

Task. Given two vector $A = 5i$, $B = 3j$. What is the direction of the cross product $[B \times A]$?

Solution. Since $[j \times i] = -k$, we obtain that $[B \times A] = -15k$.

We can produce direct calculation. We have that $A = (5, 0, 0) = 5i$, $B = (0, 3, 0) = 3j$. Then $[B \times A]$ has the following coordinates:

$$\begin{aligned} [B \times A] &= \left(\begin{vmatrix} 3 & 0 \\ 0 & 0 \end{vmatrix}, \begin{vmatrix} 0 & 0 \\ 0 & 5 \end{vmatrix}, \begin{vmatrix} 0 & 3 \\ 5 & 0 \end{vmatrix} \right) \\ &= (3 * 0 - 0 * 0, 0 * 5 - 0 * 0, 0 * 0 - 3 * 5) \\ &= (0, 0, -15) = -15k. \end{aligned}$$

Answer. $[B \times A] = -15k$.