Vector Theory
Magnitude & Direction

Addition $\overrightarrow{PQ} + \underline{a} = \begin{pmatrix} u_1 \\ u_2 \\ u_3 \end{pmatrix} + \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} = \begin{pmatrix} u_1 + a_1 \\ u_2 + a_2 \\ u_3 + a_3 \end{pmatrix}$

same for subtraction

Scalar product $k\underline{a} = \begin{pmatrix} ku_1 \\ ku_2 \\ ku_3 \end{pmatrix}$

Magnitude $|\underline{a}| = \sqrt{a_1 + a_2 + a_3}$

Basic properties

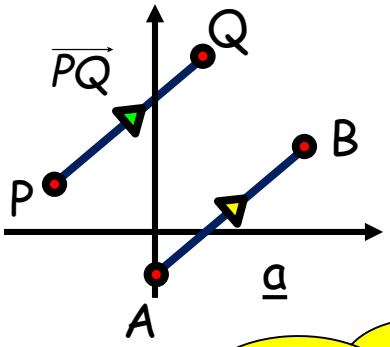
$\underline{a} \cdot \underline{b} = a_1 b_1 + a_2 b_2 + a_3 b_3 = 0$

2 vectors perpendicular if

Component form $\underline{a} \cdot \underline{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$

$\underline{a} \cdot \underline{b} = |\underline{a}||\underline{b}| \cos\theta$

scalar product



Notation

Vectors are equal if they have the same magnitude & direction

Component form $\overrightarrow{PQ} = \begin{pmatrix} u_1 \\ u_2 \\ u_3 \end{pmatrix}$

Unit vector form $\underline{a} = a_1\underline{i} + a_2\underline{j} + a_3\underline{k}$