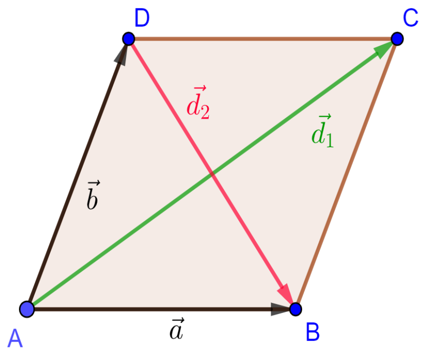
Lösung

a)

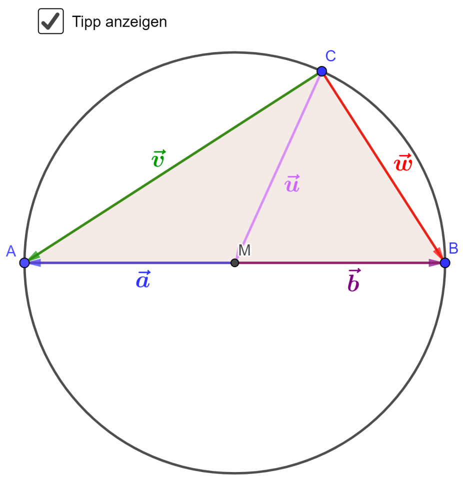


$$|\vec{a}|=|\vec{b}| \Leftrightarrow \sqrt{a_1^2+a_2^2}=\sqrt{b_1^2+b_2^2} \Leftrightarrow a_1^2+a_2^2=b_1^2+b_2^2$$

$$\vec{d}_1=\vec{a}+\vec{b} \wedge \vec{d}_2=\vec{a}-\vec{b}$$

$$\vec{d}_1\circ\vec{d}_2=(\vec{a}+\vec{b})\circ(\vec{a}-\vec{b}) \underset{\substack{\text{3.}\\\text{binomische}\\\text{Formel}}}{=} \vec{a}^2-\vec{b}^2 \underset{\vec{a}=\vec{b}}{=} \vec{a}^2-\vec{a}^2=0$$

b)



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

$$\vec{v}=\vec{u}+\vec{a} \;\wedge\; \vec{w}=\vec{u}+\vec{b}=\vec{u}-\vec{a}$$

$$|\vec{u}|=|\vec{a}| \;\Leftrightarrow\; \sqrt{u_1^2+u_2^2}=\sqrt{a_1^2+a_2^2} \;\Leftrightarrow\; u_1^2+u_2^2=a_1^2+a_2^2 \;\Leftrightarrow\; u_1^2-a_1^2+u_2^2-a_2^2=0$$

$$\underset{\text{3. binomische Formel}}{\Leftrightarrow} \;(u_1-a_1)\cdot(u_1+a_1)+(u_2-a_2)\cdot(u_2+a_2)=0$$

$$\Leftrightarrow\; (\vec{u}-\vec{a})\circ(\vec{u}+\vec{a})=0 \;\Leftrightarrow\; (\vec{u}+\vec{b})\circ(\vec{u}+\vec{a})=0 \;\Leftrightarrow\; \vec{w}\circ\vec{v}=0$$