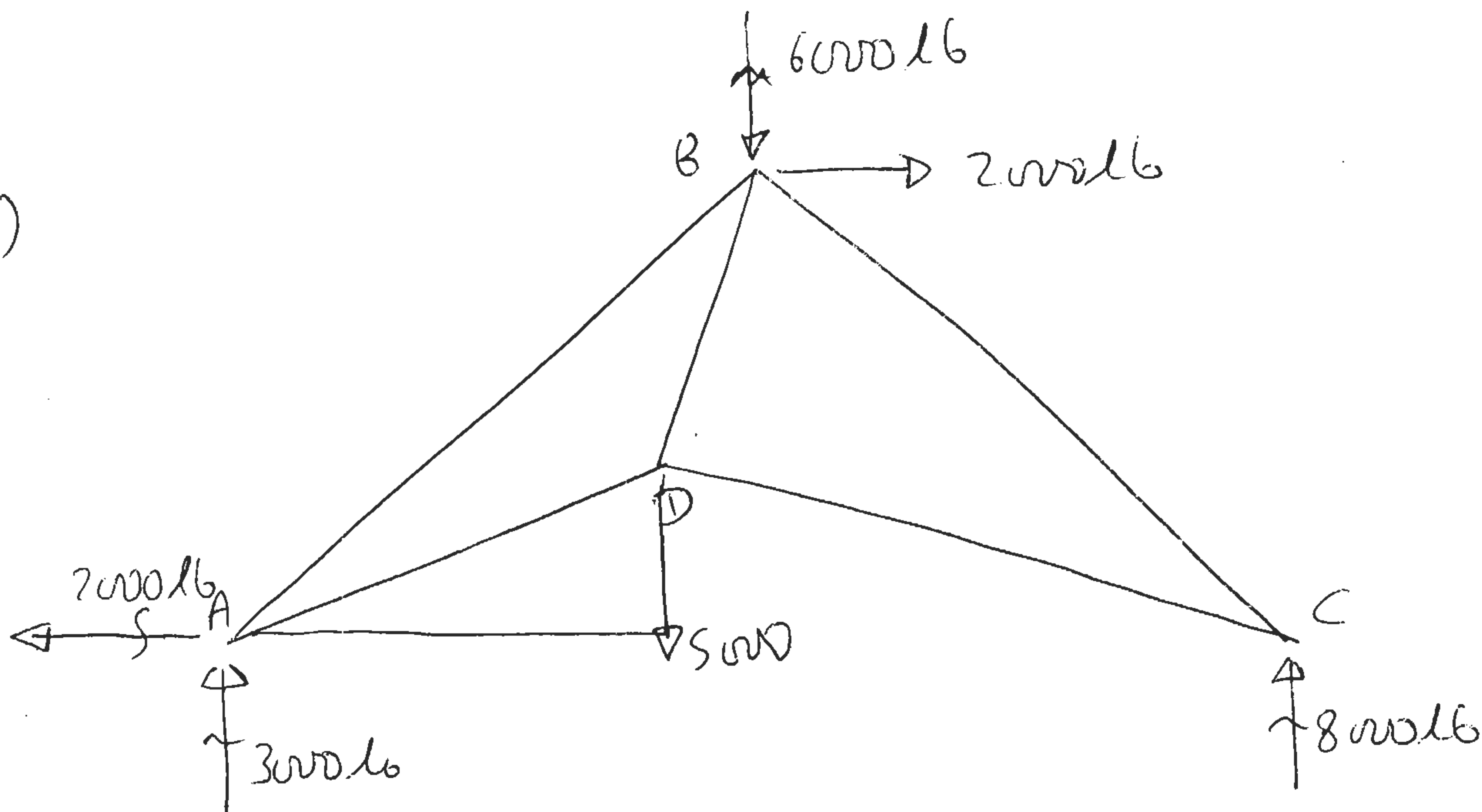
