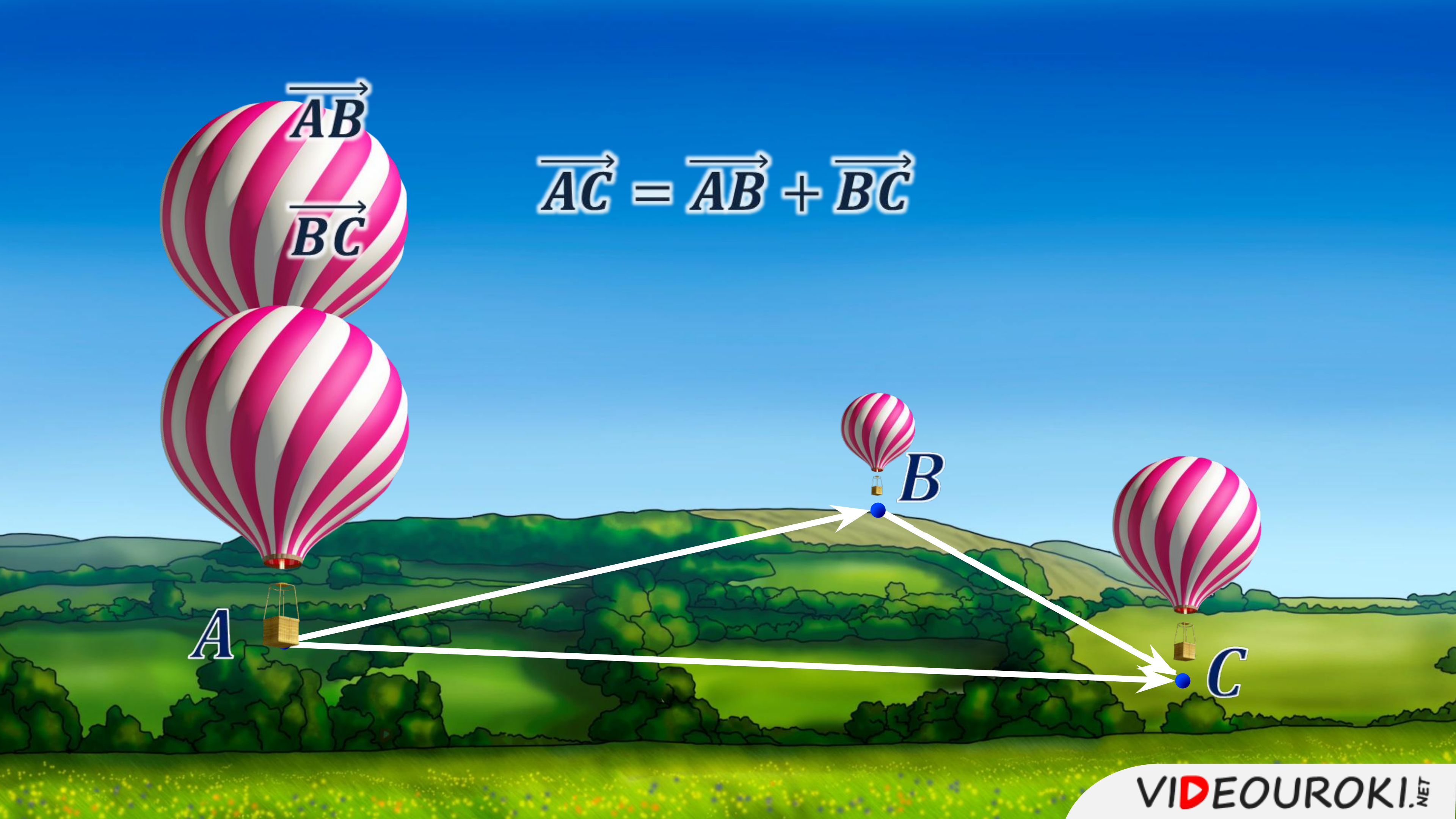
Сложение и вычитание векторов

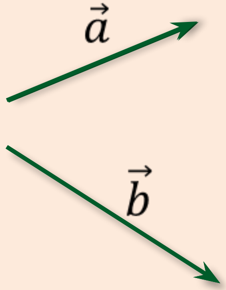

$\overrightarrow{AB}$
$\overrightarrow{BC}$
$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$
A
B
C
VIDEOUROKI.NET

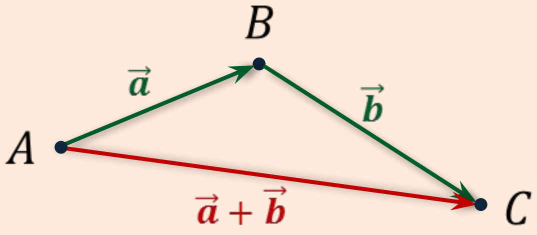
Правило треугольника

1. $\overrightarrow{AB} = \vec{a}$

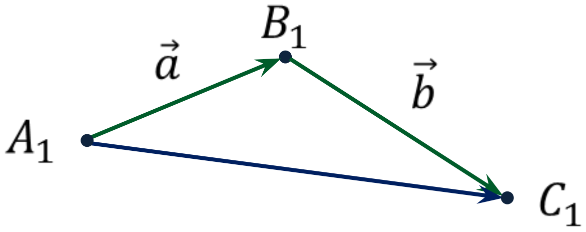
2. $\overrightarrow{BC} = \vec{b}$

3. $\overrightarrow{AC} = \vec{a} + \vec{b}$





Доказать: $\overrightarrow{AC} = \overrightarrow{A_1C_1}$.



