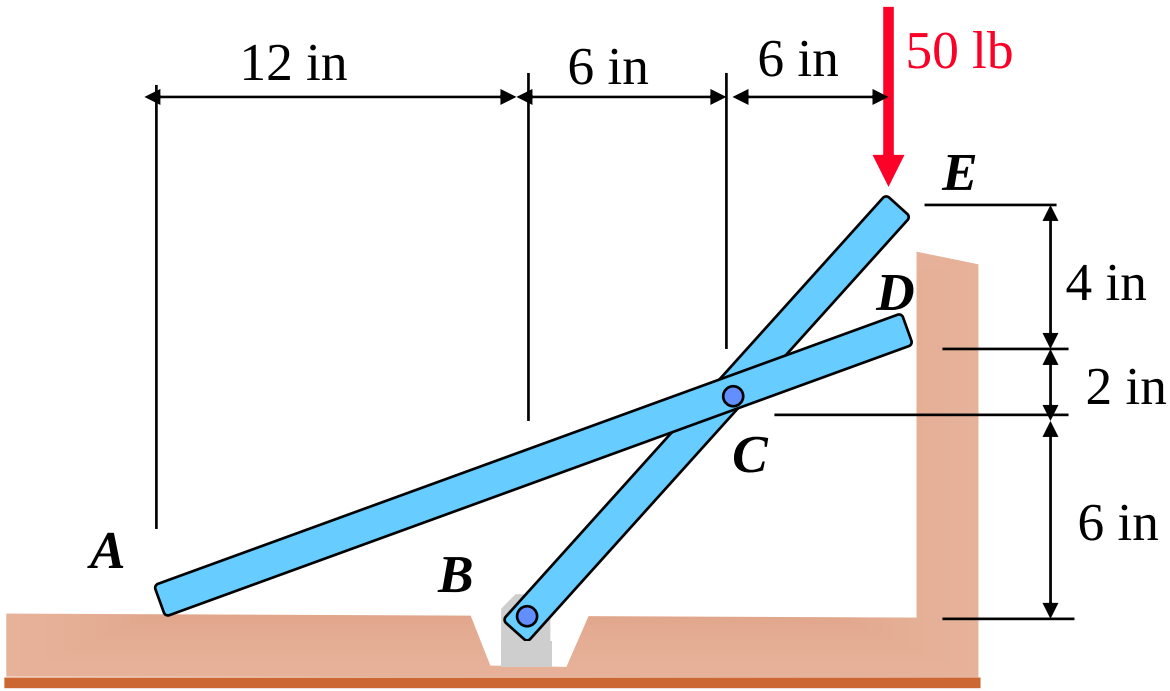
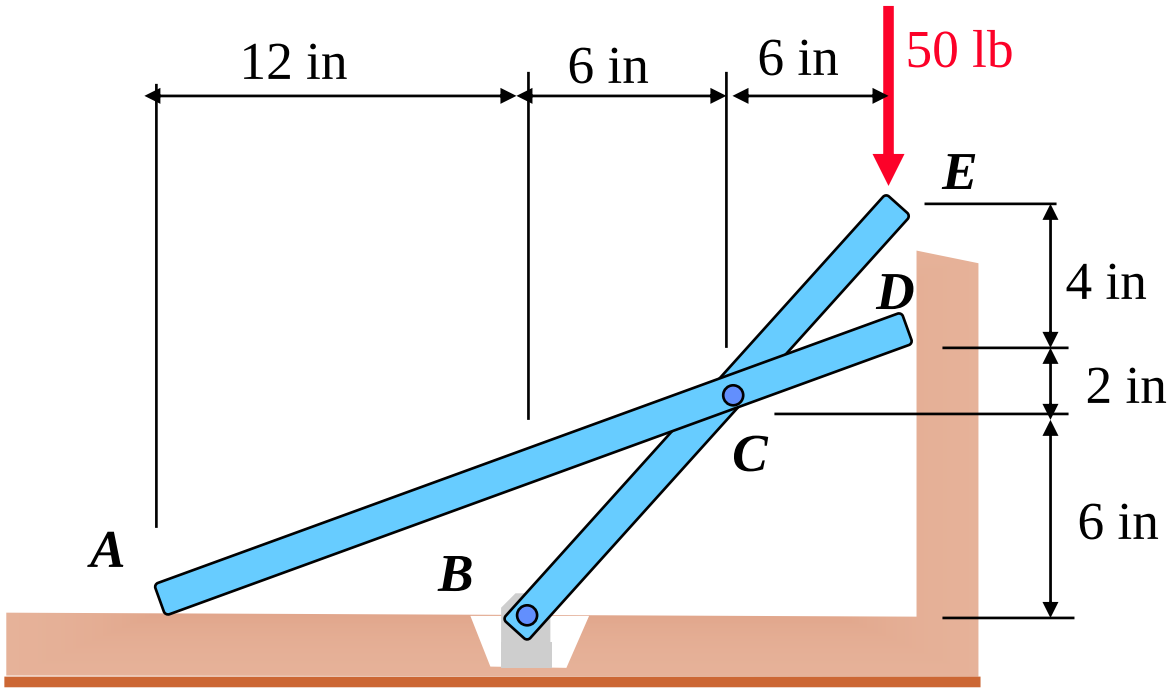
Problem 6.166 (a)



