

Answer on Question #56119 – Math – Vector Calculus

Evaluate $(A + B) \cdot (A - B)$ if $A = 2i - 3j + 5k$ and $B = 3i + j - 2k$.

- a) 20
- b) 22
- c) 24
- d) 26

Solution

First find $A + B$ and $A - B$

$$A + B = (2i - 3j + 5k) + (3i + j - 2k) = 5i - 2j + 3k$$

$$A - B = (2i - 3j + 5k) - (3i + j - 2k) = -i - 4j + 7k$$

Now, we can find the scalar product (dot product) of these vectors. Remember that for the unit vectors following identity holds $i \cdot i = j \cdot j = k \cdot k = 1$ and $i \cdot j = i \cdot k = j \cdot k = 0$

$$\begin{aligned}(A + B) \cdot (A - B) &= (5i - 2j + 3k) \cdot (-i - 4j + 7k) \\ &= -5ii - 20ij + 35ik + 2ij + 8jj - 14jk - 3ik - 12jk + 21kk \\ &= -5 + 8 + 21 = 24\end{aligned}$$

Answer: c) 24.