№ 13.5 ① $|\vec{a}| = 3,\ |\vec{b}| = 1,\ \angle(\vec{a},\vec{b}) = \frac{2\pi}{3}$

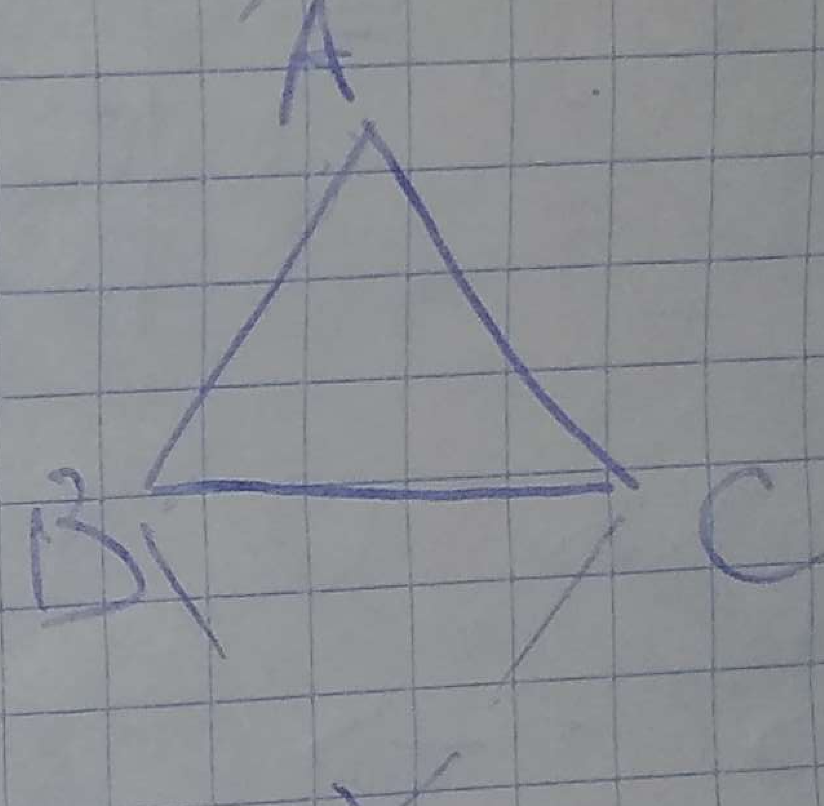
$\left| \left[3\vec{a} - 4\vec{b},\ 4\vec{a} - \vec{b} \right] \right| =$

$|[a,b]| = 3 \cdot \frac{\sqrt{3}}{2} = 1,5\sqrt{3}$

$= \left| (-3+16) [\vec{a},\vec{b}] \right| =$

$= 13 \cdot 1,5\sqrt{3} \approx 33,77$ Ответ: 33,77.

② $A(-2,-8,0)$
$B(2,-5,1)$
$C(5,-1,-2)$



$\vec{AB}\{4;3;1\}$
$\vec{AC}\{7;7;-2\}$

$|\vec{AB}| = \sqrt{26}$ $|\vec{AC}| = \sqrt{102}$

$(\vec{AB} \cdot \vec{AC}) = 28 + 21 - 2 = 47$

$\cos\angle A = \frac{47}{\sqrt{26}\sqrt{102}}$

$\sin\angle A = \sqrt{1 - \frac{47^2}{26 \cdot 102}} = \cancel{\frac{\sqrt{26 \cdot 102 - 47^2}}{\ldots}}$

$S_\Delta = \frac{1}{2} \cdot \sqrt{26} \cdot \sqrt{102} \cdot \sqrt{1 - \frac{47^2}{26 \cdot 102}} = \frac{1}{2}\sqrt{26 \cdot 102 - \ldots}$

(3) $\vec{a}\{3,-2,-2\}$
$\vec{b}\{3,4,-2\}$

$[\vec{a}, -\vec{a}+3\vec{b}] + [\vec{a}, -2[\vec{a},\vec{b}]] =$

$= [\vec{a}, -\vec{a}+3\vec{b}-2[\vec{a},\vec{b}]]$

$[\vec{a}\ \vec{b}] = \begin{vmatrix} i & j & k \\ 3 & -2 & -2 \\ 3 & 4 & -2 \end{vmatrix} = 12\vec{i} + 0\cdot\vec{j} + 18\vec{k} =$