For the frame shown and neglecting the effect of friction at the horizontal and vertical surfaces, determine the forces exerted at *B* and *C* on member *BCE*.

Problem 6.166 (a)

Solving Problems on Your Own



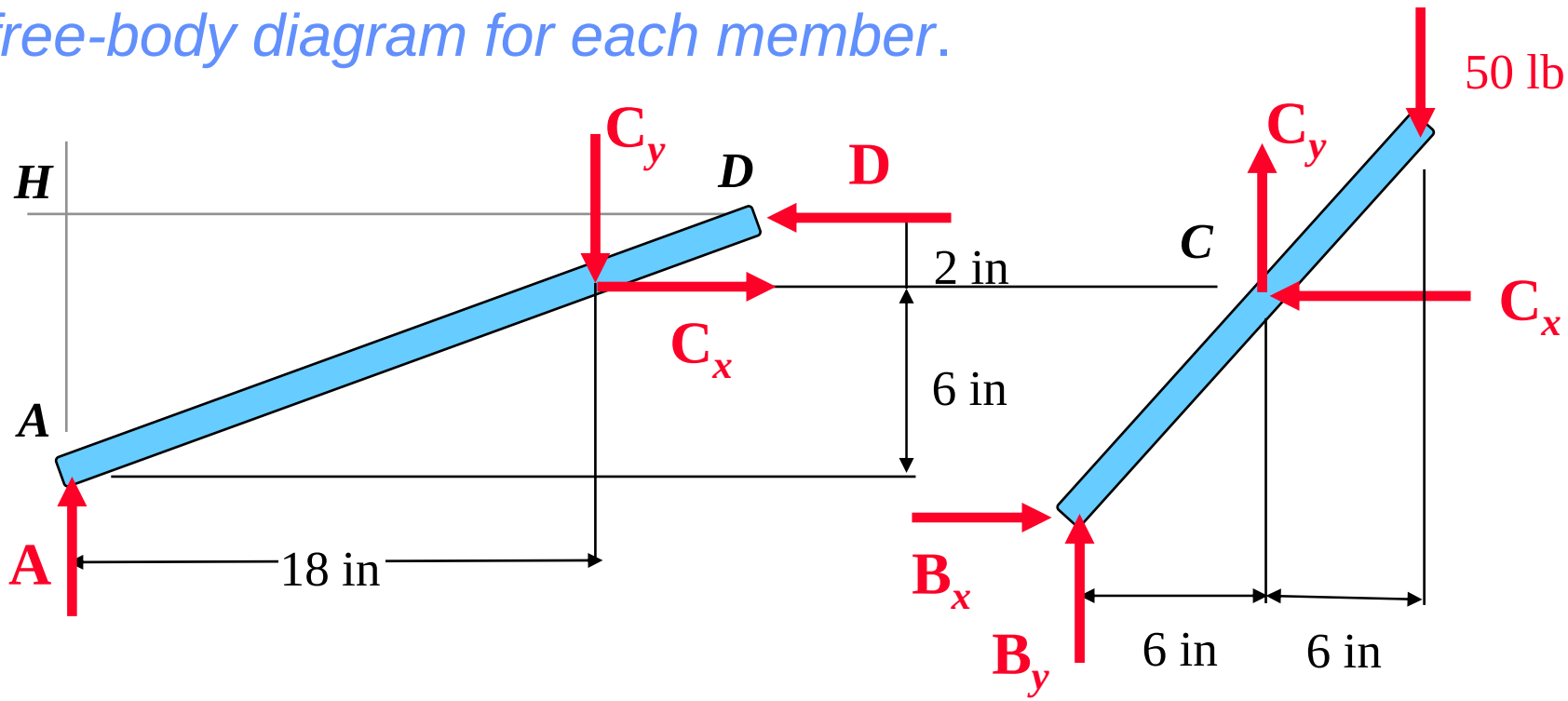
For the frame shown and neglecting the effect of friction at the horizontal and vertical surfaces, determine the forces exerted at *B* and *C* on member *BCE*.

