VECTOR ARITHMETIC - ANSWERS

(1-5) Let $\vec{u} = 2\hat{i} + 3\hat{j} + 4\hat{k}$, $\vec{v} = \hat{i} - 5\hat{j} + \hat{k}$, and $\vec{w} = -3\hat{i} - 2\hat{j} - 8\hat{k}$. Find the following.

1. $\vec{u} + \vec{v} + \vec{w}$

$$\vec{u} + \vec{v} + \vec{w} = \langle 2,3,4 \rangle + \langle 1,-5,1 \rangle + \langle -3,-2,-8 \rangle = \langle 0,-4,-3 \rangle$$

2. $3\vec{u} - \vec{v} - 2\vec{w}$

$$3\vec{u} - \vec{v} - 2\vec{w} = 3\langle 2,3,4 \rangle - \langle 1,-5,1 \rangle - 2\langle -3,-2,-8 \rangle$$
$$= \langle 6,9,12 \rangle + \langle -1,5,-1 \rangle + \langle 6,4,16 \rangle = \langle 11,18,27 \rangle$$

3. $2(\vec{u} + \vec{v}) + \vec{w}$

$$2(\vec{u} + \vec{v}) + \vec{w} = 2(\langle 2,3,4 \rangle + \langle 1,-5,1 \rangle) + \langle -3,-2,-8 \rangle$$
$$= \langle 4,6,8 \rangle + \langle 2,-10,2 \rangle + \langle -3,-2,-8 \rangle = \langle 3,-6,2 \rangle$$

4. $\vec{u} + 3(\vec{v} - \vec{w})$

$$\vec{u} + 3(\vec{v} - \vec{w}) = \langle 2,3,4 \rangle + 3(\langle 1,-5,1 \rangle - \langle -3,-2,-8 \rangle)$$
$$= \langle 2,3,4 \rangle + \langle 3,-15,3 \rangle + \langle 9,6,24 \rangle = \langle 14,-6,31 \rangle$$

5. $4\vec{w} - 3\vec{w}$

$$4\vec{w} - 3\vec{w} = \vec{w} = \langle -3,-2,-8 \rangle$$

6. $\vec{v} = -\hat{i} + 5\hat{j} - 2\hat{k}$ and $\vec{w} = 3\hat{i} + \hat{j} + \hat{k}$. Find $-2\vec{v} + 4\vec{w}$

$$-2\vec{v} + 4\vec{w} = (2\hat{i} - 10\hat{j} + 4\hat{k}) + (12\hat{i} + 4\hat{j} + 4\hat{k}) = 14\hat{i} - 6\hat{j} + 8\hat{k}$$

7. Let $\vec{v} = -\hat{i} + 5\hat{j} - 2\hat{k}$ and $\vec{w} = 3\hat{i} + \hat{j} + \hat{k}$. Find $\vec{v} - 2\vec{w}$.

$$\vec{v} - 2\vec{w} = (-\hat{i} + 5\hat{j} - 2\hat{k}) - (6\hat{i} + 2\hat{j} + 2\hat{k}) = (-\hat{i} + 5\hat{j} - 2\hat{k}) + (-6\hat{i} - 2\hat{j} - 2\hat{k})$$
$$= -7\hat{i} + 3\hat{j} - 4\hat{k}$$