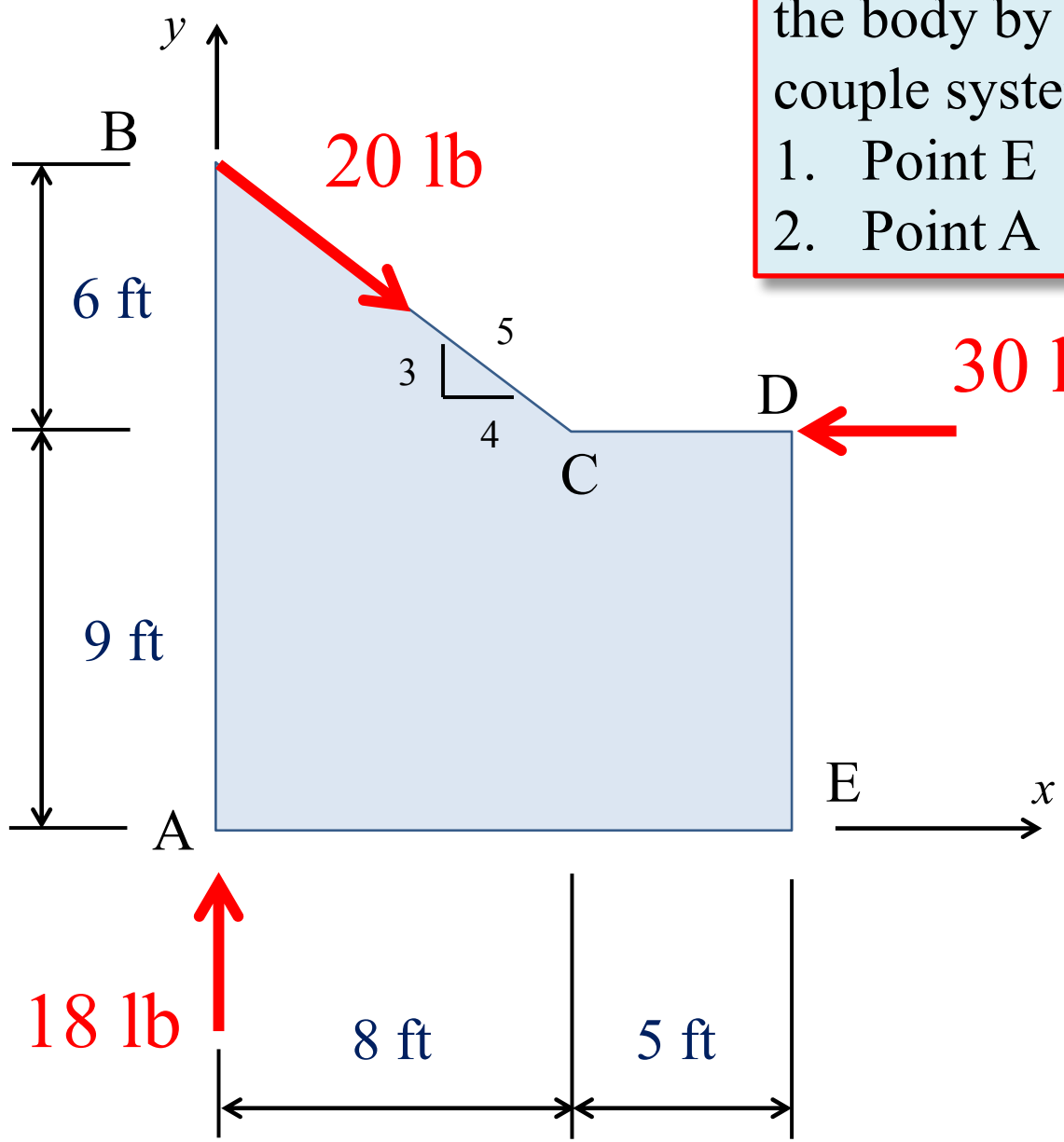
Equivalent Force-Couple System Example Problem