For this problem we note that there are no two-force members. In solving this problem, we

1. *Dismember the frame, and draw a free-body diagram for each member*.
2. *To simplify the solution, seek a way to write an equation involving a single unknown*.

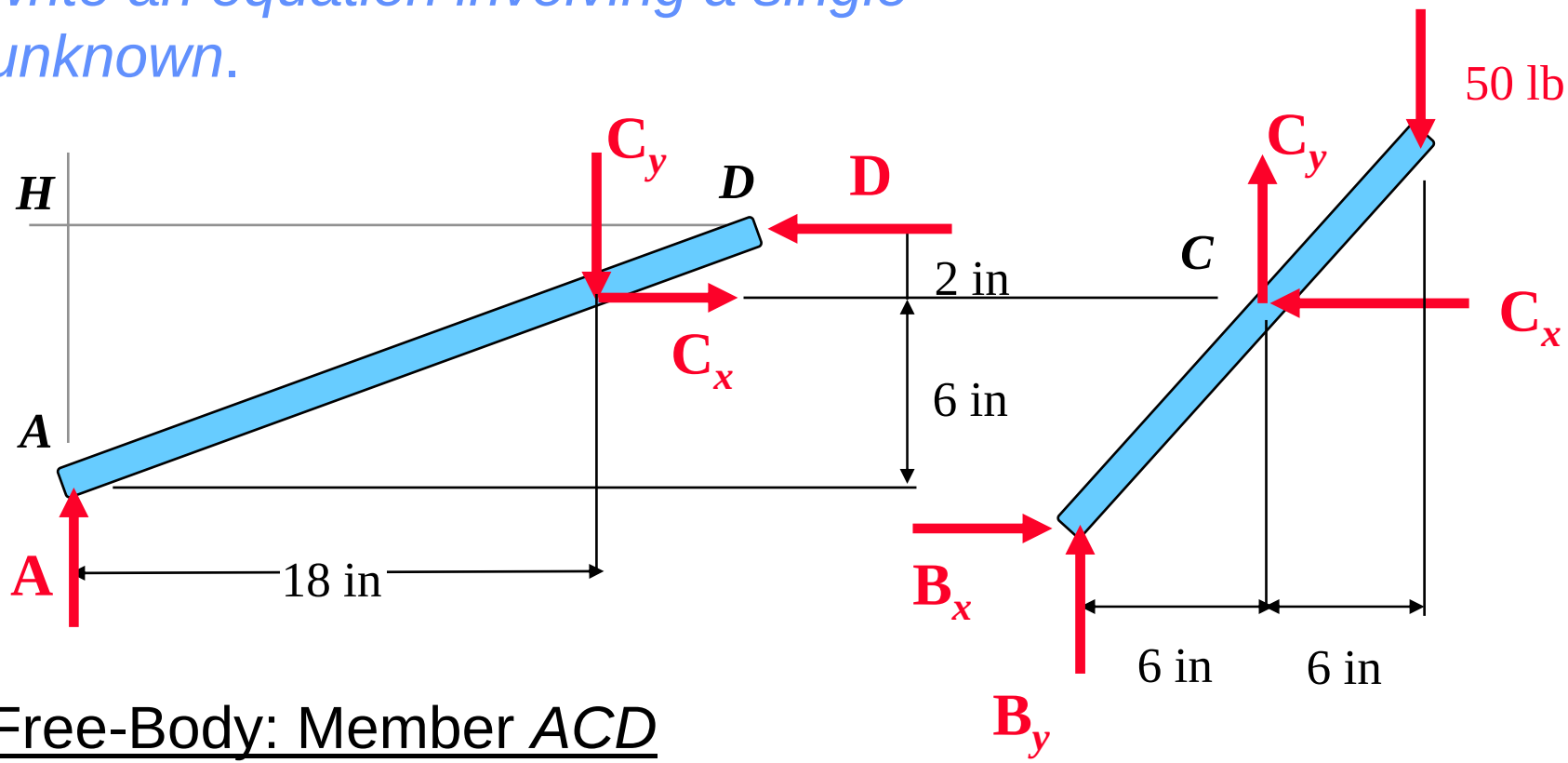
Problem 6.166 (a) Solution

Dismember the frame, and draw a free-body diagram for each member.



