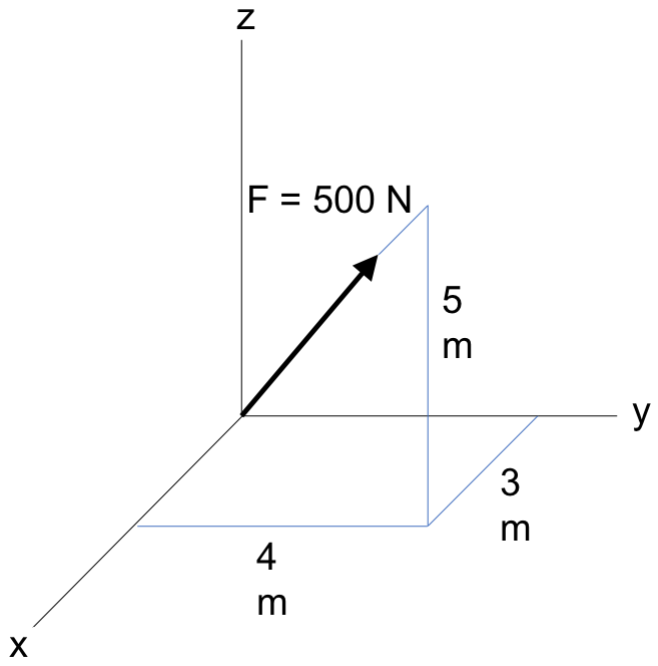
4. Position Vectors, Force Vectors on a Line, Dot Product

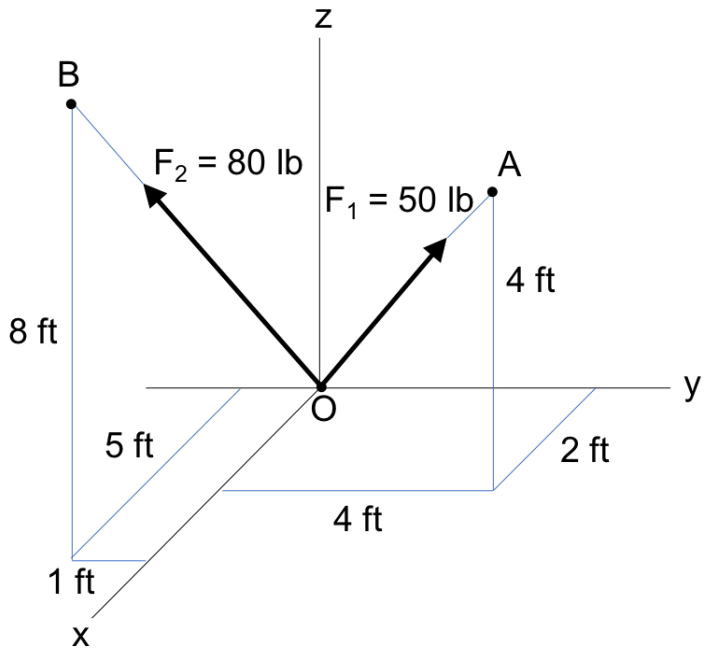
1. Points A and B are located in space. Point A has coordinates (2, 4, 6) and point B has coordinates (-3, 5, -7). The origin is located at (0, 0, 0).
    a. Find the position vector from the origin to point A, $\mathbf{r_A}$.
    b. Find the position vector from the origin to point B, $\mathbf{r_B}$.
    c. Find the position vector from Point A to point B, $\mathbf{r_{AB}}$.
    d. Find the position vector from Point B to Point A, $\mathbf{r_{BA}}$.
    e. Determine the magnitude of $\mathbf{r_{AB}}$.
        i. How does the magnitude of $\mathbf{r_{AB}}$ compare to the magnitude of $\mathbf{r_{BA}}$?
    f. Find the unit vector in the direction of $\mathbf{r_{AB}}$

2. Express the force **F** as a Cartesian vector and determine its coordinate direction angles α, β, and γ.



4. Position Vectors, Force Vectors on a Line, Dot Product

3. Forces $\mathbf{F}_1$ and $\mathbf{F}_2$ are acting on a support, which is represented by Point O. Determine the resultant force acting at O and express it as a Cartesian vector. Find the magnitude of the resultant force.



4. Pole AB is fixed to a wall at Point B. The pole is subjected to a force **F** at Point A. If the magnitude of the force is equal to 2 kN:
   a. Find the angle θ between the force and the pole
   b. Find the projection of **F** along the pole