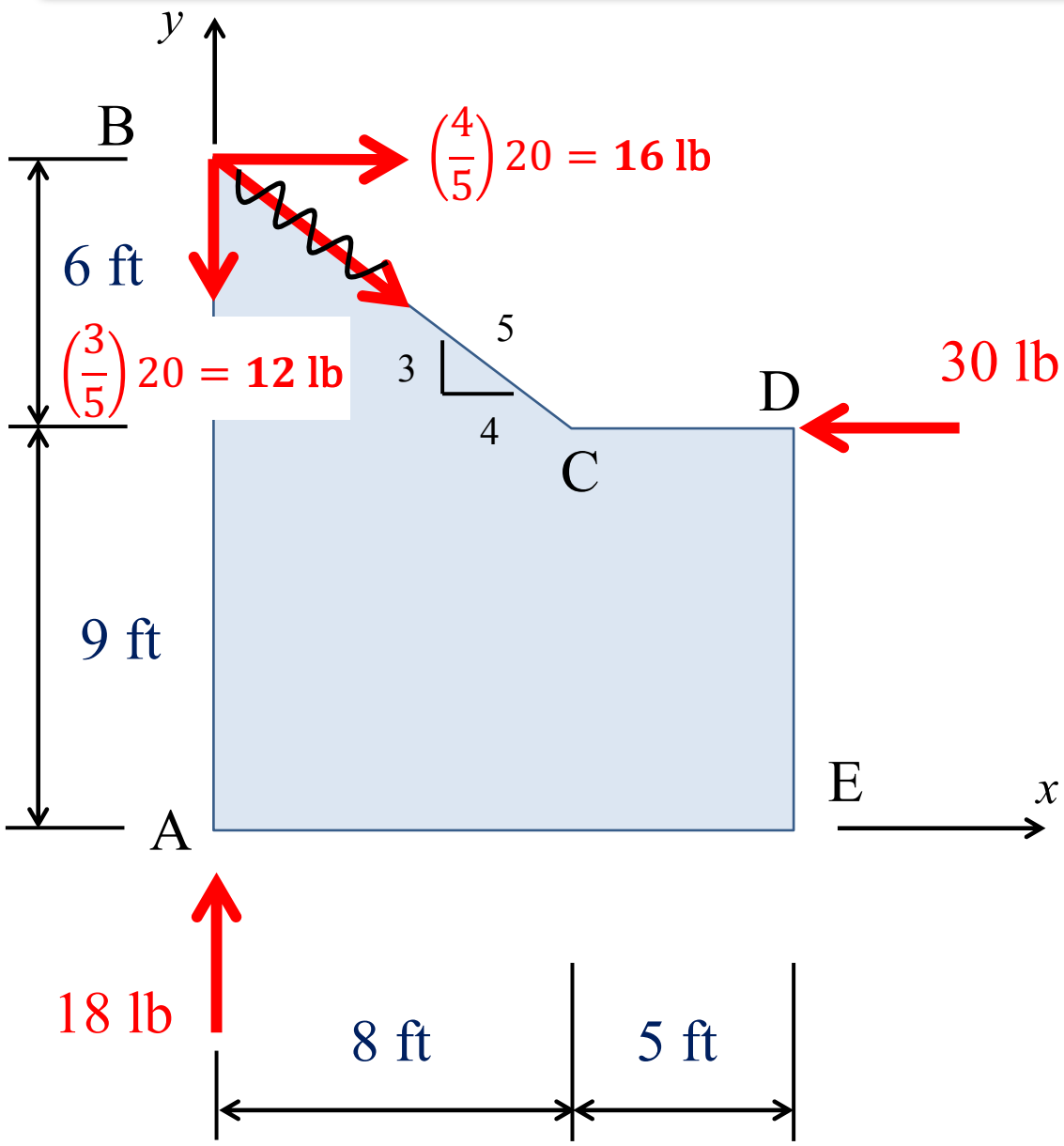
Steven Vukazich
San Jose State University

Replace the force system acting on the body by an equivalent force-couple system acting at:

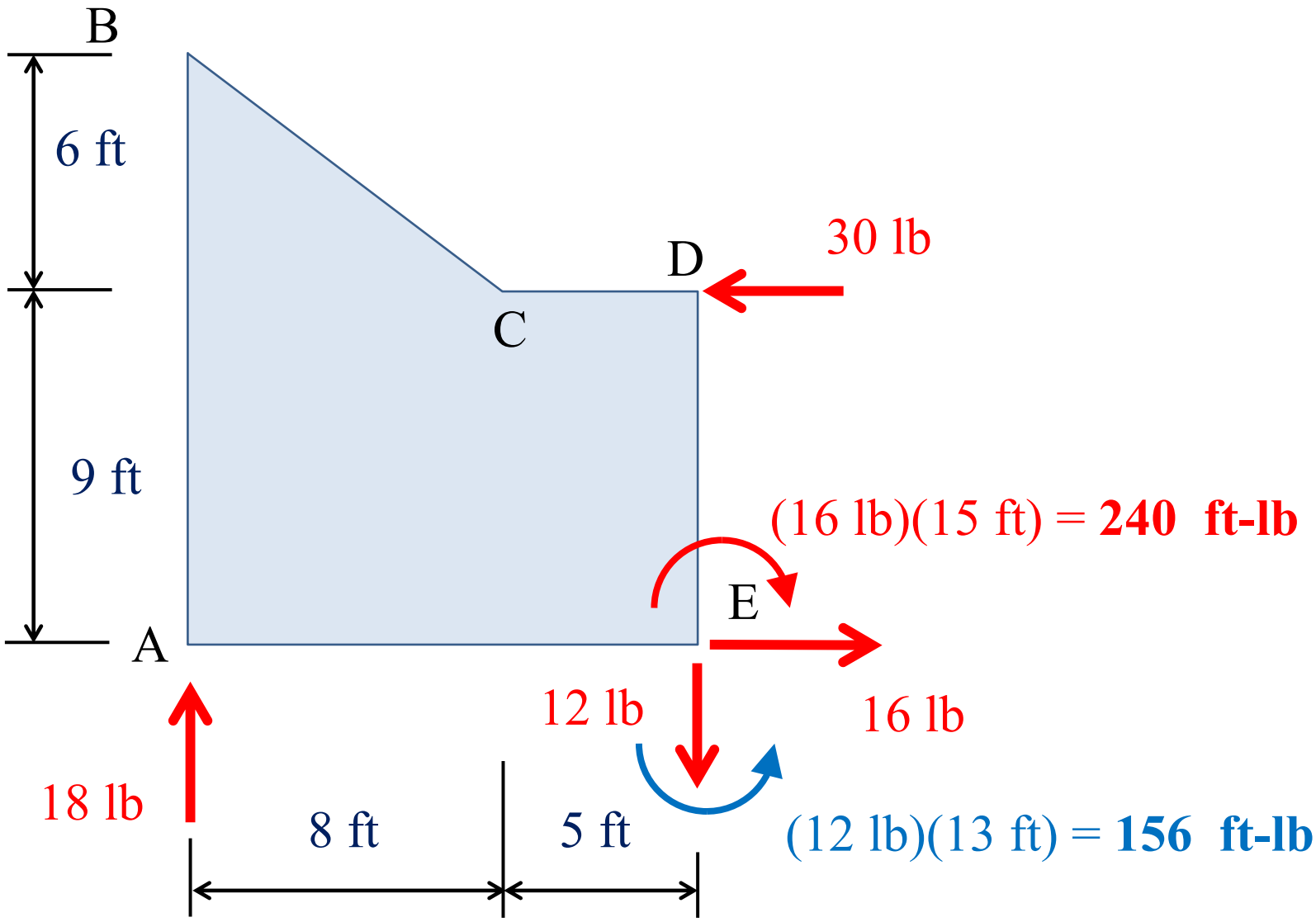
1. Point E
2. Point A



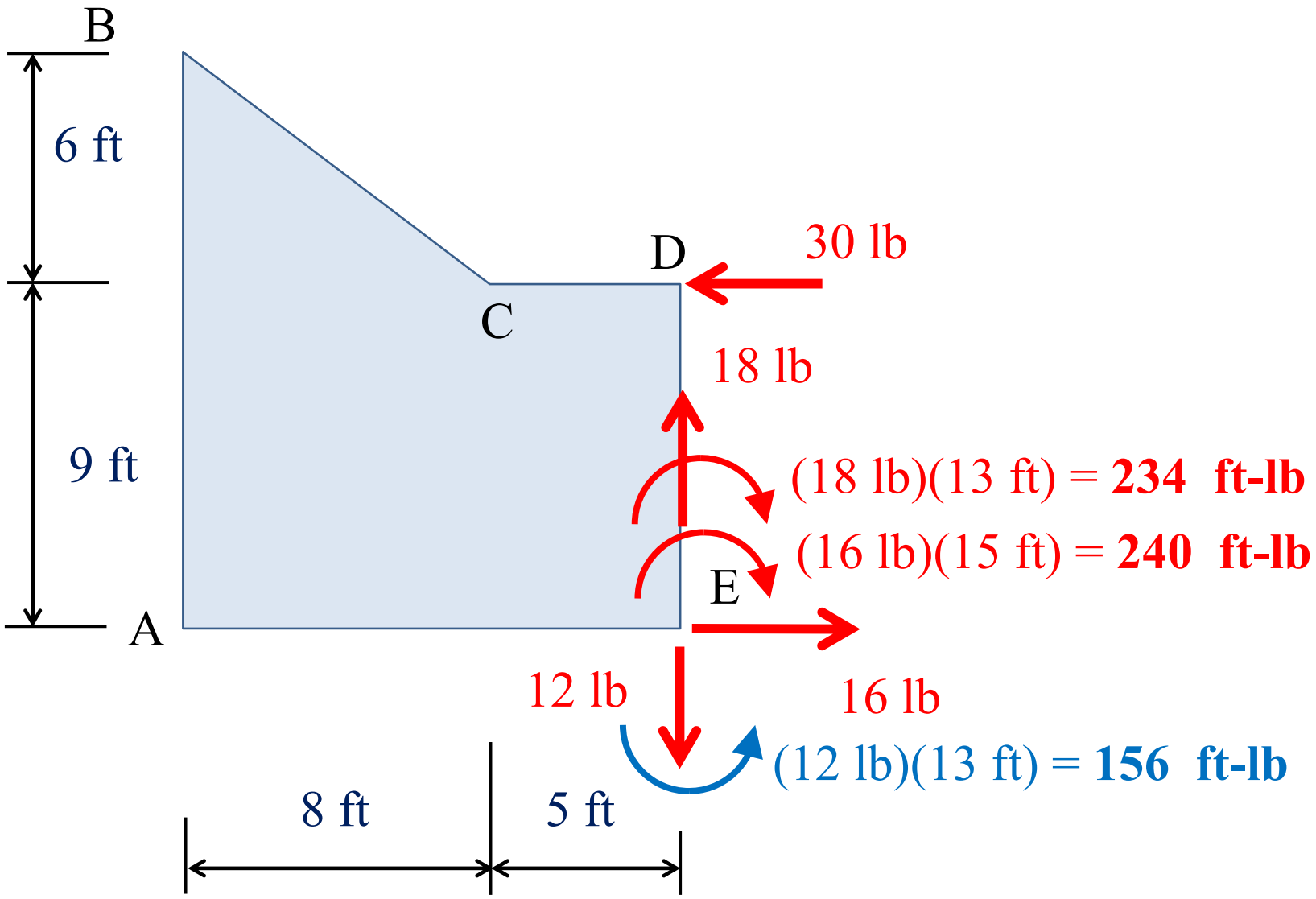
Express the Force at B in Components