To simplify the solution, seek a way to write an equation involving a single unknown.

Problem 6.166 (a) Solution

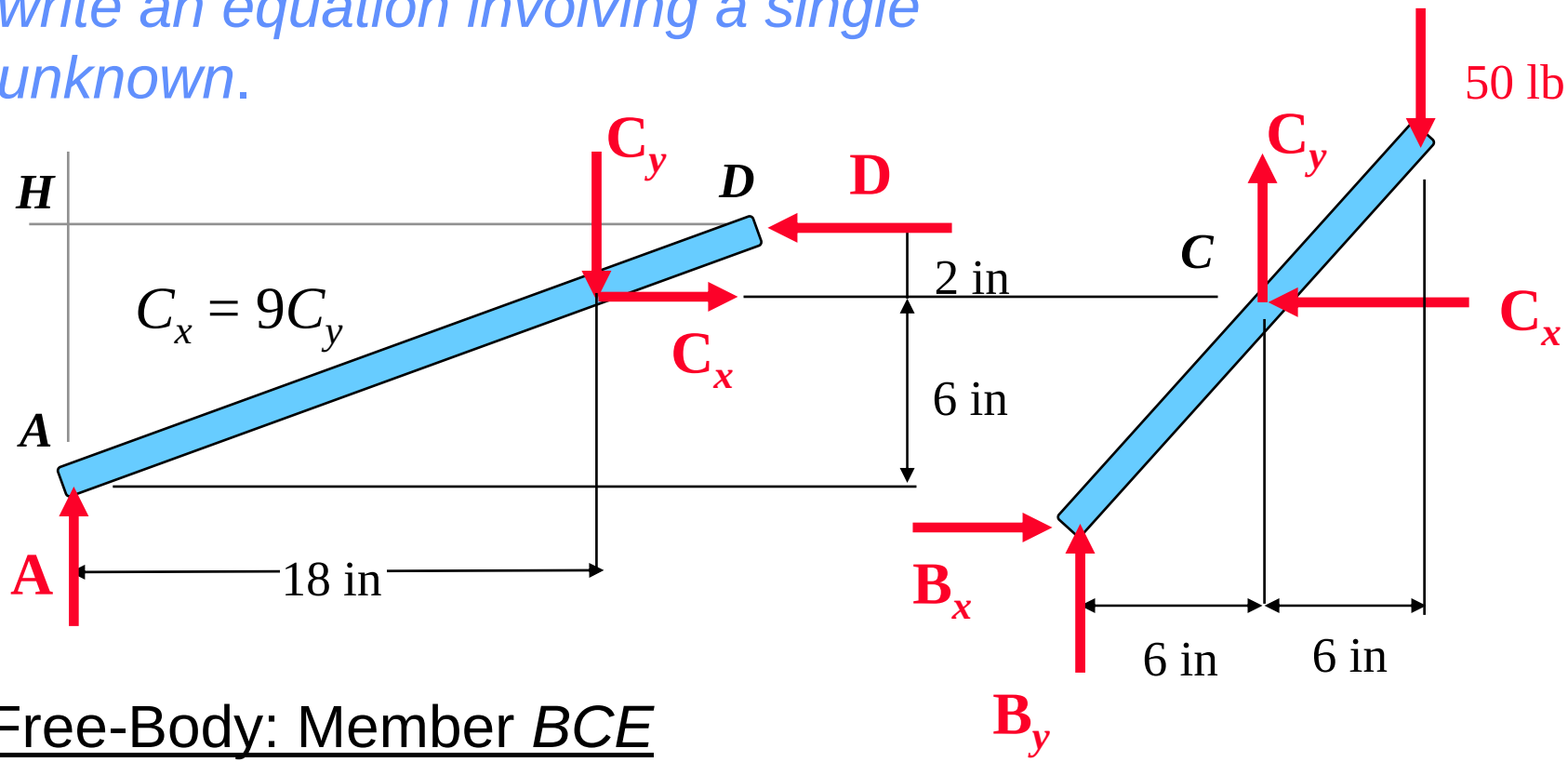


Free-Body: Member *ACD*

$$+\circlearrowleft \Sigma M_H = 0: \qquad C_x(2\text{ in}) - C_y(18\text{ in}) = 0 \qquad C_x = 9C_y$$

To simplify the solution, seek a way to write an equation involving a single unknown.