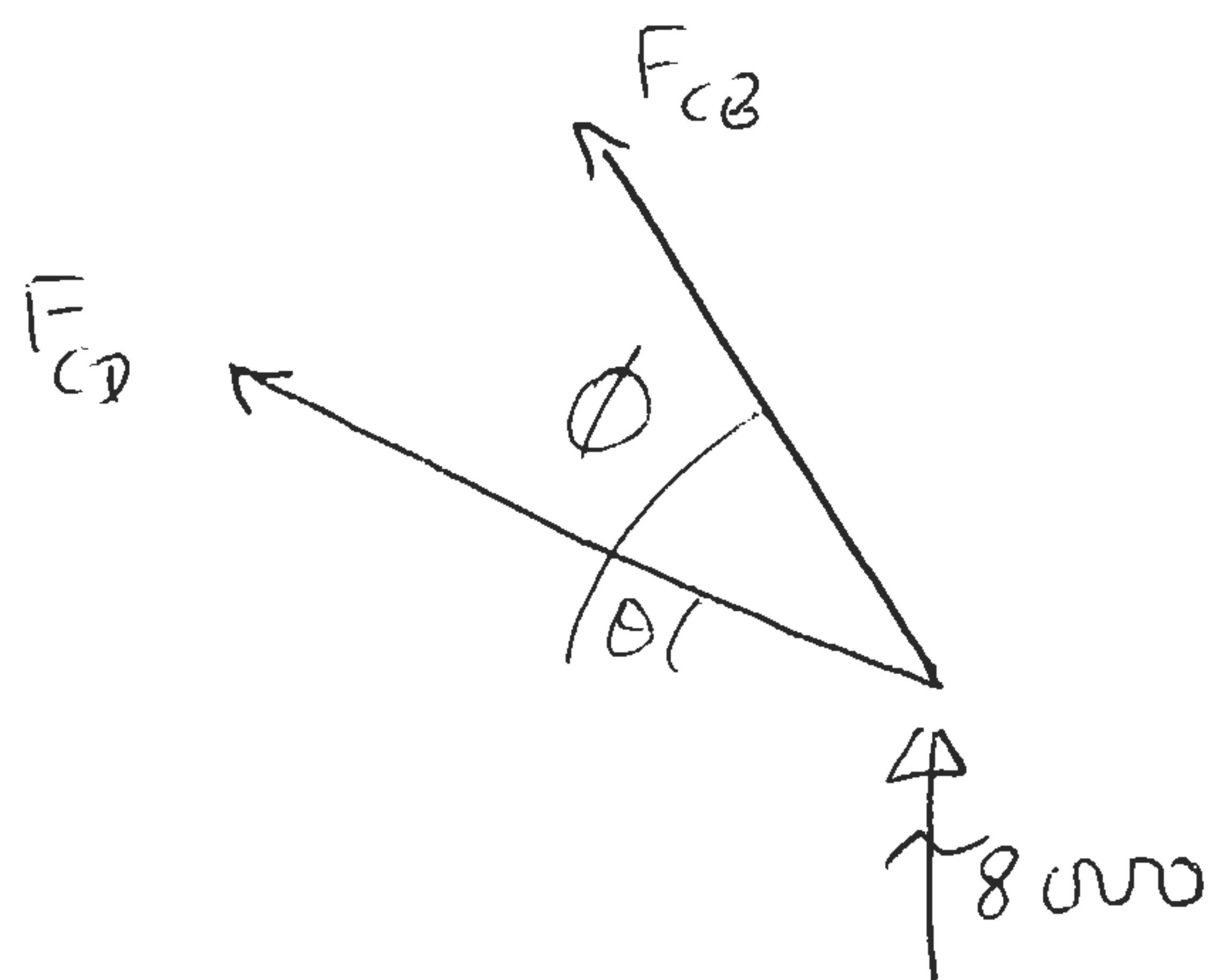