Доказать: $\overrightarrow{AC} = \overrightarrow{A_1C_1}$.

Доказательство.

$\overrightarrow{AB} = \overrightarrow{A_1B_1} \iff \overrightarrow{AB} \uparrow\uparrow \overrightarrow{A_1B_1} \Rightarrow AB \parallel A_1B_1$

$|\overrightarrow{AB}| = |\overrightarrow{A_1B_1}| \Rightarrow AB = A_1B_1$

ABB_1A_1 – параллелограмм $\Rightarrow \overrightarrow{AA_1} = \overrightarrow{BB_1}$

$\overrightarrow{BC} = \overrightarrow{B_1C_1} \iff \overrightarrow{BC} \uparrow\uparrow \overrightarrow{B_1C_1} \Rightarrow BC \parallel B_1C_1$

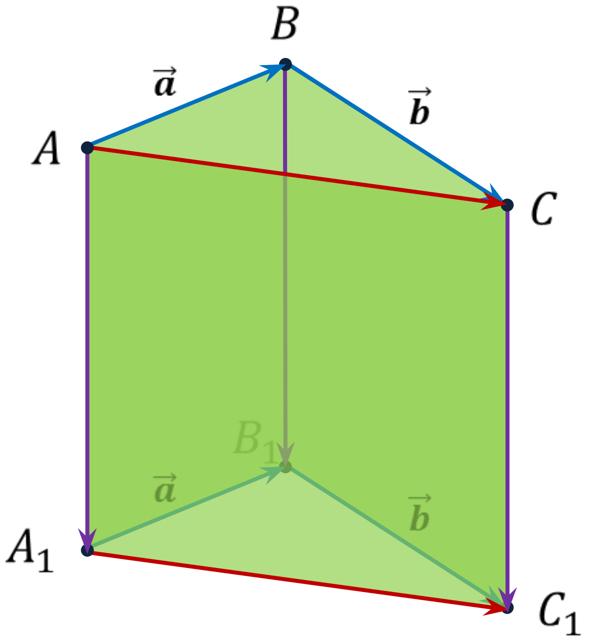
$|\overrightarrow{BC}| = |\overrightarrow{B_1C_1}| \Rightarrow BC = B_1C_1$

BCC_1B_1 – параллелограмм $\Rightarrow \overrightarrow{CC_1} = \overrightarrow{BB_1}$

$\overrightarrow{AA_1} = \overrightarrow{CC_1} \iff \overrightarrow{AA_1} \uparrow\uparrow \overrightarrow{CC_1} \Rightarrow AA_1 \parallel CC_1$

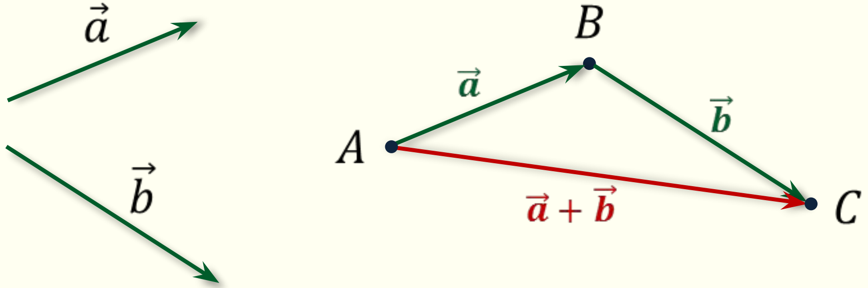
$|\overrightarrow{AA_1}| = |\overrightarrow{CC_1}| \Rightarrow AA_1 = CC_1$

AA_1C_1C – параллелограмм $\Rightarrow \overrightarrow{AC} = \overrightarrow{A_1C_1}$



Что и требовалось доказать.

