Vector Rules

$$\vec{A}=A\_{x}\hat{x}+A\_{y}\hat{y}+A\_{z}\hat{z} \vec{B}=B\_{x}\hat{x}+B\_{y}\hat{y}+B\_{z}\hat{z}$$

Unit Vectors

$$\hat{x}=\hat{i} \hat{y}=\hat{j} \hat{z}=\hat{k}$$

$$\hat{x}\hat{x}=\hat{y}\hat{y}=\hat{z}\hat{z}=1$$

$$\hat{x}\hat{y}=\hat{z} \hat{y}\hat{z}=\hat{x} \hat{z}\hat{x}=\hat{y}$$

$\hat{y}\hat{x}=-\hat{z} \hat{z}\hat{y}=-\hat{x} \hat{x}\hat{z}=-\hat{y}$

Adding Vectors

$$\vec{A}+\vec{B}=\sqrt{\left(A\_{x}+B\_{x}\right)^{2}+\left(A\_{y}+B\_{y}\right)^{2}+\left(A\_{z}+B\_{z}\right)^{2}}=scalar quantity$$

$$\vec{A}+\vec{B}=\left(A\_{x}+B\_{x}\right)\hat{x}+\left(A\_{y}+B\_{y}\right)\hat{y}+\left(A\_{z}+B\_{z}\right)\hat{z}=vector quantity$$

Subtracting Vectors

$$\vec{A}-\vec{B}=\sqrt{\left(A\_{x}-B\_{x}\right)^{2}+\left(A\_{y}-B\_{y}\right)^{2}+\left(A\_{z}-B\_{z}\right)^{2}}=scalar quantity$$

$$\vec{A}-\vec{B}=\left(A\_{x}-B\_{x}\right)\hat{x}+\left(A\_{y}-B\_{y}\right)\hat{y}+\left(A\_{z}-B\_{z}\right)\hat{z}=vector quantity$$

Multiplying Vectors

$$\vec{A}∙\vec{B}=A\_{x}B\_{x}+A\_{y}B\_{y}+A\_{z}B\_{z}=scalar quantity$$

$$\vec{A}×\vec{B}=\left(A\_{y}B\_{z}-A\_{z}B\_{y}\right)\hat{x}+\left(A\_{z}B\_{x}-A\_{x}B\_{z}\right)\hat{y}+\left(A\_{x}B\_{y}-A\_{y}B\_{x}\right)\hat{z}=vector quantity$$