

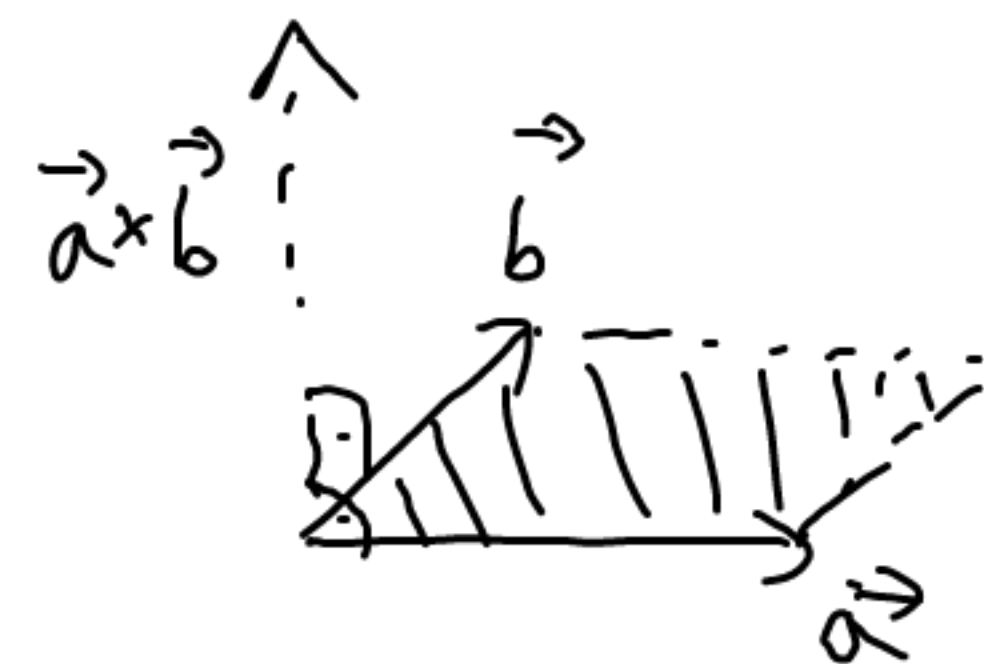
IX  $A = (0, 0, 0)$   $B = (1, 2, 2)$   $C = (-4, 0, 2)$

$$P = \frac{1}{2} |\vec{AB} \times \vec{AC}|$$

$$\vec{AB} = (1, 2, 2)$$

$$\vec{AC} = (-4, 0, 2)$$

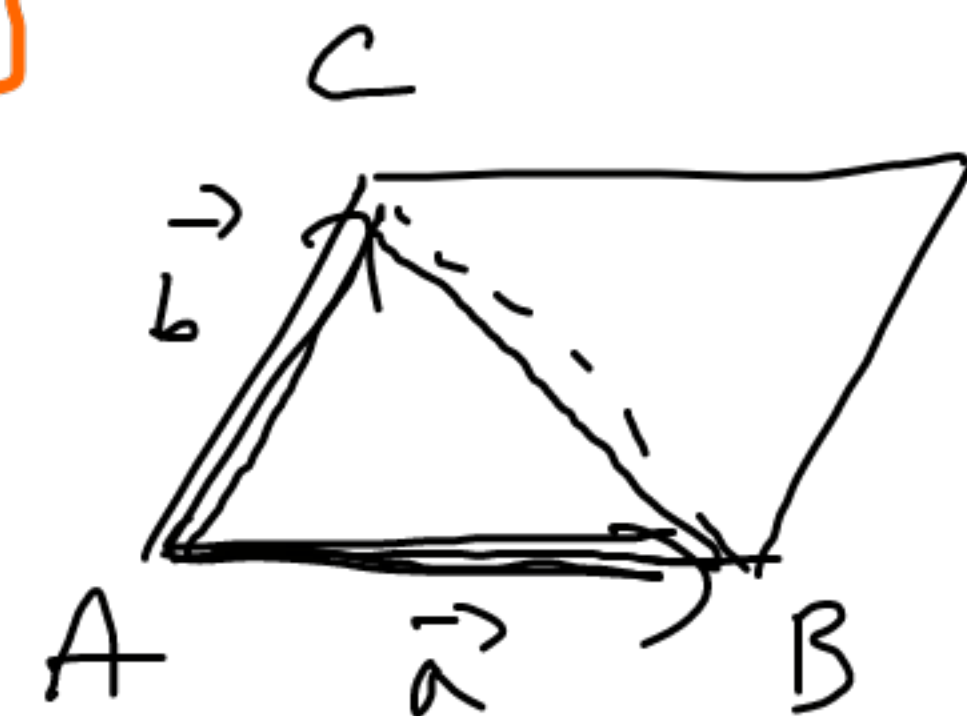
$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$



$|\vec{a} \times \vec{b}| = \text{Pole}$   
 równoległoboku  
 wyznaczonego przez  
 $\vec{a}$  i  $\vec{b}$

$$\vec{AB} \times \vec{AC} = \left[ \begin{vmatrix} 2 & 2 \\ 0 & 2 \end{vmatrix}, - \begin{vmatrix} 1 & 2 \\ 4 & 2 \end{vmatrix}, \begin{vmatrix} 1 & 2 \\ -4 & 0 \end{vmatrix} \right] =$$

$$= (4, -10, 8) = \vec{a}$$



$|\vec{a}|$

$$|\vec{a}| = \sqrt{16 + 100 + 64} = \sqrt{180} \Rightarrow$$

$$P = \frac{\sqrt{180}}{2}$$

Sprawdzenie:

$$\vec{a} \cdot \vec{AB} = (4, -10, 8) \cdot (1, 2, 2) = 4 - 20 + 16 = 0$$

$$\vec{a} \cdot \vec{AC} = (4, -10, 8) \cdot (-4, 0, 2) = -16 + 0 + 16 = 0$$