

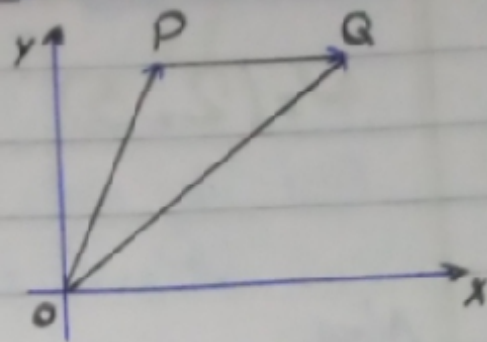
How to obtain a Free Vector:

From figure we see that

$\vec{OP}$ = Position Vector of Pt P

$\vec{OQ}$ = Position Vector of Pt Q

$\vec{PQ}$ = Free Vector



Then by head to tail Rule

$$\vec{OP} + \vec{PQ} = \vec{OQ}$$

$$\vec{PQ} = \vec{OQ} - \vec{OP}$$

Magnitude of Vector:

$$\underline{r} = x\hat{i} + y\hat{j}$$

$$|\underline{r}| = |x\hat{i} + y\hat{j}|$$

$$|\underline{r}| = \sqrt{x^2 + y^2}$$

Example:

$$\underline{a} = 4\hat{i} + 5\hat{j}$$

$$|\underline{a}| = |4\hat{i} + 5\hat{j}|$$

$$|\underline{a}| = \sqrt{4^2 + 5^2}$$

$$|\underline{a}| = \sqrt{16 + 25}$$

$$|\underline{a}| = \sqrt{41}$$

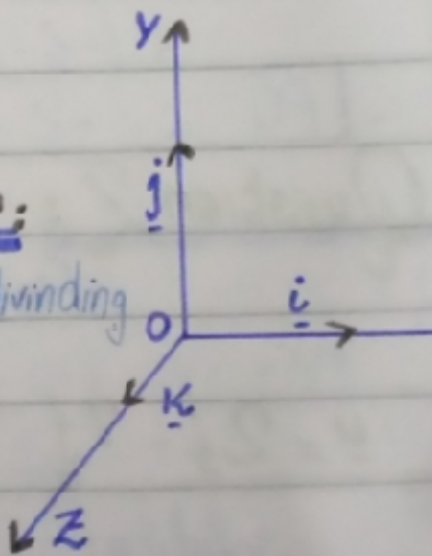
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How to obtain a Unit Vector:

A unit vector can be obtained by dividing a vector to its magnitude.

Formula:

$$\hat{a} = \frac{\underline{a}}{|\underline{a}|} \quad \text{or} \quad \underline{a} = |\underline{a}|\hat{a}$$



Note:

$\hat{i}$ = unit vector along x-axis.

$\hat{j}$ = unit vector along y-axis.

$\hat{k}$ = unit vector along z-axis.