

## Answer on Question #51713 – Math – Vector Calculus

$a=2i+3j-k$ ,  $b=6i-2j+5k$  find a unit vector parallel to the resultant of these vectors? here should i use  $(\pm)$  to find unit vector? if needed then why? I can't figure out this. please show me in diagram, where it is +ve and where it is -ve

### Solution:

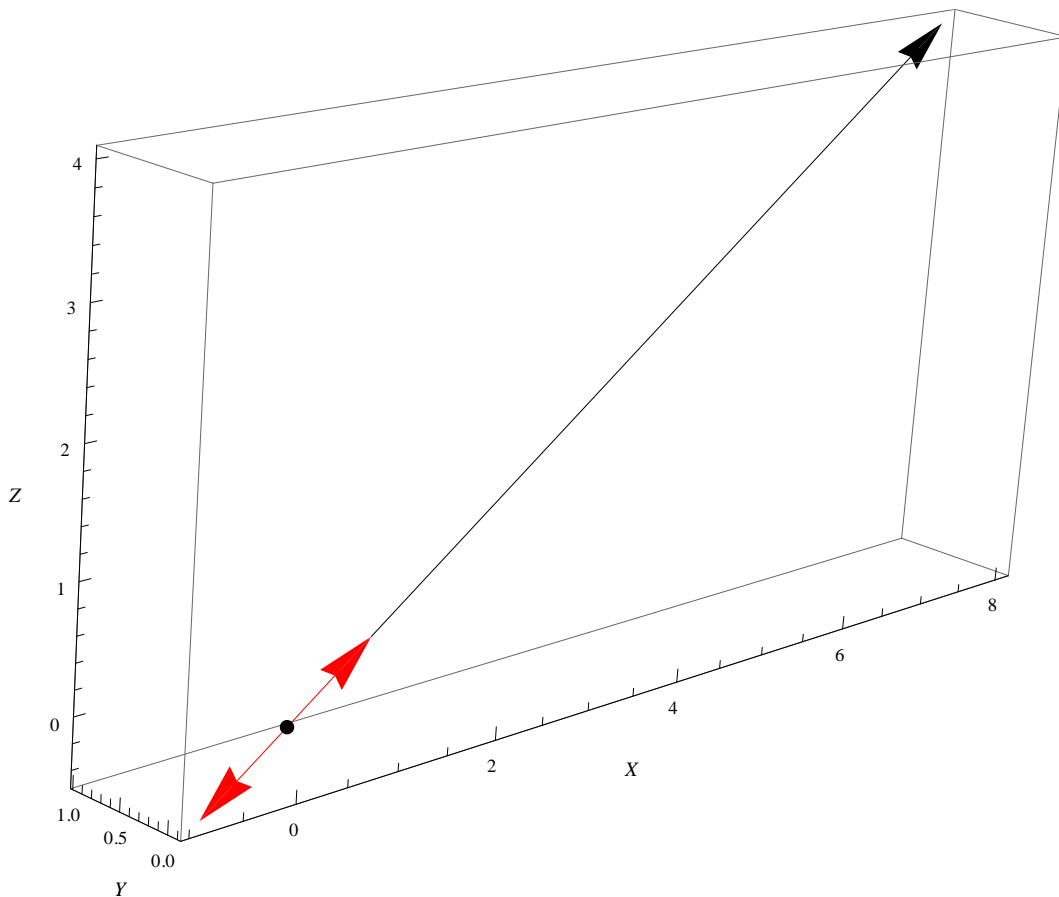
The resultant vector is given by

$$\vec{v} = \vec{a} + \vec{b} = 2\vec{i} + 3\vec{j} - \vec{k} + 6\vec{i} - 2\vec{j} + 5\vec{k} = 8\vec{i} + \vec{j} + 4\vec{k}$$

The unit vector parallel to it is

$$\vec{v}_u = \pm \frac{\vec{v}}{|\vec{v}|} = \pm \frac{8\vec{i} + \vec{j} + 4\vec{k}}{\sqrt{64 + 1 + 16}} = \pm \frac{8\vec{i} + \vec{j} + 4\vec{k}}{\sqrt{81}} = \pm \frac{8\vec{i} + \vec{j} + 4\vec{k}}{9}$$

In the diagram below two red vectors are unit vectors  $\vec{v}_u$ , parallel to  $\vec{v}$  (the black one in the diagram). The big point in the diagram denotes the origin. These two red vectors are both parallel to  $\vec{v}$ , but they have opposite directions. So it's more properly to use  $(\pm)$ .



**Answer:**  $\vec{v}_u = \pm \frac{8\vec{i} + \vec{j} + 4\vec{k}}{9}$ .