Kreuzprodukt / Vektorprodukt:

$$\vec{n} = \vec{a} \times \vec{b}$$

Gegeben:

$$\vec{a} = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}$$

$$\vec{b} = \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix}$$

Gesucht:

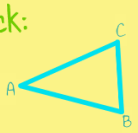
$$\vec{n} = \vec{a} \times \vec{b}$$

$$\vec{n} = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix} \times \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 3 - 4 \\ 4 - 1 \\ 2 - 6 \end{pmatrix} = \begin{pmatrix} -1 \\ 3 \\ -4 \end{pmatrix}$$

Anwendungungen des Vektorprodukts

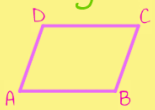
a) Flächeninhalt F Dreieck:

$$F = \frac{1}{2} \cdot \left| \overrightarrow{AB} \times \overrightarrow{AC} \right|$$



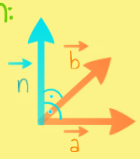
b) Flächeninhalt F Parallelogramm:

$$F = \left| \overrightarrow{AB} \times \overrightarrow{AD} \right|$$



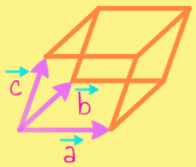
c) Vektor $\vec{n}$ bestimmen:

$$\vec{n} = \vec{a} \times \vec{b}$$



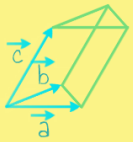
d) Volumen V Spat:

$$V = \left(\vec{a} \times \vec{b} \right) \circ \vec{c}$$



e) Volumen V Prisma:

$$V_{Prisma} = \frac{1}{2} \left(\vec{a} \times \vec{b} \right) \circ \vec{c}$$



f) Volumen V Pyramide:

$$V_{\substack{\text{dreiseitige} \\ \text{Pyramide}}} = \frac{1}{6} \left(\vec{a} \times \vec{b} \right) \circ \vec{c}$$