6.4 Properties of Vectors

A Properties of Vectors

$\vec{a}+\vec{b}=\vec{b}+\vec{a}$

$\vec{a}+\vec{0}=\vec{0}+\vec{a}=\vec{a}$

$\vec{a}+(-\vec{a})=(-\vec{a})+\vec{a}=\vec{0}$

$(\vec{a}+\vec{b})+\vec{c}=\vec{a}+(\vec{b}+\vec{c})$

$\| k\vec{a} \| = | k | \| \vec{a} \|$

$k(\vec{a}+\vec{b})=k\vec{a}+k\vec{b}$

$(kl)\vec{a}=k(l\vec{a})=l(k\vec{a})$

$(k+l)\vec{a}=k\vec{a}+l\vec{a}$

$1\vec{a}=\vec{a}$

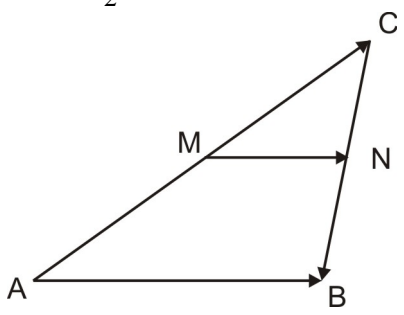
$(-1)\vec{a}=-\vec{a}$

$0\vec{a}=\vec{0}$

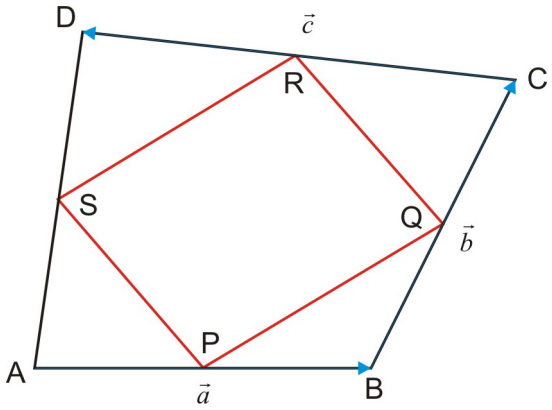
$\| \vec{0} \| = 0$

Ex 1. If $\vec{a}=2\vec{i}-3\vec{j}$ and $\vec{b}=\vec{i}+\vec{j}$, find $\vec{i}$ and $\vec{j}$ in terms of $\vec{a}$ and $\vec{b}$.

Ex 2. Consider the triangle ΔABC. Let M be the midpoint of AC and N be the midpoint of BC. Prove that $\overrightarrow{MN}=\frac{1}{2}\overrightarrow{AB}$.



Ex 3. Consider a polygon $ABCD$ and let P, Q, R, and S be the midpoints of AB, BC, CD, and DA respectively. Prove that $PQRS$ is a parallelogram.



Ex 4. Prove that diagonals of a rhombus (rhomboid) are perpendicular to each other.	Ex 5. Consider the triangle ΔABC and the point O defined by $\overrightarrow{AO} = \frac{\overrightarrow{AB} + \overrightarrow{AC}}{3}$. Let M be the midpoint of BC. a) Prove that $\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} = \vec{0}$. b) Prove that $\overrightarrow{AM} = \frac{3}{2}\overrightarrow{AO}$.

Reading: Nelson Textbook, Pages 302-306
Homework: Nelson Textbook: Page 306 #1, 6, 7, 8, 9; Page 308 #3, 6, 7, 13, 15