M6 a)



Use Method of joints

at C



$$\cos \theta = \frac{6}{12} = \frac{1}{2}$$

$$\tan \phi = \frac{12}{9} = \frac{4}{3}$$

$$\sum \vec{F}_x = 0: -F_{CD} \cos \theta - F_{CB} \cos \phi = 0 \quad (1)$$

$$\sum F_y \uparrow = 0 \Rightarrow 8000 + F_{CD} \sin \theta + F_{CB} \sin \phi = 0 \quad (2)$$

$$\theta = 26.56 \quad \begin{array}{l} \cos \theta = 0.894 \\ \sin \theta = 0.447 \end{array} \quad \left| \quad \begin{array}{l} \cos \phi = \frac{4}{5} \\ \sin \phi = \frac{3}{5} \end{array} \right.$$

$$-0.894 F_{CD} - \frac{4}{5} F_{CB} = 0 \quad (1)$$

$$0.447 F_{CD} + \frac{3}{5} F_{CB} = -8000 \quad (2)$$

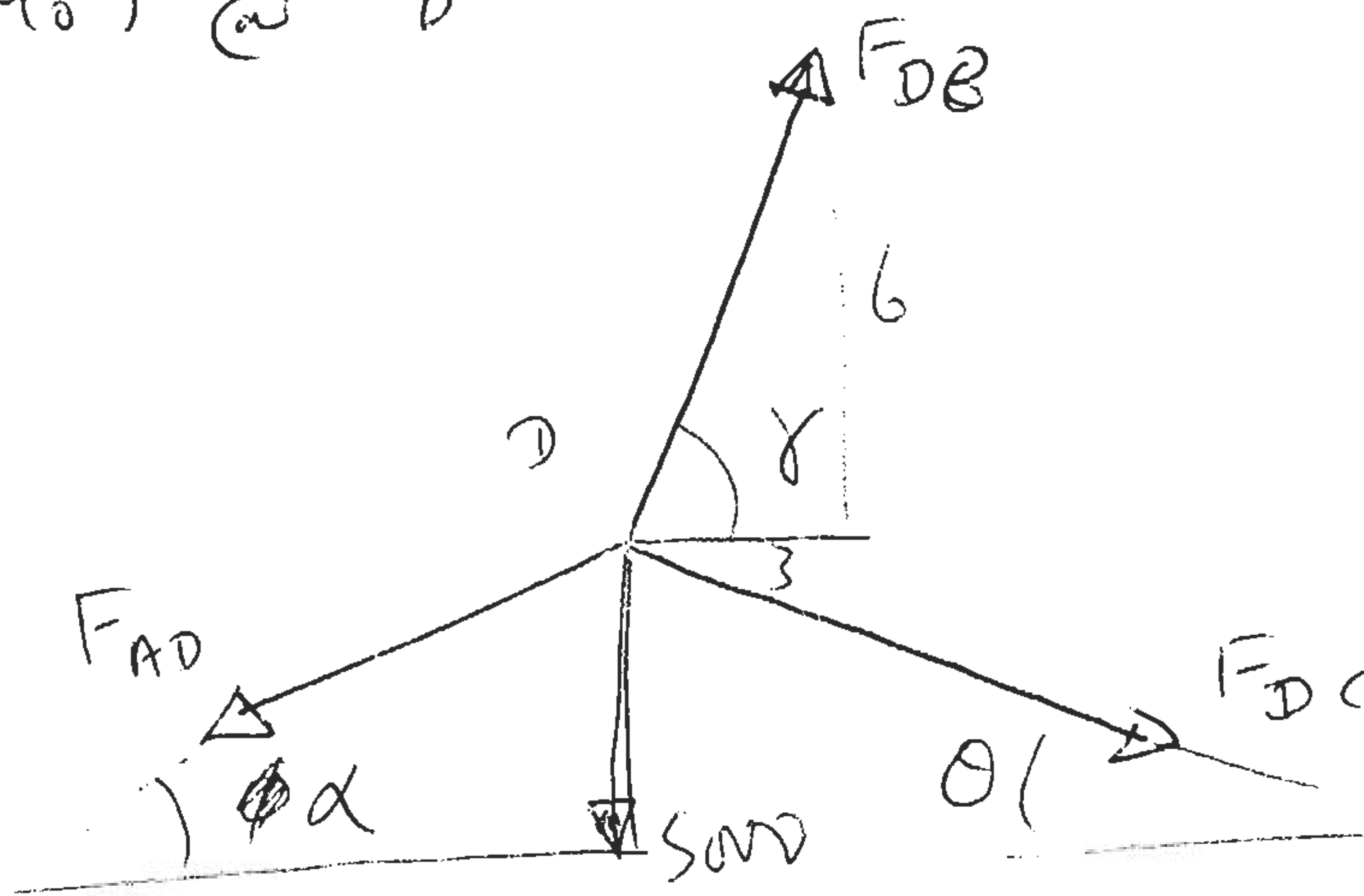
$$(2) \times \frac{4}{3} + (1) \Rightarrow 0.596 F_{CD} = -10666.7$$

$$F_{CD} = -17897 \text{ lb}$$

$$\text{from (1)} \quad F_{CB} = -\frac{5}{4} \times 0.894 (-17897)$$

$$F_{CB} = +20000 \text{ lb}$$

MOT @ D



$$\text{Ebs tan } \alpha = \frac{6}{18} = \frac{1}{3} \quad \alpha = 18^\circ$$

$$\cos \alpha = 0.949$$

$$\sin \alpha = 0.316$$

$$\tan \gamma = \frac{6}{3} = 2 \Rightarrow \gamma = 63.4^\circ$$

$$\cos \gamma = 0.447$$

$$\sin \gamma = 0.894$$

$$\sum \vec{F}_x = 0 \quad -F_{AD} \cos \alpha + F_{DC} \cos \theta + F_{DB} \cos \gamma = 0 \quad (3)$$

$$\sum F_y = 0 \quad -F_{AD} \sin \alpha - 5000 - F_{DC} \sin \theta + F_{DB} \sin \gamma = 0 \quad (4)$$