$= \{12, 0, 18\}$

$-\vec{a}+3\vec{b}-2[\vec{a},\vec{b}] =$

$= \{-3+9-24;\ 2+12,\ 2-6-36\} =$

$= \{-18;\ 14;\ -40\}$

$\begin{vmatrix} i & j & k \\ 3 & -2 & -2 \\ -18 & 14 & -40 \end{vmatrix} = \cancel{(80)}\ (-80-36)\vec{j} + (42-36)\vec{k}$

$+156\ \vec{j}$ $\quad 78$ $\quad 6$

(4) $\vec{a}(-2,-5,2)$ $\quad \vec{b}(3,-2,0)$

$\vec{x}\perp\vec{a},\vec{b} \Rightarrow \vec{x}\parallel[\vec{a},\vec{b}]$

$\begin{vmatrix} i & j & k \\ -2 & -5 & 2 \\ 3 & -2 & 0 \end{vmatrix} = +2\vec{i}+3\vec{j}-\cancel{19}\,\vec{k}$ $\quad \{2;\ 3;\ 17\}$

$(\vec{x},\vec{c}) = 2$ $\quad \vec{c}\{-4;\ 0;\ 2\}$

$|\vec{c}| = \sqrt{20}$

$\vec{x}\{a, b, c\}$ $\quad \{2n;\ 3n;\ 17n\}$

$(\vec{x},\vec{c}) = -4a+2c = 2$

$-2a + c = 1$

$c = 1+2a$

$b \in \cancel{\mathbb{Z}}\ \mathbb{R}$

$a = 2n$

$c = 17n$

$17n = 1+4n$

$n = \frac{1}{13}$

$\left\{\frac{2}{13};\ \frac{3}{13};\ \frac{17}{13}\right\}$

$-8n+34n = 2$

$26n = 2$

$n = \frac{1}{13}$

Линал. практика.

Д/З #5 Продолжение

(5) $A(1, 0, -4)$ $\quad \overrightarrow{AB}\{-4; 4; -2\}$

$B(-3, 4, -6)$ $\quad \overrightarrow{AC}\{-6; 0; -1\}$ $\quad (\overrightarrow{AB}, \overrightarrow{AC})$

$C(-5, 0, -5)$ $\quad \cos(\overrightarrow{AB} \wedge \overrightarrow{AC}) = \dfrac{-24 + 2}{6 \cdot \sqrt{37}}$ $\quad |\overrightarrow{AB}|$ $\quad |\overrightarrow{AC}|$

α

$\sin\alpha = \sqrt{1 - \dfrac{22^2}{36 \cdot 37}}$

$S_{\triangle} = [\overrightarrow{AB}\ \overrightarrow{AC}] = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -4 & 4 & 2 \\ -6 & 0 & -1 \end{vmatrix} = \vec{i}(-4) - \vec{j}(+4 - 12)$

$+ \vec{k}(24) = \{-4; 8; 24\}$

$S_{\square} = |[\overrightarrow{AB}\ \overrightarrow{AC}]| = \sqrt{16 + 64 + 576} = \sqrt{656}$

$|\vec{x}| = |\overrightarrow{AA_1}| = \dfrac{210}{\sqrt{656}}$

~~искомый~~

$\overrightarrow{AA_1}\left\{-\dfrac{210 \cdot 4}{656}, \dfrac{210 \cdot 8}{656}, \dfrac{210 \cdot 24}{656}\right\}$

$A_1\left(1 - \dfrac{210 \cdot 4}{656}, \dfrac{210 \cdot 8}{656}, \dfrac{210 \cdot 24}{656} - 4\right)$

$(-0{,}28;\ 2{,}56;\ 3{,}68)$

(6) $\begin{vmatrix} 3 & 3 & -4 \\ 0 & -5 & -4 \\ 3 & -4 & -2 \end{vmatrix} = \begin{vmatrix} 3 & 3 & -4 \\ 0 & -5 & -4 \\ 0 & -7 & 2 \end{vmatrix} = 3(-10 - 28) \neq$

$\neq 0 \Rightarrow$ ~~все~~ вектора ~~$\neq 0$~~ некомпланарны $\Rightarrow$

$\Rightarrow$ можно установить базис.