

1. Given $\vec{a} = \vec{i} - 4\vec{j}$ and $\vec{b} = 3\vec{i} + 2\vec{j}$

a) Find $\vec{a} + 2\vec{b}$

b) Find $\vec{b} - \vec{a}$

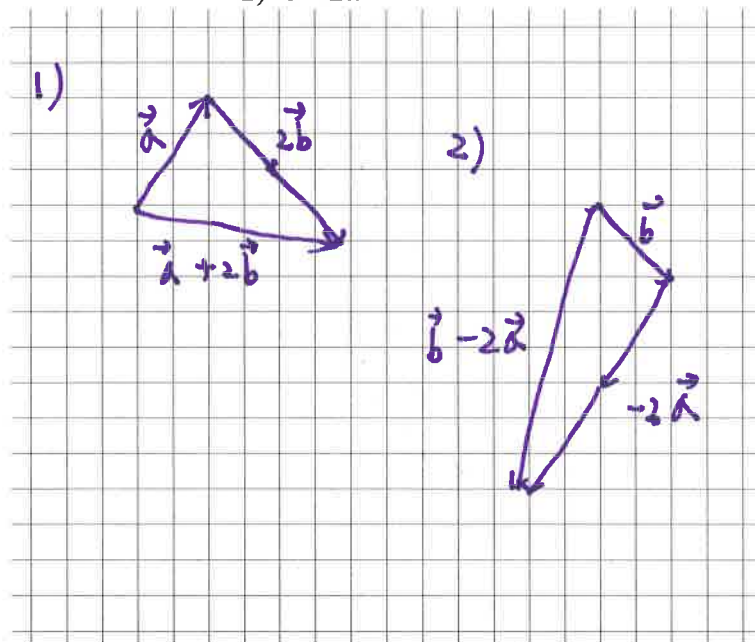
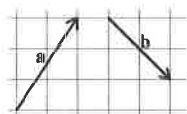
$$\vec{i} - 4\vec{j} + 2(3\vec{i} + 2\vec{j}) = \boxed{7\vec{i}}$$

$$= (3\vec{i} + 2\vec{j}) - (\vec{i} - 4\vec{j}) = \boxed{2\vec{i} + 6\vec{j}}$$

c) Illustrate the resultant vectors of $\vec{a} + 2\vec{b}$ and $\vec{b} - 2\vec{a}$ on the grid paper below.

1) $\vec{a} + 2\vec{b}$

2) $\vec{b} - 2\vec{a}$



2. Given $\vec{a} = \vec{i} - 5\vec{j} + w\vec{k}$ is perpendicular to $\vec{b} = \vec{i} + 2\vec{j} - 3\vec{k}$, $\vec{a} + 2\vec{b} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$, what is the value of w?

$$\begin{pmatrix} 1 \\ -5 \\ w \end{pmatrix} + 2 \begin{pmatrix} 1 \\ 2 \\ -3 \end{pmatrix} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$$

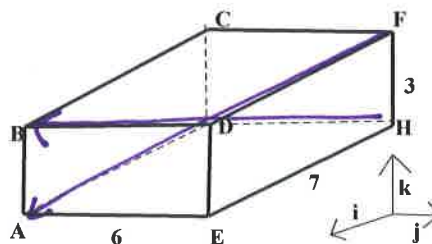
$$\boxed{w = 8}$$

3. Consider the prism shown

a. Find the vectors \vec{FA} and \vec{HB} .

$$\vec{FA} = 7\vec{i} - 6\vec{j} - 3\vec{k}$$

$$\vec{HB} = 7\vec{i} - 6\vec{j} + 3\vec{k}$$



b. Find $|\vec{HB}| = 2\sqrt{7^2 + 6^2 + 3^2} = \boxed{2\sqrt{94}}$

c. Find the vector in direction of \vec{FA} with magnitude of 3 units.

$$3 \left[\frac{7\vec{i} - 6\vec{j} - 3\vec{k}}{\sqrt{94}} \right] = \left[\frac{21\vec{i}}{\sqrt{94}} - \frac{18\vec{j}}{\sqrt{94}} - \frac{9\vec{k}}{\sqrt{94}} \right]$$

Using the diagram on right:

3. Write \overrightarrow{BD} in terms of y and z .

$$\overrightarrow{BD} = y - z$$

4. Write \overrightarrow{BF}

a) in terms of x , k , and w .

$$\overrightarrow{BF} = x - k + \frac{1}{2}w$$

b) in terms of y , z , and w .

$$\overrightarrow{BF} = y - z - \frac{1}{2}w$$