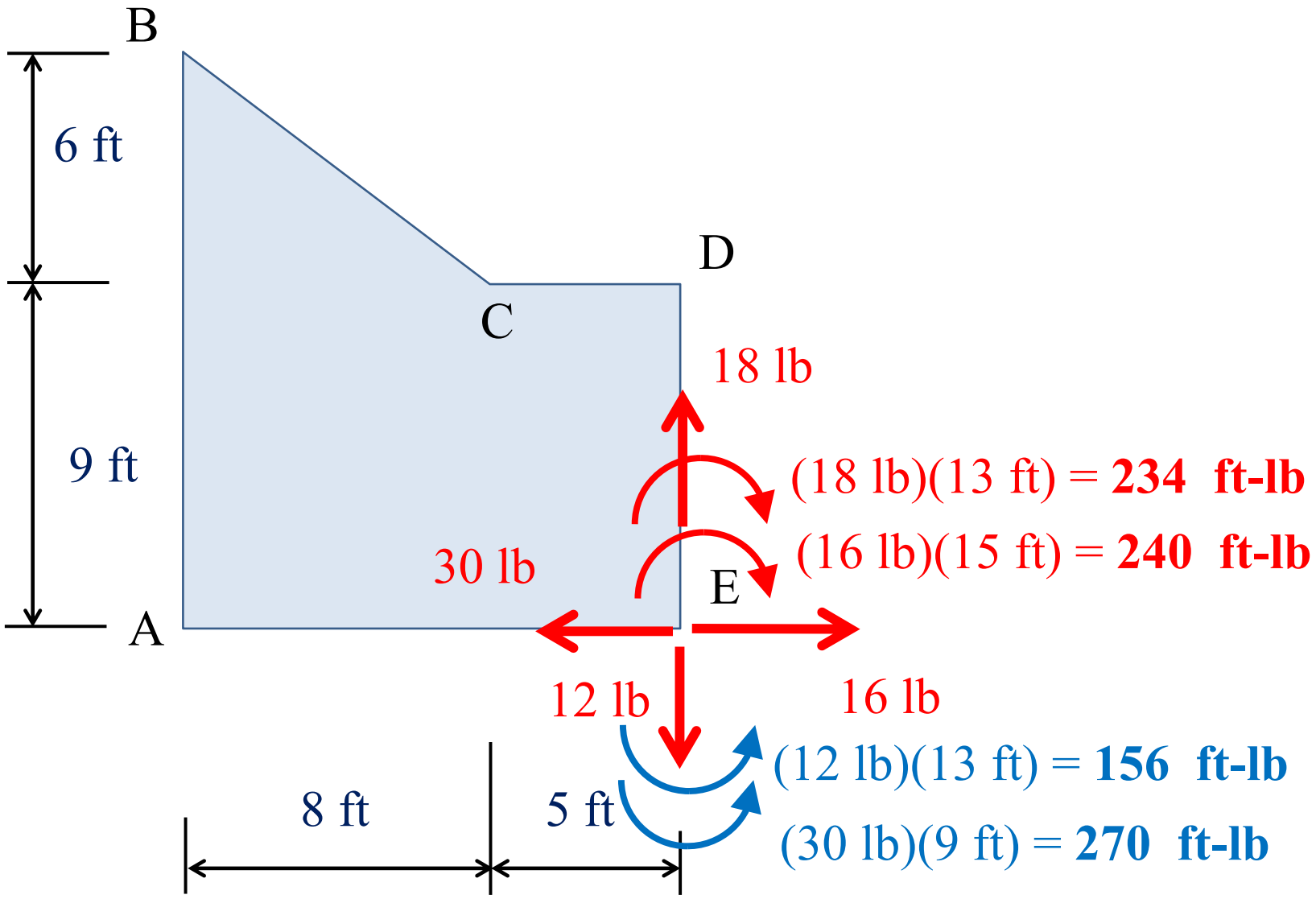
Replace Each Component of the Force at B by an Equivalent Force-Couple System at Point E