Problem 6.166 (a) Solution



Free-Body: Member *BCE*

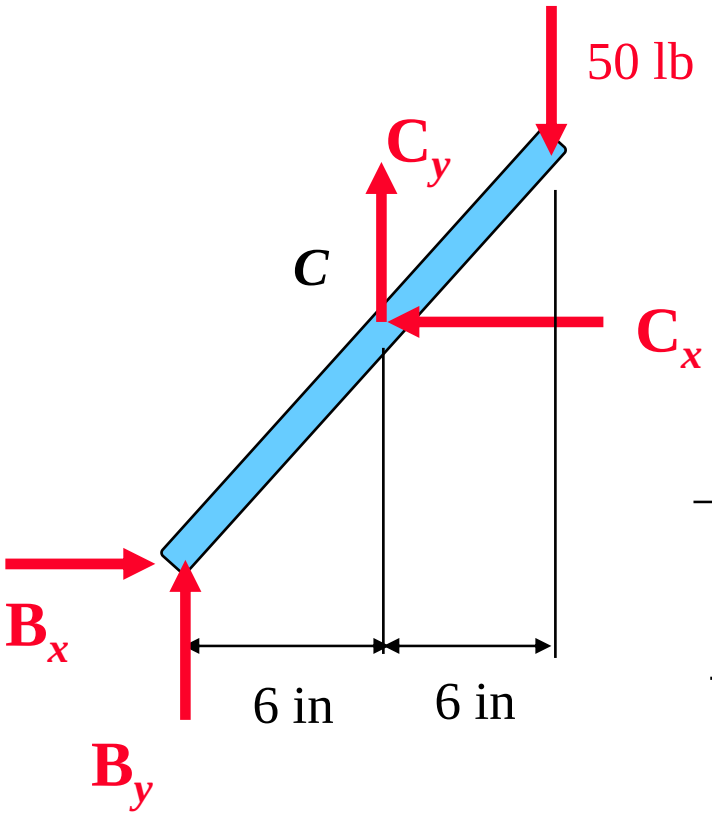
$$+\circlearrowright \Sigma M_B = 0: \qquad C_x(6\text{ in}) + C_y(6\text{ in}) - (50\text{ lb})(12\text{ in}) = 0$$

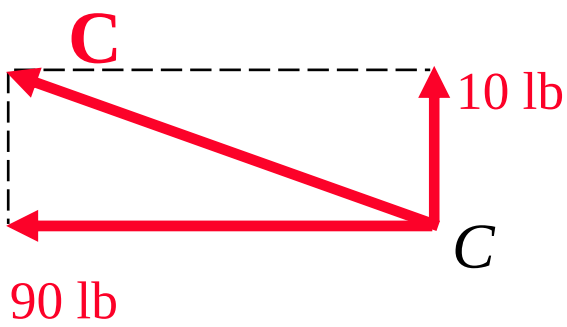
Substitute $C_x = 9C_y$: $\quad 9C_y(6\text{ in}) + C_y(6\text{ in}) - 600 = 0$

$$C_y = +10\text{ lb}; \quad C_x = 9C_y = 9(10) = 90\text{ lb}$$

Free-Body: Member *BCE*

Problem 6.166 (a) Solution





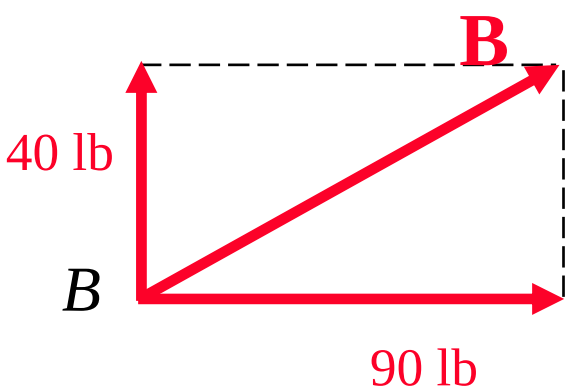
C = 90.6 lb, 6.3°

$$\xrightarrow{+} \Sigma F_x = 0: \quad B_x - 90\text{ lb} = 0$$

$$B_x = 90\text{ lb}$$

$$+\uparrow \Sigma F_y = 0: \quad B_y + 10\text{ lb} - 50\text{ lb} = 0$$

$$B_y = 40\text{ lb}$$



B = 98.5 lb, 24.0°