Правило треугольника



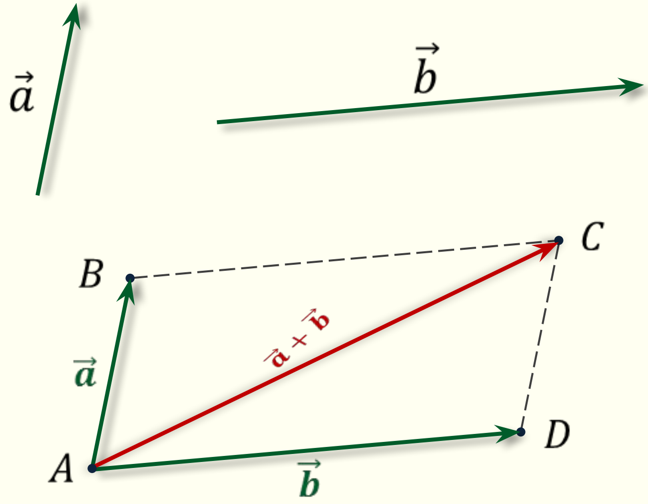
$$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$$

$$\overrightarrow{KL} + \overrightarrow{LM} = \overrightarrow{KM}$$

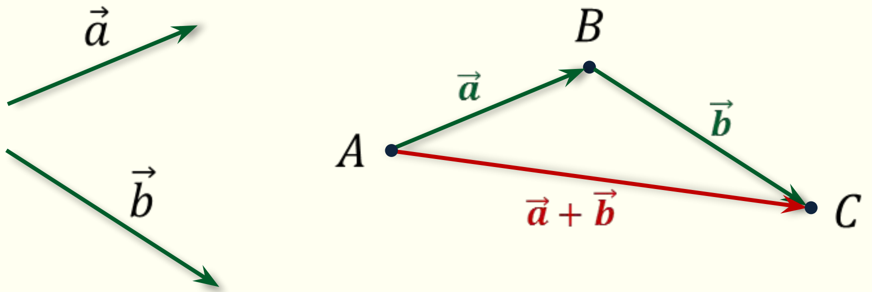
$$\overrightarrow{XY} + \overrightarrow{YZ} = \overrightarrow{XZ}$$

$$\overrightarrow{RS} + \overrightarrow{ST} = \overrightarrow{RT}$$

Правило параллелограмма

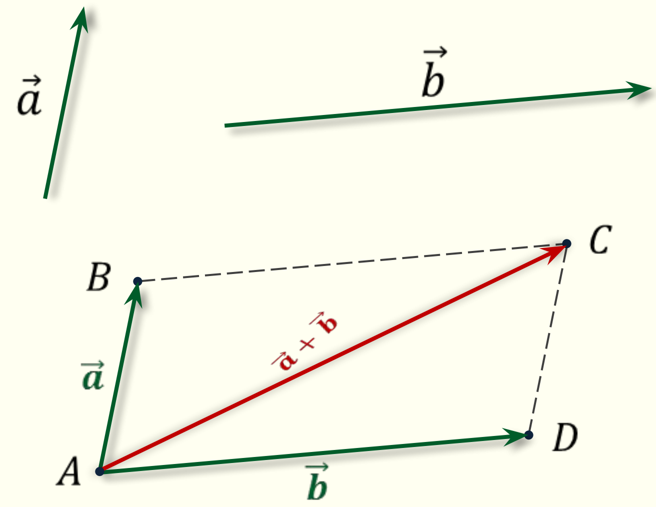


Правило треугольника



$$\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$$

Правило параллелограмма



Законы сложения векторов

$$\vec{a} + \vec{b} = \vec{b} + \vec{a}$$

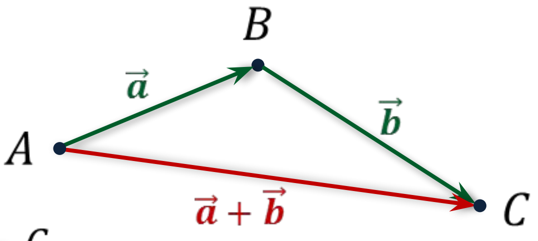
переместительный закон

$$(\vec{a} + \vec{b}) + \vec{c} = \vec{a} + (\vec{b} + \vec{c})$$

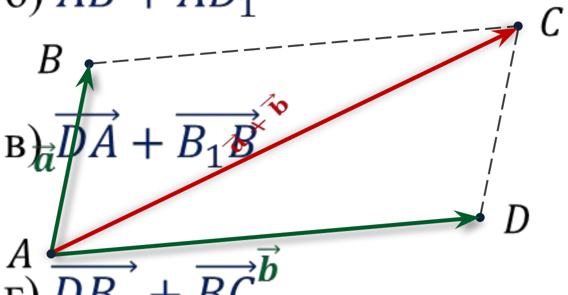
сочетательный закон

$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{AB} + \overrightarrow{A_1D_1}$



