrium give



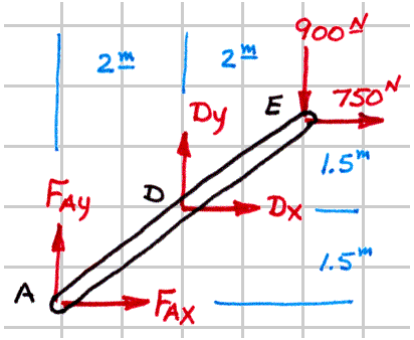
$$\rightarrow \Sigma F_x = 0: \qquad A_x + B_x - F_{Ax} = 0$$

$$\uparrow \Sigma F_y = 0: \qquad A_y - F_{Ay} - B_y + C = 0$$

$$\circlearrowleft \Sigma M_A = 0: \qquad 4(2587.50) - 2B_y = 0$$

$$B_y = 5175.00 \text{ N} \qquad F_{Ay} = -4275.00 \text{ N}$$

Finally, from a free-body diagram of the bar *ADE*



$$\rightarrow \Sigma F_x = 0: \qquad F_{Ax} + D_x + 750 = 0$$

$$\uparrow \Sigma F_y = 0: \qquad F_{Ay} + D_y - 900 = 0$$

$$\circlearrowleft \Sigma M_D = 0: \qquad 1.5F_{Ax} - 2(-4275) - 2(900) - 1.5(750) = 0$$

$$F_{Ax} = -3750 \text{ N}$$

$$D_x = 3000 \text{ N} \qquad D_y = 5175 \text{ N}$$

A = 5690 N ◤ 48.7° ..... **Ans.**

D = 5980 N ◢ 59.9° ..... **Ans.**

E = 1170 N ◥ 50.2° ..... **Ans.**