

$$a. \vec{F} = F_0 \vec{d} = F_0 \begin{pmatrix} 5 \\ -3 \\ 1 \end{pmatrix} \quad r = \begin{pmatrix} 0 \\ 0 \\ 0.6 \end{pmatrix}$$

$$\vec{T} = \vec{r} \times \vec{F} = \begin{pmatrix} 0 \\ 0 \\ 0.6 \end{pmatrix} \times F_0 \begin{pmatrix} 5 \\ -3 \\ 1 \end{pmatrix} = \cancel{F_0} \begin{pmatrix} 1.8 \\ 3 \\ 0 \end{pmatrix}$$

direction, F_0 doesn't matter. $\sqrt{1.8^2 + 3^2} = \sqrt{12.24}$

direction: $\frac{1}{\sqrt{12.24}} \begin{pmatrix} 1.8 \\ 3 \\ 0 \end{pmatrix}$

$$b. \vec{T} = F_0 \begin{pmatrix} 1.8 \\ 3 \\ 0 \end{pmatrix} \quad |\vec{T}| = 400 = F_0 \sqrt{1.8^2 + 3^2}$$

$$F_0 = \frac{400}{\sqrt{12.24}} \approx 114.3 \text{ N}$$