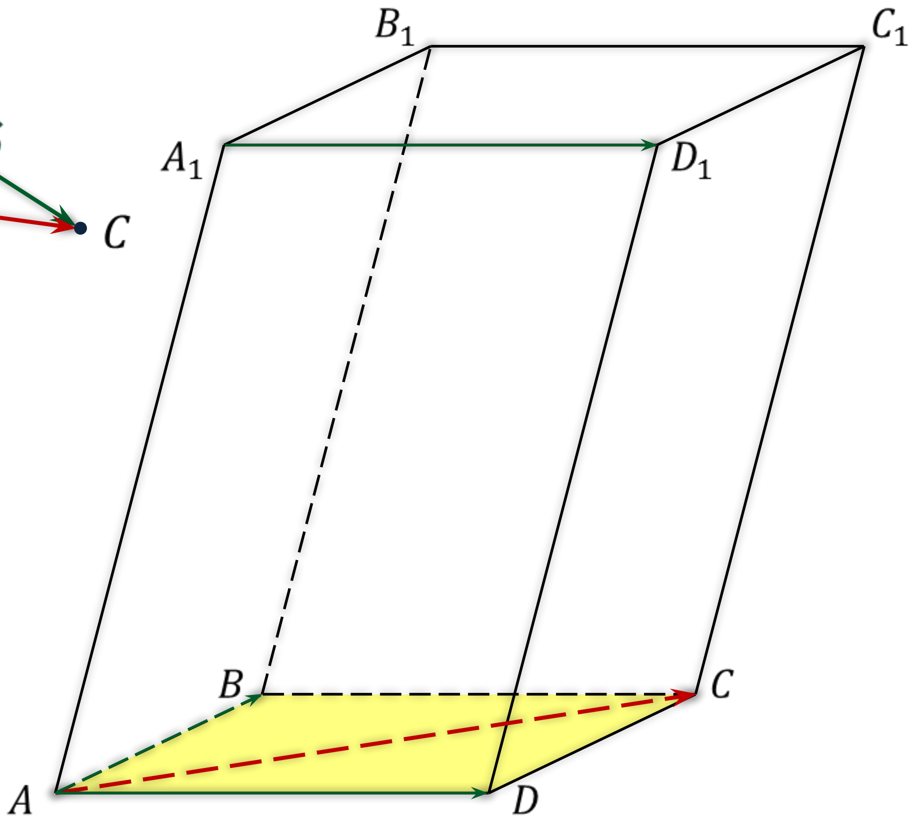
б) $\overrightarrow{AB} + \overrightarrow{AD_1}$



в) $\overrightarrow{DA} + \overrightarrow{B_1B}$

г) $\overrightarrow{DB_1} + \overrightarrow{BC}$

д) $\overrightarrow{A_1A}$ +

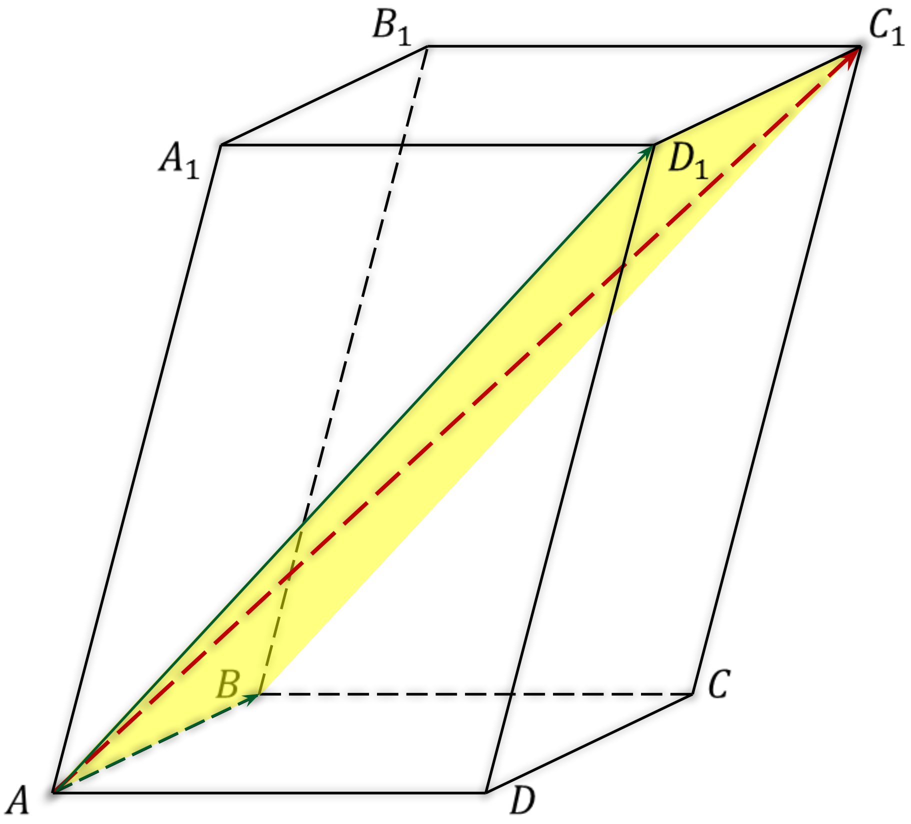


От любой точки M **пространства** можно отложить вектор, равный данному вектору $\vec{a}$, и притом только один.