Replace the Force at A by an Equivalent Force-Couple System at Point E

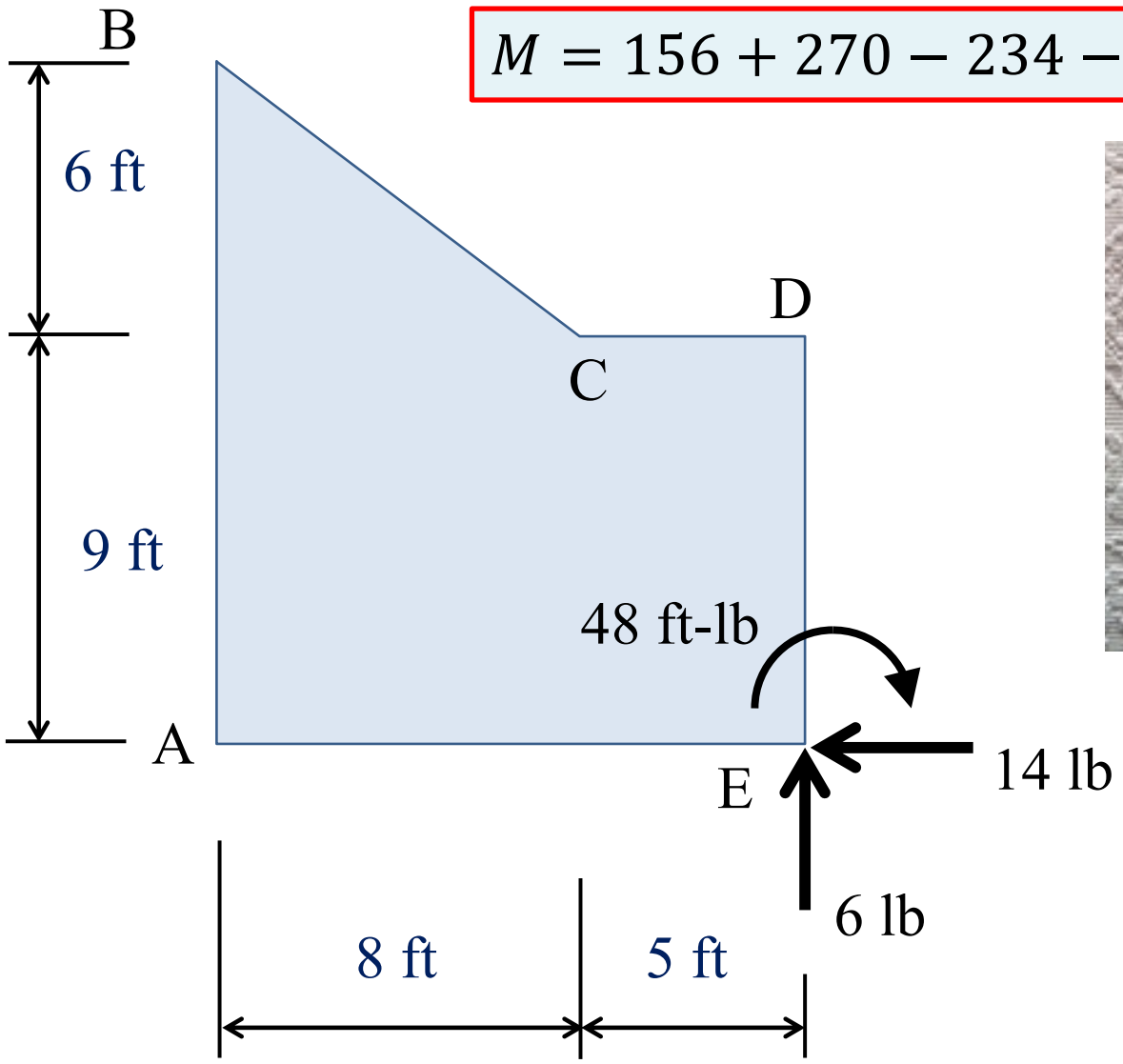


Replace the Force at D by an Equivalent Force-Couple System at Point E

