

21-S-3-3-AG-058

A particle is being acted upon by forces $\mathbf{F}_1 = A\hat{\mathbf{i}} + B\hat{\mathbf{j}} + C\hat{\mathbf{k}}$, $\mathbf{F}_2 = -A\hat{\mathbf{i}} + B\hat{\mathbf{j}} + 0\hat{\mathbf{k}}$, and $\mathbf{F}_3 = 0\hat{\mathbf{i}} - 2B\hat{\mathbf{j}} - C\hat{\mathbf{k}}$. What are the magnitudes of the forces? Is the particle in equilibrium?

ANSWER:

The magnitudes of the forces can be found by,

$$F_1 = \sqrt{A^2 + B^2 + C^2}$$

$$F_2 = \sqrt{A^2 + B^2 + 0^2}$$

$$F_3 = \sqrt{0^2 + 4 \cdot B^2 + C^2}$$

To see if the particle is in equilibrium, we must sum the components.

$$\sum F_x = A - A + 0 = 0$$

$$\sum F_y = B + B - 2B = 0$$

$$\sum F_z = C + 0 - C = 0$$

The particle is in equilibrium.