$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{AB} + \overrightarrow{A_1D_1} = \overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{\boldsymbol{AC}}$

б) $\overrightarrow{AB} + \overrightarrow{AD_1}$



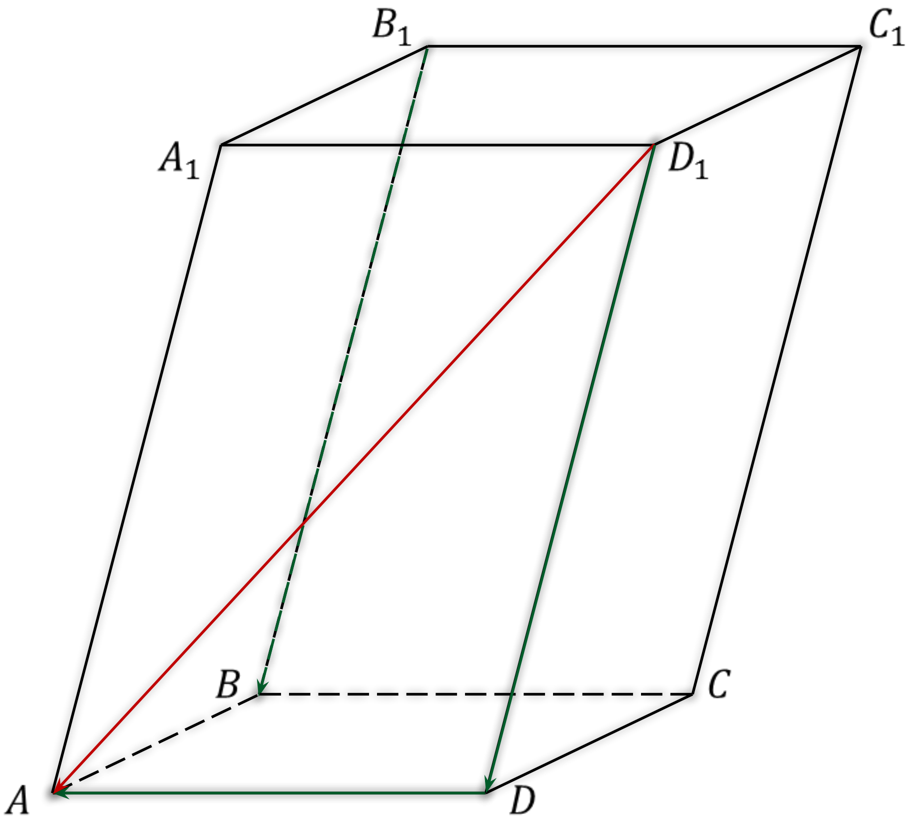
$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{AB} + \overrightarrow{A_1D_1} = \overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{\boldsymbol{AC}}$

б) $\overrightarrow{AB} + \overrightarrow{AD_1} = \overrightarrow{\boldsymbol{AC_1}}$

в) $\overrightarrow{DA} + \overrightarrow{B_1B}$

$\overrightarrow{DA} + \overrightarrow{D_1D}$



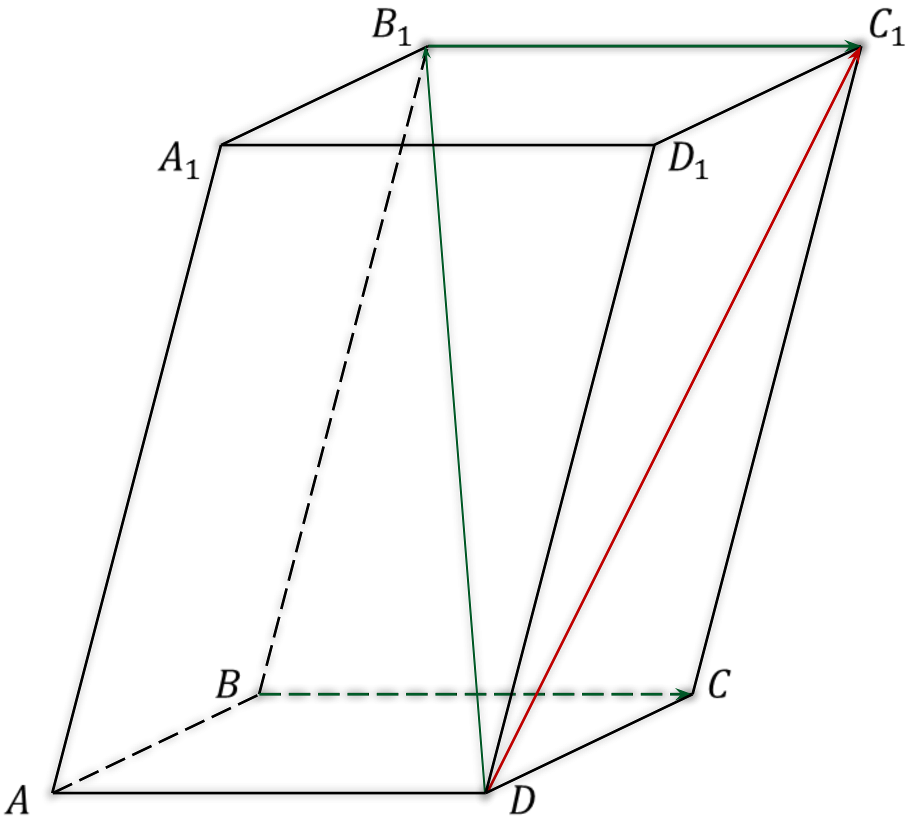
$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{AB} + \overrightarrow{A_1D_1} = \overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{\boldsymbol{AC}}$

