

Assignment 4

(5 questions
x 2 = 10 marks)

1. State whether each of the following has meaning. If so, state whether it is a vector or scalar quantity.

a) $\vec{u} \cdot (\vec{v} \cdot \vec{w})$

b) $\vec{u} \vec{v}$

c) $\vec{u} (\vec{u} \cdot \vec{v})$

d) $|\vec{u}|^2$

2. If $\vec{u} = (5, -6, 3)$ and $\vec{v} = (-3, -4, 7)$ find

a) $\vec{v} - \vec{u}$

b) $8\vec{v} + 2\vec{u}$

c) $8\hat{i} - 5\vec{u} - 3\hat{j} - \hat{k}$

d) $|2\vec{u} - 3\vec{v}|$

3. Given the points $P(3, -1, -4)$, $Q(-3, 1, 5)$ and $R(-7, -4, 0)$ find:

a) \vec{QP} , \vec{PR} , \vec{RQ}

b) the perimeter of triangle PQR

4. For each of the following pairs of vectors find $\vec{u} \times \vec{v}$.

a) $\vec{u} = (1, -2, 2)$ & $\vec{v} = (3, 4, -1)$

b) $\vec{u} = (1, -6, 9)$ & $\vec{v} = (3, 3, -2)$

c) $\vec{u} = -2\hat{i} + 3\hat{j} - \hat{k}$ & $\vec{v} = 6\hat{i} - 9\hat{j} + 3\hat{k}$

d) $\vec{u} = 5\hat{i} + 3\hat{j} + \hat{k}$ & $\vec{v} = \hat{i} - 3\hat{j} - 5\hat{k}$

5 Find a unit vector perpendicular to both $\vec{u} = (1, 1, 1)$ & $\vec{v} = (2, -1, -2)$. Check your answer using the dot product.