Problem Solving

1. If $|\mathbf{a}| = 2$, $|\mathbf{b}| = 3$ and the angle between $\mathbf{a}$ and $\mathbf{b}$ is $60°$, calculate

    a) **a.(a+b)**   b) **b.(a+b)**

2. If $\mathbf{a} = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}$ evaluate **a.(b+c)**

3. $\mathbf{a} = \begin{pmatrix} 1 \\ -1 \\ 1 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 1 \\ 4 \\ x \end{pmatrix}$. Find x if **a.(b+c) = a.a**

4. $\mathbf{a} = 2\mathbf{u} + 3\mathbf{v}$ where $\mathbf{u}$ and $\mathbf{v}$ are vectors of unit lengths inclined at $\frac{1}{3}\pi$ to each other.

    a) Calculate **u.u, v.v** and **a.a.**   b) What is the value of $|\mathbf{a}|$?

5. In an equilateral triangle **ABC**, $\overrightarrow{AB}$ represents **p** and $\overrightarrow{AC}$ represents **q**. If each side is 2 units long, evaluate **p.q** What would be the answer if **q** was represented by $\overrightarrow{CA}$ instead?

Answers

1. a) 7   b) 12

2. 8

3. $x = 6$

4. a) 1   1 19   b) $\sqrt{19}$

5. 2 -2

Answers

1. a) 7   b) 12

2. 8

3. $x = 6$

4. a) 1   1   19   b) $\sqrt{19}$

5. 2 -2