Substitute for $F_{DC} = -17897 \text{ kN}$

$$(3) \Rightarrow -0.949 F_{AD} - 0.894 \times 17897 + F_{DB} \times 0.447 = 0$$

$$\Rightarrow 0.447 F_{DB} - 0.949 F_{AD} = 16008 \quad (3)$$

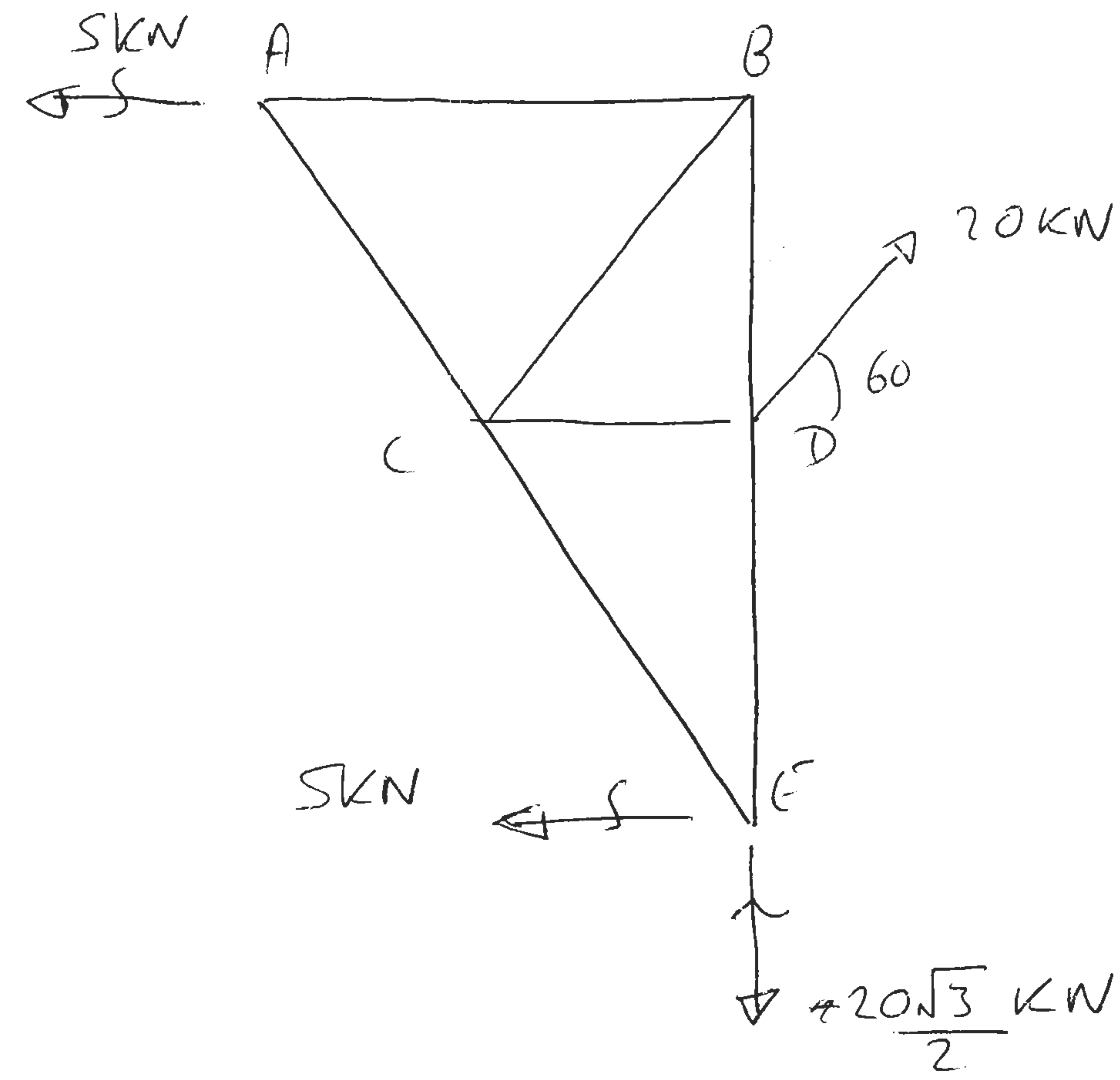
$$-0.316 F_{AD} + 0.894 F_{DB} = +3000 \quad (4)$$

