Answer on Question # 41701 – Physics, Mechanics | Kinametics | Dynamics

1. If a and b are two sides of a parallelogram and c and d are the diagonals then:

(1) c2 + d2 = a2 + b2

(2) c2 + d2 = 2 (a2 + b2)

(3) c2 - d2 = a2 - b2

(4) c2 - d2 = 2 (a2 - b2).

Solution.

If a and b are two sides of a parallelogram and c and d are the diagonals, then $\vec{a}+\vec{b}=\vec{c}$, $\vec{a}-\vec{b}=\vec{d}$, where the directions of the vectors can be chosen in such a way that direction of each vector coincides with the direction of an appropriate section.

Let bring the equalities to the square:

$$a^2+2\left(\vec{a}\,\vec{b}\right)+b^2=c^2,\quad a^2-2\left(\vec{a}\,\vec{b}\right)+b^2=d^2.$$

The sum of this equalities is $2\left(a^2+b^2\right)=c^2+d^2$.

Answer: the right answer is the second one.