Mathematics Department – Langholm Academy

HIGHER HOMEWORK UNIT 3

CHAPTER 1

Vectors 2

Higher - Unit 3
Vectors 2

1. Using the following vectors calculate the scalar products shown

   $\underset{\sim}{m} = 2\underset{\sim}{i} + \underset{\sim}{j} + 2\underset{\sim}{k}$, $\underset{\sim}{n} = \underset{\sim}{i} - 2\underset{\sim}{j} + \underset{\sim}{k}$, $\underset{\sim}{p} = 3\underset{\sim}{i} + \sqrt{3}\,\underset{\sim}{k}$

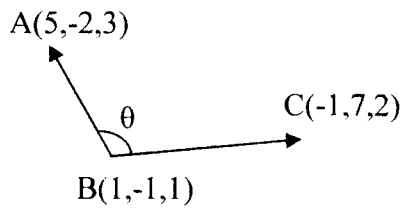
   a. $\underset{\sim}{m}.\underset{\sim}{n}$ b. $\underset{\sim}{m}.\underset{\sim}{p}$ c. $\underset{\sim}{p}.\underset{\sim}{p}$

2. Find the value of k for which the given vectors are perpendicular

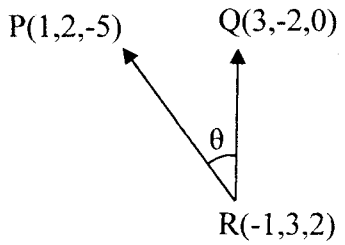
   a. $\begin{pmatrix} k \\ 2 \\ 3 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}$ b. $\begin{pmatrix} -1 \\ -4 \\ 4 \end{pmatrix}$ and $\begin{pmatrix} 2k-3 \\ 2 \\ -1 \end{pmatrix}$

3. Find the angle between the following vectors, giving your answer to 1 decimal place.

   a)

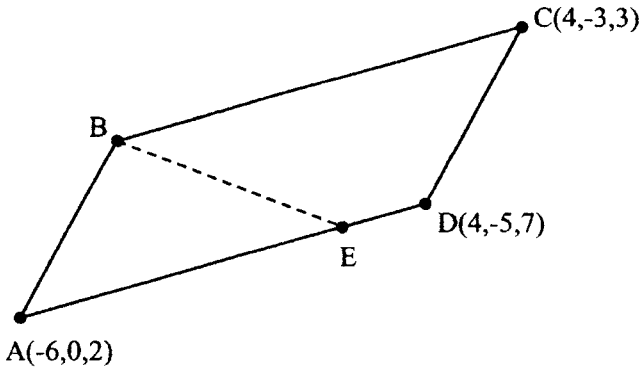
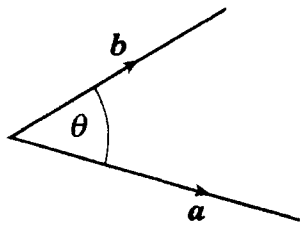


   b)



4. In the diagram, not to scale, ABCD is a parallelogram with three of its vertices A(-6,0,2), C(4,-3,3) and D(4,-5,7) as shown.

   a. Find the coordinates of B.
   b. E lies on AD and has coordinates (2,-4,k). Find the value of k.
   c. Hence calculate the size of angle BEA to the nearest degree.



5. The diagram shows vectors **a** and **b**.
   If |**a**| = 6, |**b**| = 5 and **a**.(**a**+**b**) = 49, find the size of the acute angle θ between **a** and **b**.