

## UNIT I: Worksheet 1

1. Let  $\vec{r}_1 = 2\hat{i} - \hat{j}$  and  $\vec{r}_2 = \hat{i} + 3\hat{j}$

a. Find the unit vector of  $\vec{r}_1$

b. Find the length of  $\vec{r}_2$

c. Calculate  $\vec{r}_1 + \vec{r}_2$

d. Calculate  $\vec{r}_1 - \vec{r}_2$

e. Calculate  $\vec{r}_1 \cdot \vec{r}_2$  and  $\vec{r}_2 \cdot \vec{r}_1$

f. Calculate  $\vec{r}_1 \times \vec{r}_2$  and  $\vec{r}_2 \times \vec{r}_1$

g. Calculate the angle between  $\vec{r}_1$  and  $\vec{r}_2$

h. Prove  $\vec{r}_1$  and  $\vec{r}_2$  are parallel, perpendicular, or neither

2. Let  $\vec{r}_1 = -\hat{i} + 2\hat{j} + 5\hat{k}$  and  $\vec{r}_2 = 3\hat{i} + 4\hat{j} - \hat{k}$

a. Find the unit vector of  $\vec{r}_1$

b. Find the length of  $\vec{r}_2$

c. Calculate  $\vec{r}_1 + \vec{r}_2$

d. Calculate  $\vec{r}_1 - \vec{r}_2$

e. Calculate  $\vec{r}_1 \cdot \vec{r}_2$  and  $\vec{r}_2 \cdot \vec{r}_1$

f. Calculate  $\vec{r}_1 \times \vec{r}_2$  and  $\vec{r}_2 \times \vec{r}_1$

g. Calculate the angle between  $\vec{r}_1$  and  $\vec{r}_2$

h. Prove  $\vec{r}_1$  and  $\vec{r}_2$  are parallel, perpendicular, or neither