

S. 306 Nr. 7

A(3| -1| 2) B(0| 3| 4) C(5| 5| 6) D(8| 1| 4)

$$a) \vec{AB} = \begin{pmatrix} -3 \\ 4 \\ 2 \end{pmatrix} \quad \vec{CD} = \begin{pmatrix} 3 \\ -4 \\ -2 \end{pmatrix}$$

$$\vec{AB} = (-1) \cdot \vec{CD}$$

$$\vec{BC} = \begin{pmatrix} 5 \\ 2 \\ 2 \end{pmatrix} \quad \vec{AD} = \begin{pmatrix} 5 \\ 2 \\ 2 \end{pmatrix}$$

$$\vec{BC} = 1 \cdot \vec{AD}$$

$$|\vec{AB}| = \sqrt{(-3)^2 + 4^2 + 2^2} = \sqrt{9 + 16 + 4} = \sqrt{29}$$

$$|\vec{CD}| = \sqrt{3^2 + (-4)^2 + (-2)^2} = \sqrt{29}$$

$$|\vec{AB}| = |\vec{CD}|$$

$$|\vec{BC}| = \sqrt{5^2 + 2^2 + 2^2} = \sqrt{25 + 4 + 4} = \sqrt{33}$$

$$|\vec{AD}| = \sqrt{5^2 + 2^2 + 2^2} = \sqrt{25 + 4 + 4} = \sqrt{33}$$

$$|\vec{BC}| = |\vec{AD}|$$

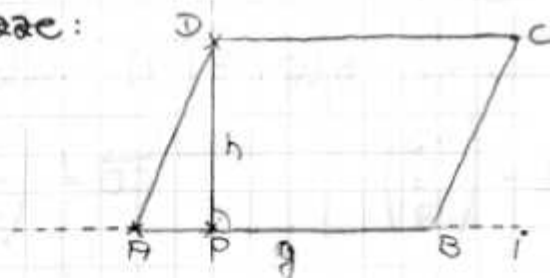
$$b) A = g \cdot h$$

$$g = |\vec{AB}| = \sqrt{(-3)^2 + 4^2 + 2^2}$$

$$= \sqrt{9 + 16 + 4}$$

$$= \sqrt{29}$$

Skizze:



$$i: \vec{x} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix} + q \cdot \begin{pmatrix} -3 \\ 4 \\ 2 \end{pmatrix} \rightarrow P(3-3q \mid -1+4q \mid 2+2q)$$

$$\vec{DP} = \begin{pmatrix} 3-3q-8 \\ -1+4q-1 \\ 2+2q-4 \end{pmatrix} = \begin{pmatrix} -3q-5 \\ 4q-2 \\ 2q-2 \end{pmatrix}$$

$$\begin{pmatrix} -3 \\ 4 \\ 2 \end{pmatrix} \cdot \begin{pmatrix} -3q-5 \\ 4q-2 \\ 2q-2 \end{pmatrix} \stackrel{!}{=} 0$$

$$-3 \cdot (-3q-5) + 4 \cdot (4q-2) + 2 \cdot (2q-2) = 0$$

$$9q + 15 + 16q - 8 + 4q - 4 = 0$$

$$29q + 3 = 0 \quad | -3$$

$$29q = -3 \quad | : 29$$

$$q = -\frac{3}{29}$$

$$\vec{DP} = \begin{pmatrix} -\frac{3 \cdot 29}{29} - 5 \\ \frac{4 \cdot 29}{29} - 2 \\ -\frac{2 \cdot 29}{29} - 2 \end{pmatrix} = \begin{pmatrix} -\frac{136}{29} \\ \frac{70}{29} \\ -\frac{64}{29} \end{pmatrix}$$

$$|\vec{DP}| = \sqrt{\left(-\frac{136}{29}\right)^2 + \left(-\frac{70}{29}\right)^2 + \left(-\frac{64}{29}\right)^2}$$

$$= \sqrt{\frac{18486}{841} + \frac{4900}{841} + \frac{4096}{841}}$$

$$= \sqrt{\frac{27482}{841}} = \frac{\sqrt{27482}}{29} = \frac{\sqrt{29} \cdot \sqrt{948}}{29}$$

$$A = g \cdot h = \sqrt{29} \cdot \frac{\sqrt{29} \cdot \sqrt{948}}{29} = \frac{29}{29} \cdot \sqrt{948} = \sqrt{948} \approx \underline{\underline{30,79 \text{ FE}}}$$