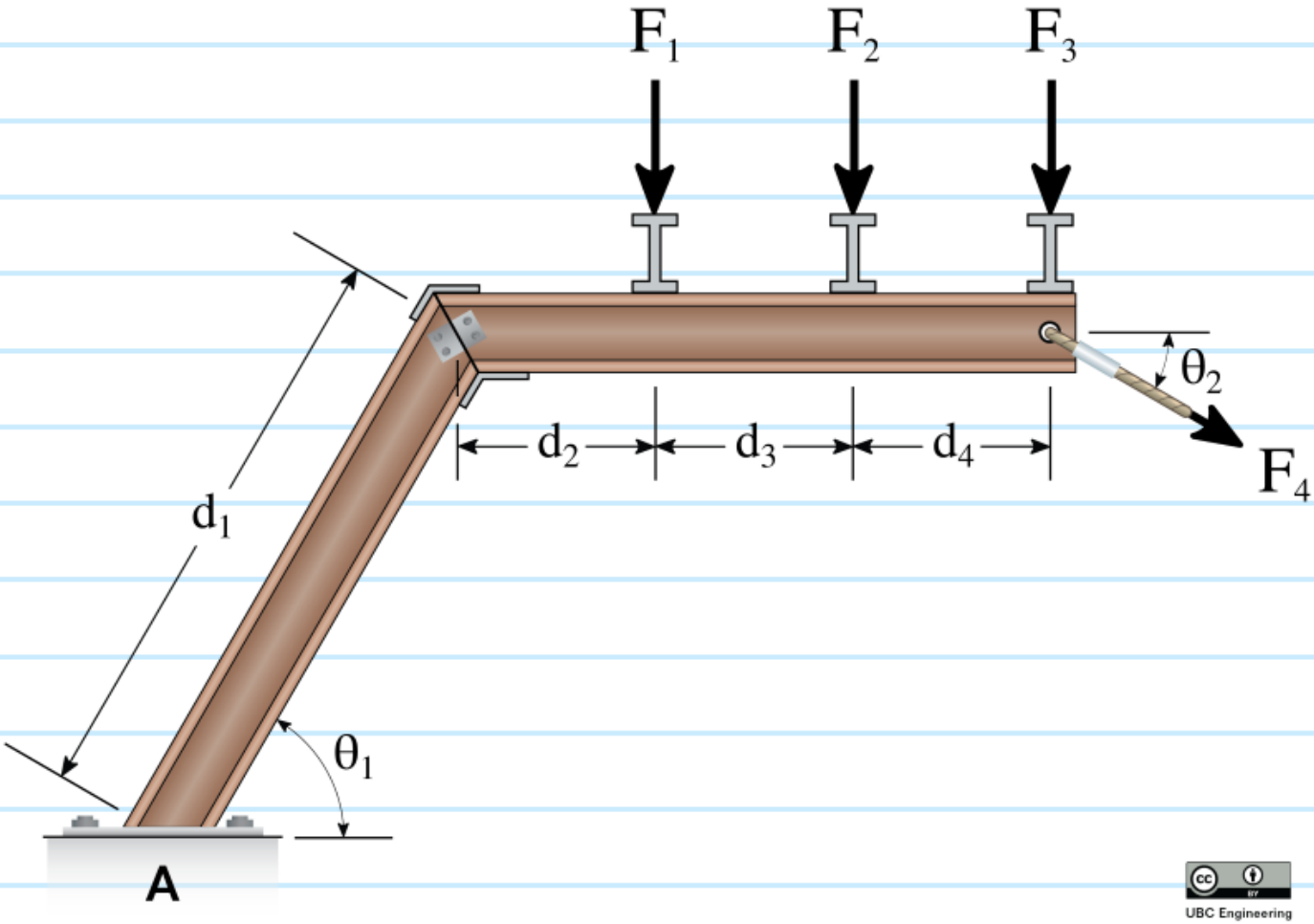
21-S-4-4-GD-001



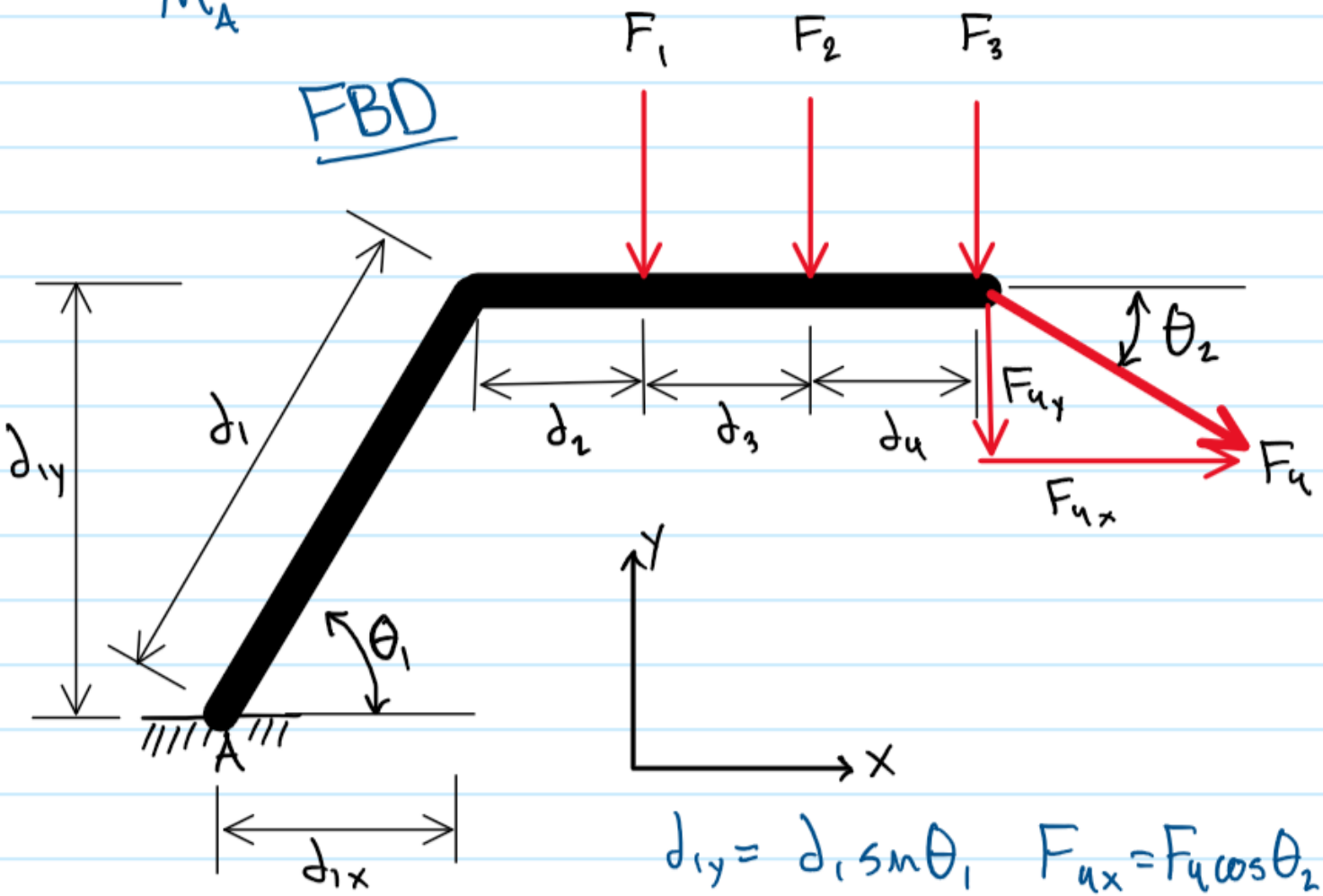
The beam is subjected to the forces $F_1 = F_1$ N, $F_2 = F_2$ N, $F_3 = F_3$ N, and $F_4 = F_4$ N as shown. What is the total moment of the force about A?

($d_1 = d_1$ m, $d_2 = d_2$ m, $d_3 = d_3$ m, $d_4 = d_4$ m, $\theta_1 = \theta_1^\circ$, and $\theta_2 = \theta_2^\circ$)

given $F_1, F_2, F_3, F_4, d_1, d_2, d_3, d_4, \theta_1, \theta_2$

find M_A

FBD



$d_{1y} = d_1 \sin\theta_1 \quad F_{4x} = F_4 \cos\theta_2$

$d_{1x} = d_1 \cos\theta_1 \quad F_{4y} = F_4 \sin\theta_2$

Moments

$$+\circlearrowleft M_A = -(d_{1x} + d_2)F_1 - (d_{1x} + d_2 + d_3)F_2 - (d_{1x} + d_2 + d_3 + d_4)(F_3 + F_{4y}) - (d_{1y})F_{4x}$$