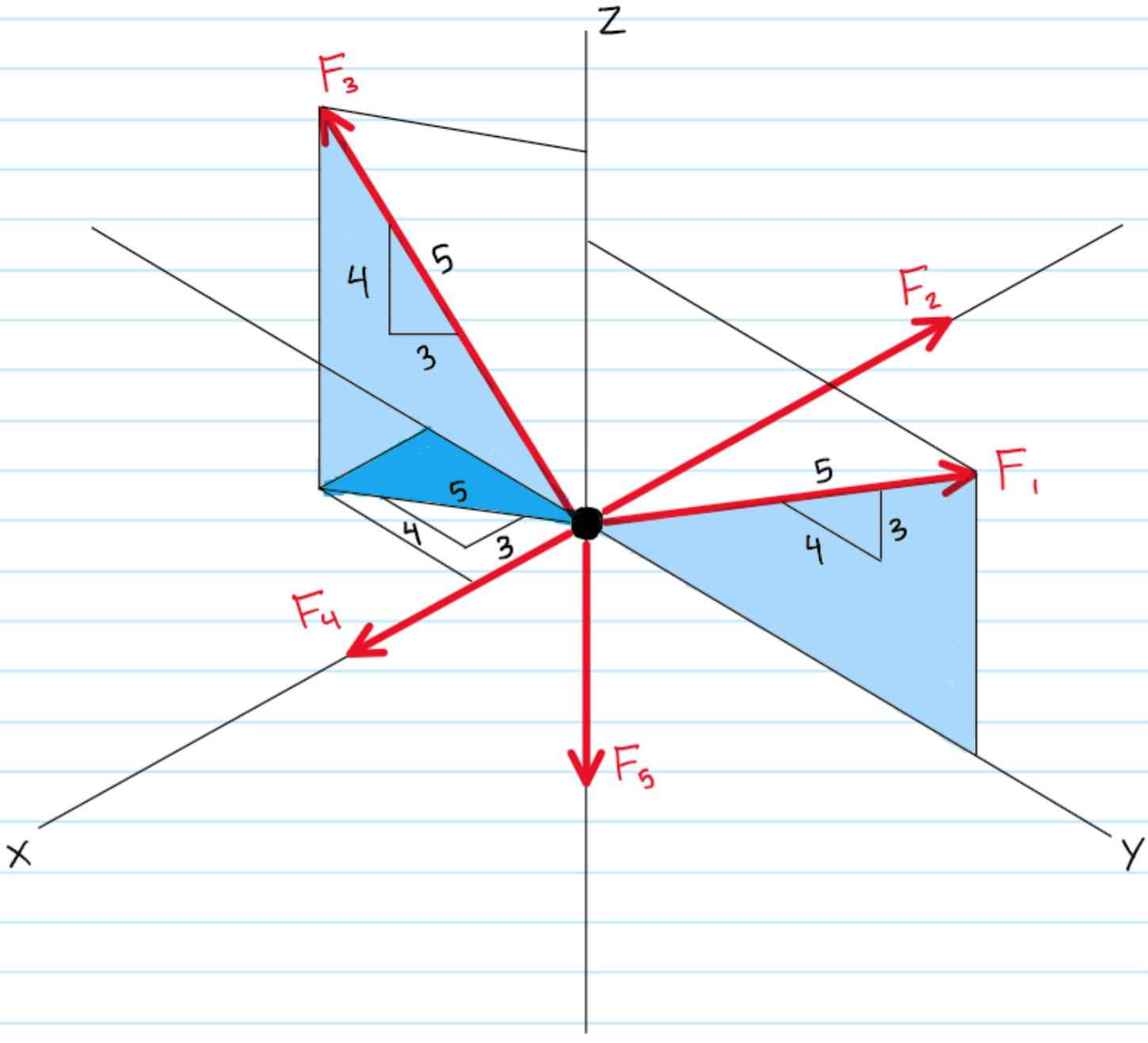
21-S-3-4-GD-001

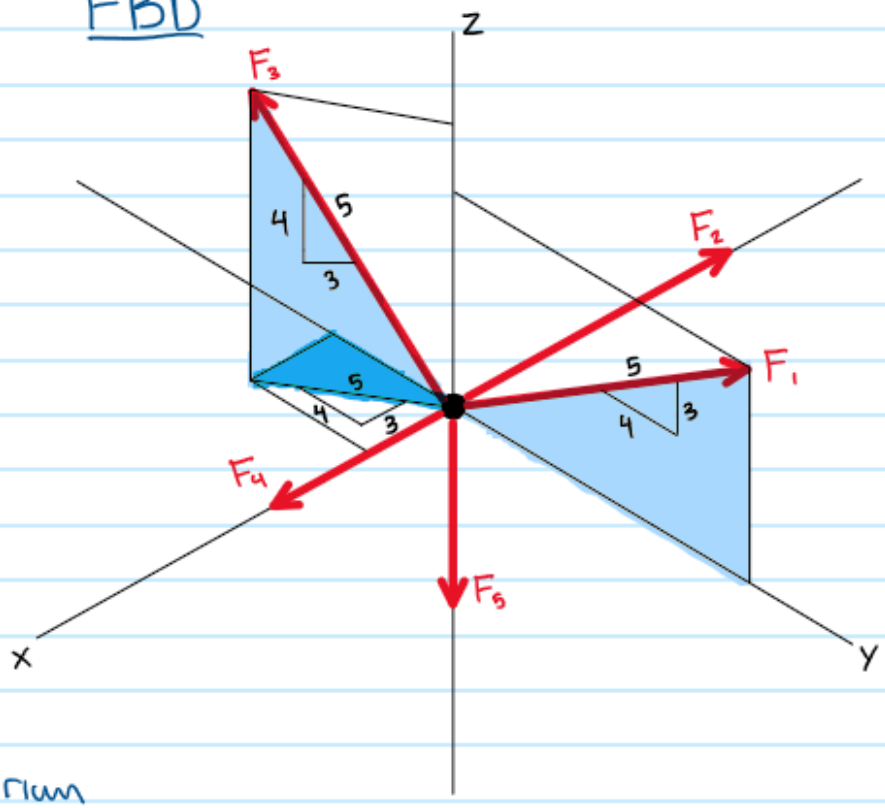


The particle is subjected to 5 forces as shown, holding the particle in equilibrium. If $F_5 = F_5$ N and $F_4 = F_{\equiv 4}$ N, what are the magnitudes of F_1, F_2 and F_3?

Given F_5, F_4

Find F_1, F_2, F_3

FBD



Equations of Equilibrium

$\Sigma F_x = 0 = F_4 + F_3(3/5)(3/5) - F_2$ (1)

$\Sigma F_y = 0 = F_1(4/5) - F_3(3/5)(4/5)$ (2)

$\Sigma F_z = 0 = F_1(3/5) + F_3(4/5) - F_5$ (3)

$F_2 = F_4 + F_3(3/5)^2$ (1)' $\qquad F_3 = F_1(5/3)$ (2)'

substitute (2)' → (3)

$0 = F_1(3/5) + F_1(5/3)(4/5) - F_5$

$F_1 = \dfrac{F_5}{3/5 + (5/3)(4/5)}$ sub into (2)' $F_3 = F_1(5/3)$ sub into (2)' $F_2 = F_4 + F_3(3/5)^2$