б) $\overrightarrow{AB} + \overrightarrow{AD_1} = \overrightarrow{\boldsymbol{AC_1}}$

в) $\overrightarrow{DA} + \overrightarrow{B_1B} = \overrightarrow{DA} + \overrightarrow{D_1D} = \overrightarrow{\boldsymbol{D_1A}}$

г) $\overrightarrow{DB_1} + \overrightarrow{BC}$



$ABCDA_1B_1C_1D_1$ – параллелепипед.

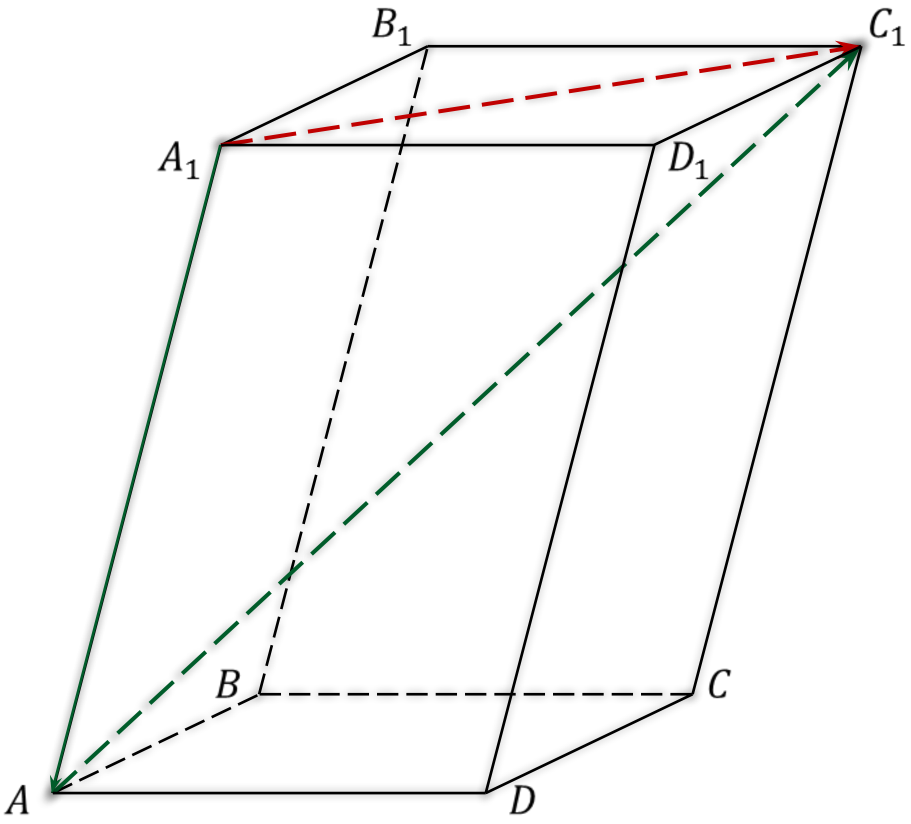
а) $\overrightarrow{AB} + \overrightarrow{A_1D_1} = \overrightarrow{AB} + \overrightarrow{AD} = \overrightarrow{\boldsymbol{AC}}$

б) $\overrightarrow{AB} + \overrightarrow{AD_1} = \overrightarrow{\boldsymbol{AC_1}}$

в) $\overrightarrow{DA} + \overrightarrow{B_1B} = \overrightarrow{DA} + \overrightarrow{D_1D} = \overrightarrow{\boldsymbol{D_1A}}$

г) $\overrightarrow{DB_1} + \overrightarrow{BC} = \overrightarrow{DB_1} + \overrightarrow{B_1C_1} = \overrightarrow{\boldsymbol{DC_1}}$

д) $\overrightarrow{A_1A} + \overrightarrow{AC_1}$

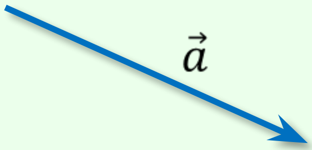


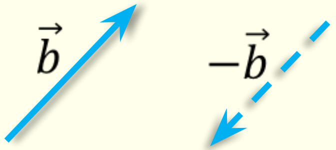
Разность векторов

$\vec{a} - \vec{b}$

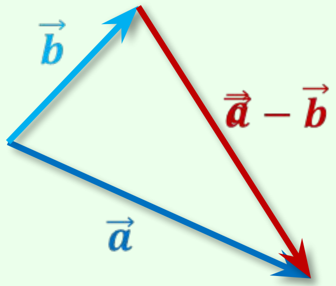
$\vec{c} + \vec{b} = \vec{a}$

Разностью векторов $\vec{a}$ и $\vec{b}$ называют такой вектор $\vec{c}$, сумма которого с вектором $\vec{b}$ равна вектору $\vec{a}$.

