

32. Schulübung GEOMETRIE

$$577) \quad \vec{a} = \begin{pmatrix} 4 \\ -2 \\ -4 \end{pmatrix} \quad \vec{b} = \begin{pmatrix} -2 \\ 4 \\ -4 \end{pmatrix}$$

$$(1) \quad |\vec{a}| = \sqrt{36} = 6 \quad |\vec{b}| = \sqrt{36} = \underline{\underline{6}}$$

$$\begin{pmatrix} 4 \\ -2 \\ -4 \end{pmatrix} \cdot \begin{pmatrix} -2 \\ 4 \\ -4 \end{pmatrix} = -8 - 8 + 16 = 0 \Rightarrow \underline{\underline{\vec{a} \perp \vec{b}}}$$

$$(2) \quad \vec{c} = \vec{a} \times \vec{b} = \begin{pmatrix} 24 \\ 24 \\ 12 \end{pmatrix} \parallel \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix}$$

$$\begin{vmatrix} -2 & 4 \\ -4 & -4 \end{vmatrix}$$

$$\begin{vmatrix} 4 & -2 \\ -4 & -4 \end{vmatrix}$$

$$\begin{vmatrix} 4 & -2 \\ -2 & 4 \end{vmatrix}$$

$$8 - (-16) = 24$$

$$-16 - (+8) = -24$$

$$16 - (+4) = 12$$

$$\downarrow \\ +24$$

$$|\vec{c}| = \sqrt{9} = 3 \Rightarrow \vec{c}_0 = \frac{1}{3} \begin{pmatrix} 24 \\ 24 \\ 12 \end{pmatrix}$$

$$\vec{c} = \frac{6}{3} \cdot \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} = \underline{\underline{\begin{pmatrix} 4 \\ 4 \\ 2 \end{pmatrix}}}$$

$$(3) \quad A = (0|0|0)$$

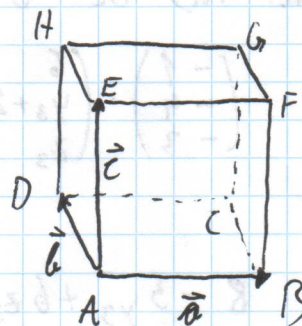
$$B = (4|-2|-4)$$

$$C = (2|2|-8)$$

$$D = (-2|4|-4)$$

$$E = (4|4|2)$$

$$C = A + \vec{a} + \vec{b} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} 4 \\ -2 \\ -4 \end{pmatrix} + \begin{pmatrix} -2 \\ 4 \\ -4 \end{pmatrix} = \begin{pmatrix} 2 \\ 2 \\ -8 \end{pmatrix}$$



$$F = B + \vec{c} = \begin{pmatrix} 4 \\ -2 \\ -4 \end{pmatrix} + \begin{pmatrix} 4 \\ 4 \\ 2 \end{pmatrix} = \begin{pmatrix} 8 \\ 2 \\ -2 \end{pmatrix}$$

$$G = C + \vec{c} = \begin{pmatrix} 4 \\ -2 \\ -2 \end{pmatrix} + \begin{pmatrix} 4 \\ 4 \\ 2 \end{pmatrix} = \begin{pmatrix} 8 \\ 2 \\ 0 \end{pmatrix}$$

$$H = D + \vec{c} = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix} + \begin{pmatrix} 4 \\ 4 \\ 2 \end{pmatrix} = \begin{pmatrix} 9 \\ 6 \\ 3 \end{pmatrix}$$

$$F = (8 | 2 | -2)$$

$$G = (8 | 2 | 0)$$

$$H = (9 | 6 | 3)$$

578) $A = (-1 | 2 | 3)$ $B = (x_2 | -2 | 0)$ $C = (4 | y_3 | z_3)$ $D = (x_4 | y_4 | z_4)$

$e: 2x - 5y + 6z = d$ $S \in g: X = \begin{pmatrix} 7 \\ -18 \\ 20 \end{pmatrix} + t \begin{pmatrix} 4 \\ 5 \\ -1 \end{pmatrix}$

$A \in e: -2 - 10 + 18 = d$

$d = 6$

$e: 2x - 5y + 6z = 6$

$B \in e: 2x_2 + 10 = 6$

$x_2 = -2$

Rechnech: $\vec{AB} \cdot \vec{BC} = 0$

$$\begin{pmatrix} -1 \\ -4 \\ -3 \end{pmatrix} \cdot \begin{pmatrix} 6 \\ y_3 + 2 \\ z_3 \end{pmatrix} = -6 - 4y_3 - 8 - 3z_3 = 0$$

$-4y_3 - 3z_3 = 14 \quad | \cdot 2 \quad (1. \text{ Gleichung})$

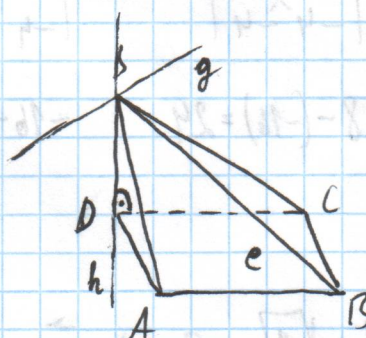
$C \in e: 8 - 5y_3 + 6z_3 = 6 \Rightarrow$ $-5y_3 + 6z_3 = -2 \quad (2. \text{ Gleichung})$

$-8y_3 - 6z_3 = 28$

$-5y_3 + 6z_3 = -2$

$-13y_3 = 26 \quad | :(-13)$

$y_3 = -2 \Rightarrow z_3 = -2$



$$B = (-2 | -2 | 0)$$

$$C = (4 | -2 | -2)$$

$$D = (5 | 2 | 1)$$

$$D = A + \vec{BC} = \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix} + \begin{pmatrix} 6 \\ 0 \\ -2 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \\ 1 \end{pmatrix}$$

$\frac{3 \cdot 1}{2} = \frac{3}{2}$