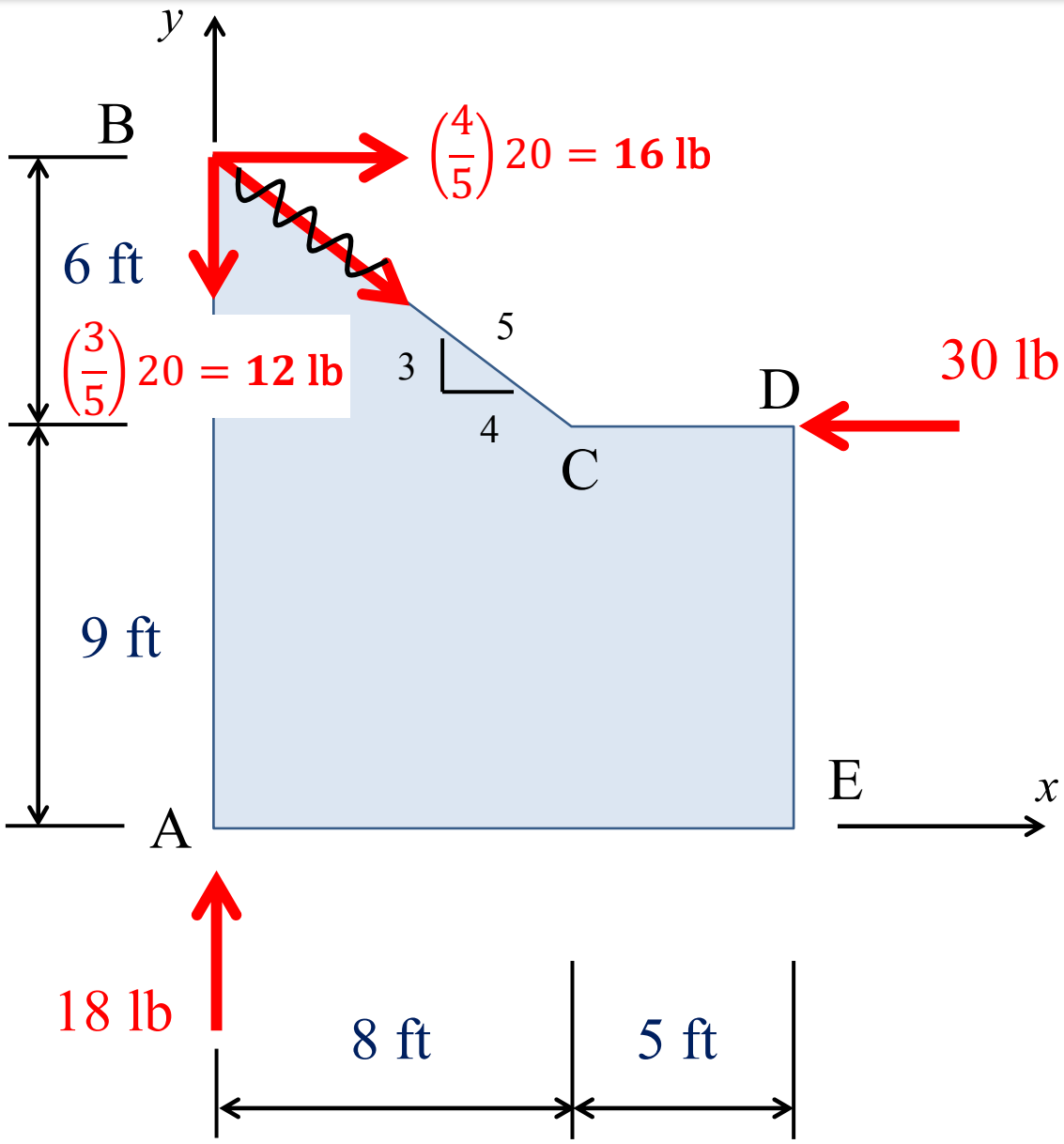


Add the Force Components and Couples

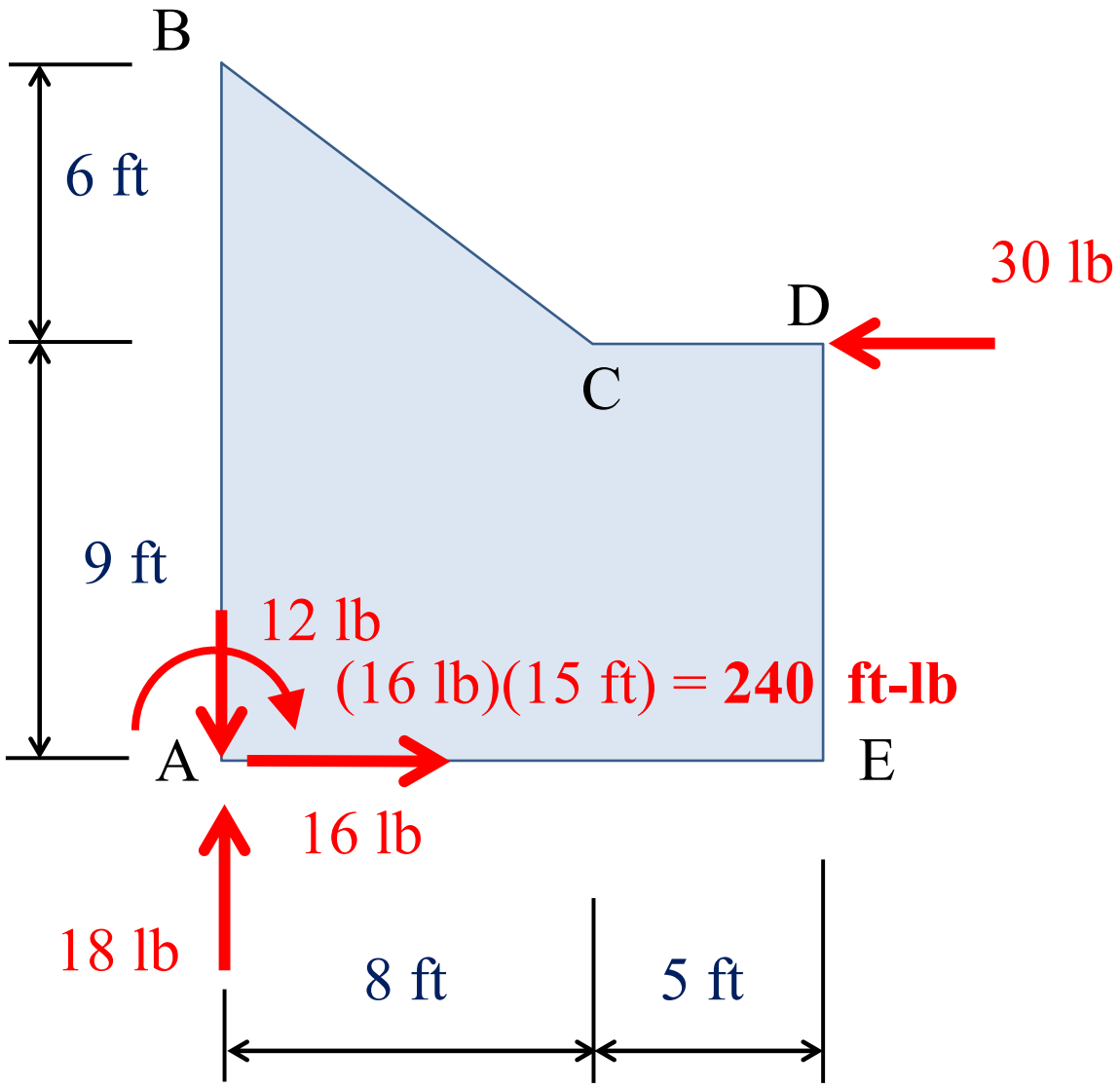
$$M = 156 + 270 - 234 - 240 = -48 \text{ ft–lb}$$