$$(4) \times \frac{0.949}{0.316} - (3)$$

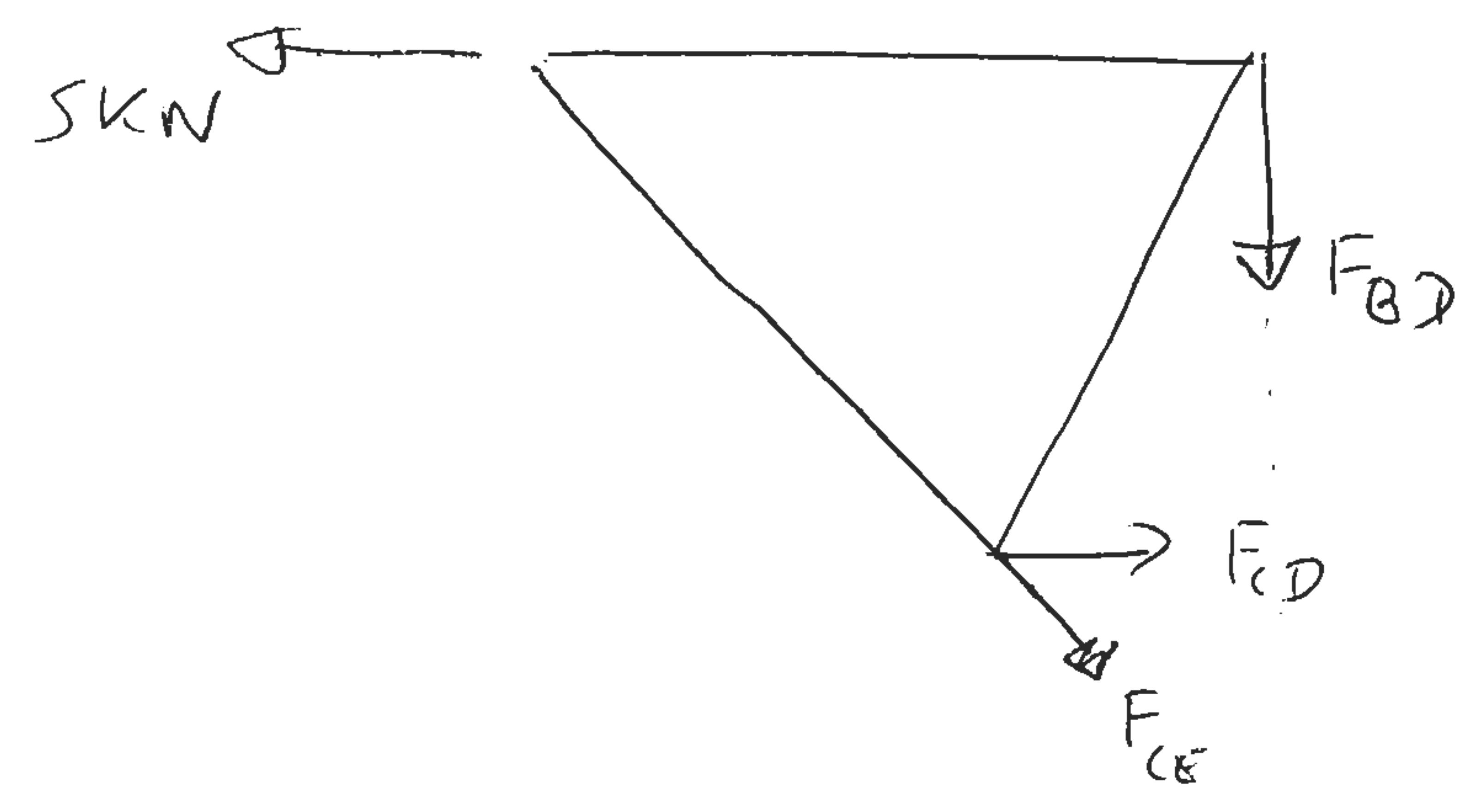
$$\Rightarrow 2.238 F_{DB} = -7000 \text{ lb.}$$

$$F_{DB} = -3127 \text{ lb.} \Leftarrow$$

M6 b)



Method of sections



Take moments about E (F_{BD} + F_{CE} intersect)

$$\sum M_E = 0: + 5 \text{ kN} \cdot 2 \cos 30^\circ - F_{CD} \cos 30^\circ = 0$$

$$F_{CD} = +10 \text{ kN}$$