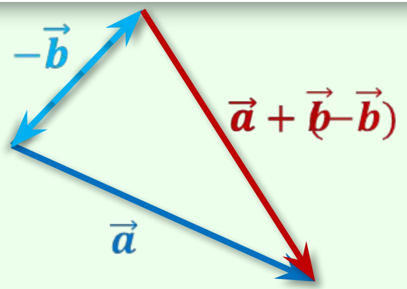




противоположные векторы



$\vec{a} - \vec{b}$



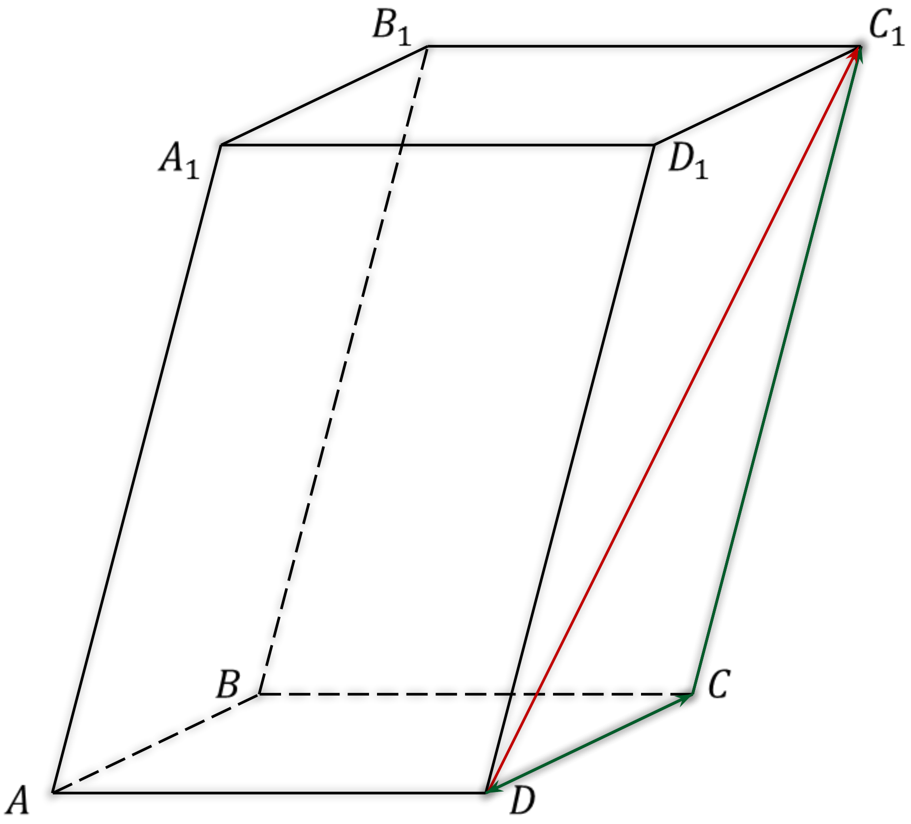
$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{CC_1} - \overrightarrow{CD}$