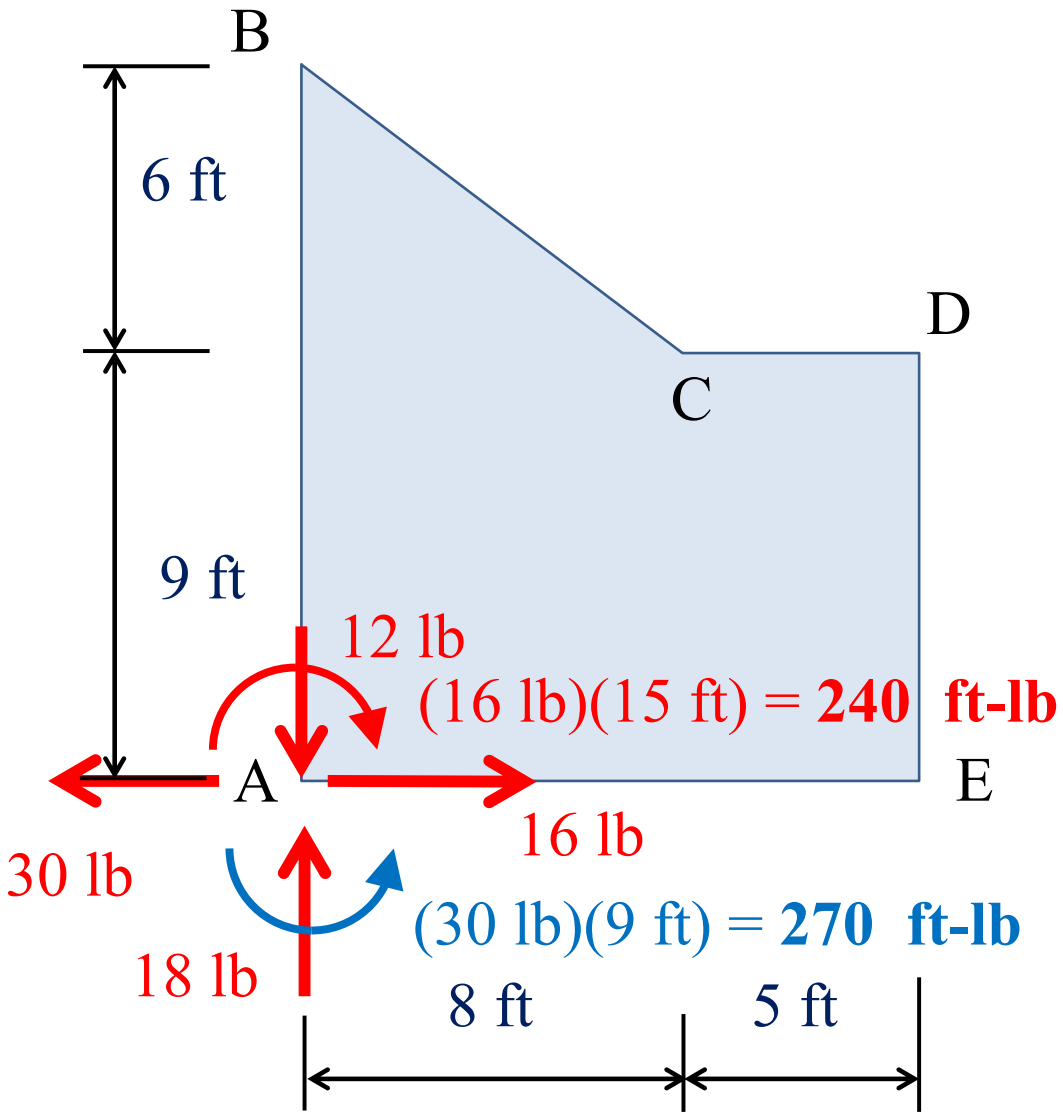
Equivalent Force-Couple System at Point A



