

## Answer on Question 63938, Physics, Other

### Question:

Suppose that  $\vec{a} = 2\hat{i} + \hat{j}$ ,  $\vec{b} = 5\hat{i} - 4\hat{j} + \hat{k}$ ,  $\vec{c} = 3\hat{i} + 4\hat{j} + \hat{k}$ . What is the magnitude of the vector  $2\vec{a} - \vec{b} + \vec{c}$ ?

### Solution:

Let's first call the new vector  $\vec{d} = 2\vec{a} - \vec{b} + \vec{c}$  and find it:

$$\begin{aligned}\vec{d} &= 2(2\hat{i} + \hat{j}) - (5\hat{i} - 4\hat{j} + \hat{k}) + (3\hat{i} + 4\hat{j} + \hat{k}) = \\ &= (4\hat{i} + 2\hat{j} + 0\hat{k}) - (5\hat{i} - 4\hat{j} + \hat{k}) + (3\hat{i} + 4\hat{j} + \hat{k}) = \\ &= (4\hat{i} - 5\hat{i} + 3\hat{i}) + (2\hat{j} + 4\hat{j} + 4\hat{j}) + (0\hat{k} - \hat{k} + \hat{k}) = 2\hat{i} + 10\hat{j}.\end{aligned}$$

So,  $\vec{d} = 2\hat{i} + 10\hat{j}$ .

The magnitude of the vector  $\vec{d}$  can be found using the Pythagorean theorem:

$$|\vec{d}| = \sqrt{d_x^2 + d_y^2} = \sqrt{2^2 + 10^2} = 10.2.$$

### Answer:

$$|\vec{d}| = 10.2.$$