$\overrightarrow{CC_1} - \overrightarrow{CD}$

б) $\overrightarrow{AA_1} - \overrightarrow{AC}$

в) $\overrightarrow{C_1D_1} - \overrightarrow{BA_1}$

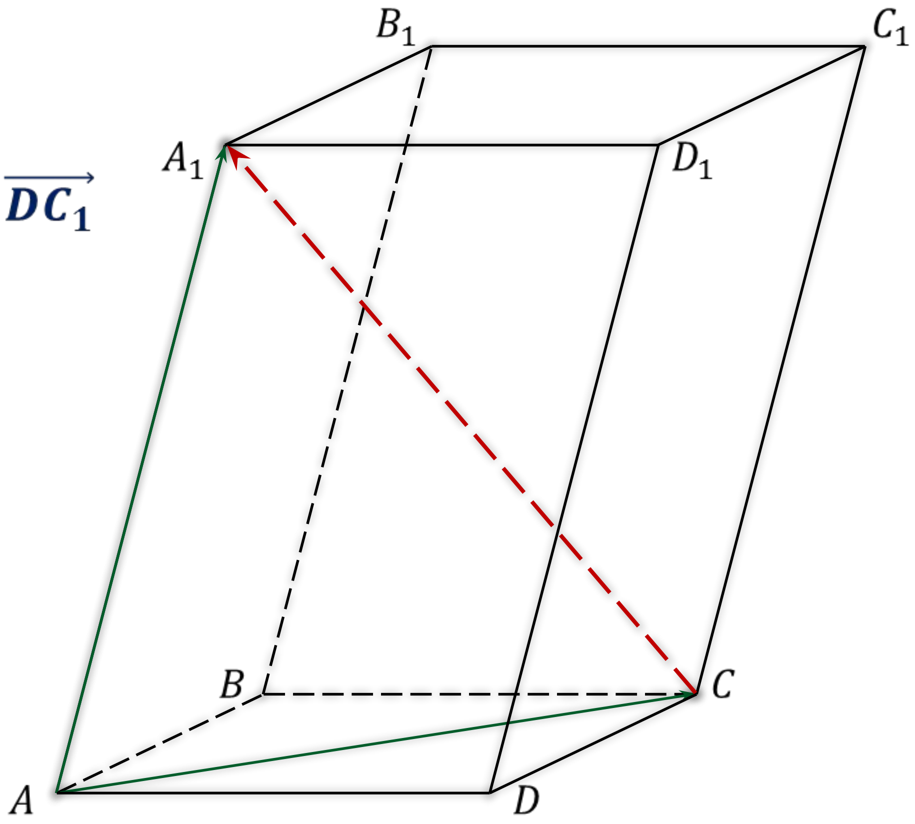


$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{CC_1} - \overrightarrow{CD} = \boldsymbol{\overrightarrow{DC_1}}$

$\overrightarrow{CC_1} - \overrightarrow{CD} = \overrightarrow{CC_1} + \left(-\overrightarrow{CD}\right) = \overrightarrow{CC_1} + \overrightarrow{DC} = \boldsymbol{\overrightarrow{DC_1}}$

б) $\overrightarrow{AA_1} - \overrightarrow{AC}$



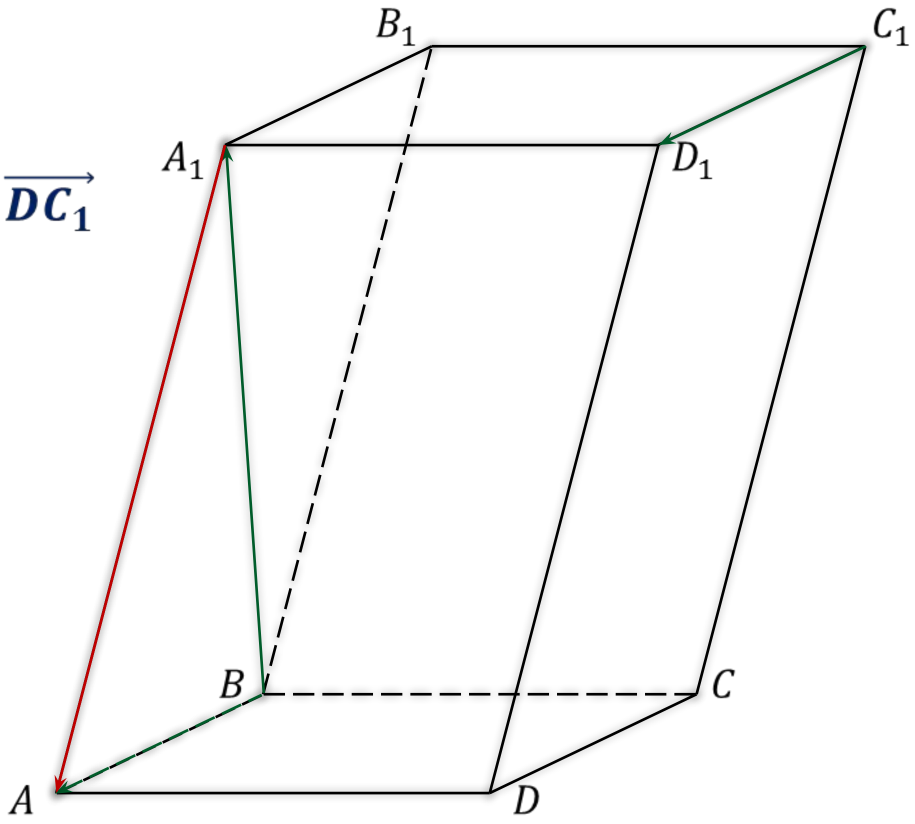
$ABCDA_1B_1C_1D_1$ – параллелепипед.

а) $\overrightarrow{CC_1} - \overrightarrow{CD} = \boldsymbol{\overrightarrow{DC_1}}$

$\overrightarrow{CC_1} - \overrightarrow{CD} = \overrightarrow{CC_1} + (-\overrightarrow{CD}) = \overrightarrow{CC_1} + \overrightarrow{DC} = \boldsymbol{\overrightarrow{DC_1}}$

б) $\overrightarrow{AA_1} - \overrightarrow{AC} = \boldsymbol{\overrightarrow{CA_1}}$

в) $\overrightarrow{C_1D_1} - \overrightarrow{BA_1}$



Сложение и вычитание векторов