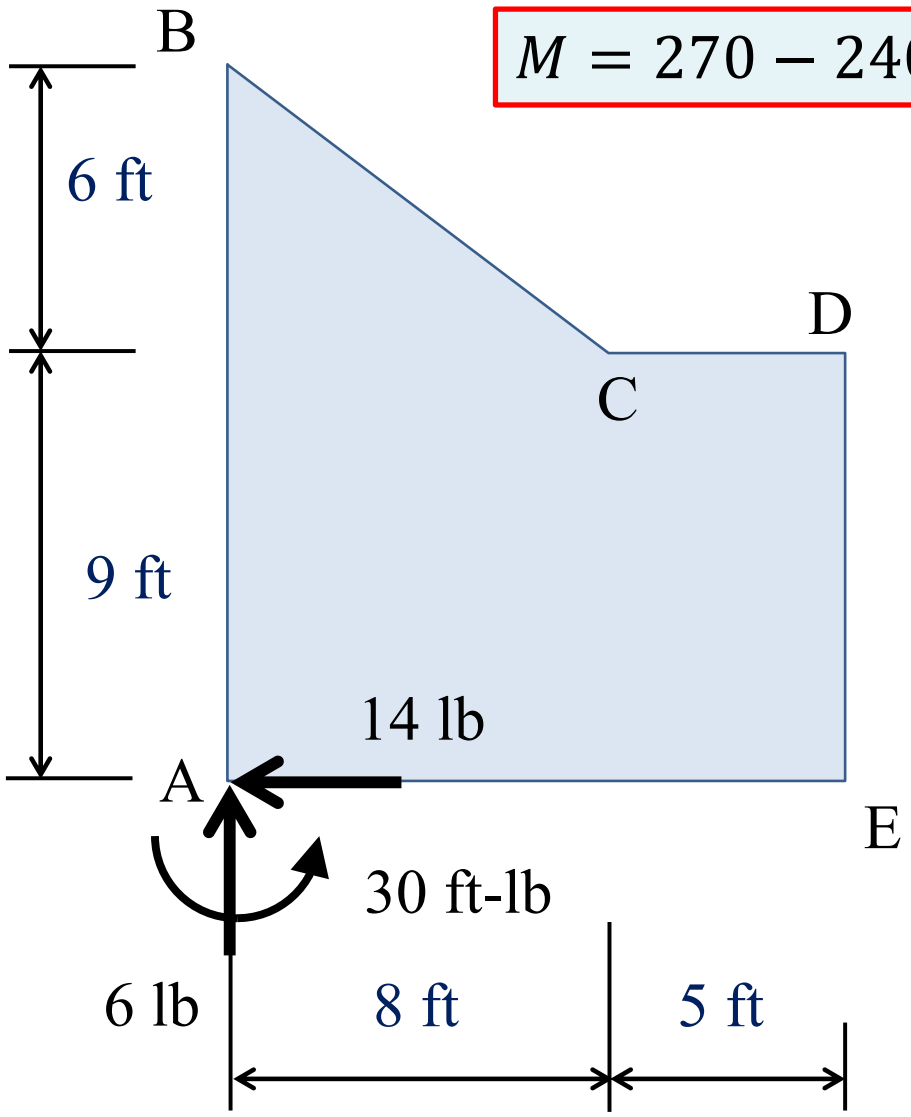
Replace Each Component of the Force at B by an Equivalent Force-Couple System at Point A



Replace Each Component of the Force at D by an Equivalent Force-Couple System at Point A

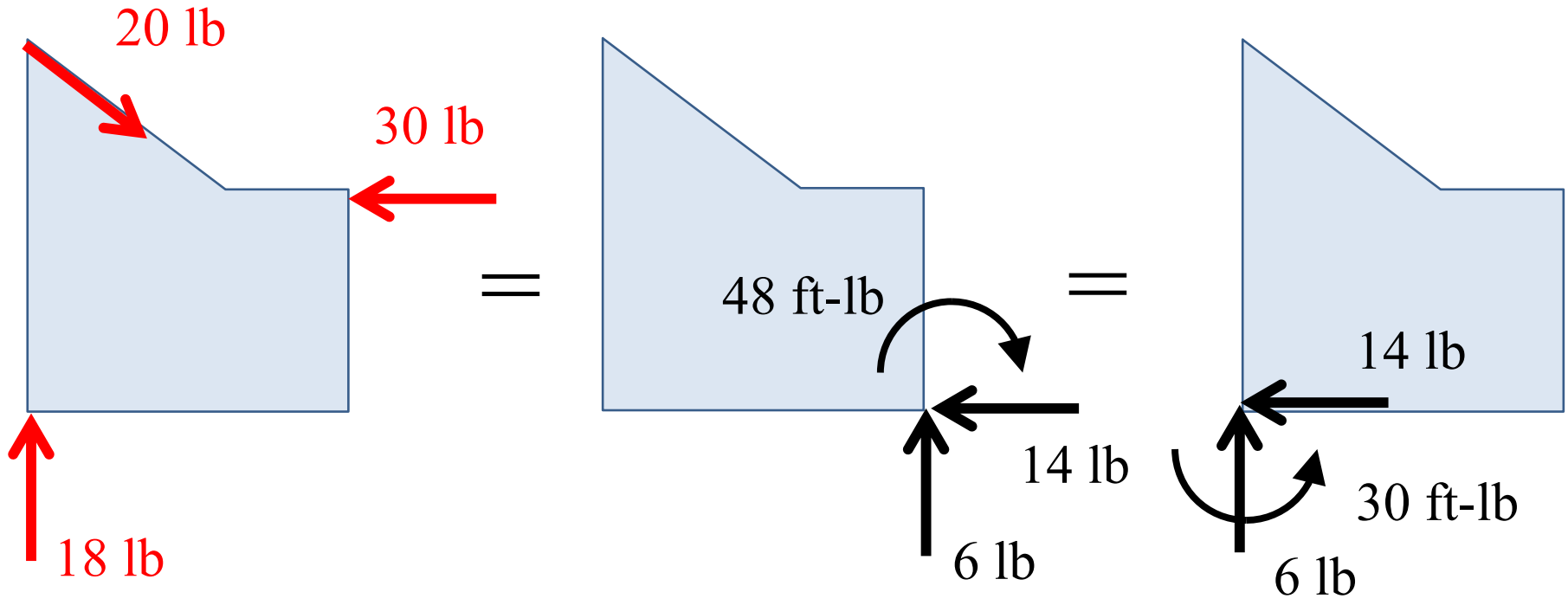


Add the Force Components and Couples



$$M = 270 - 240 = 30 \text{ ft–lb}$$

All Three Force Systems are Equivalent



Question – Is the Body in Equilibrium?