Worksheet 3
Year 13 Mathematics

Write the answers in your Exercise Book.

1. Find the values of m and n such that $\begin{pmatrix} m \\ 5 \\ 1 \end{pmatrix} + 2\begin{pmatrix} 0 \\ -5 \\ 2n \end{pmatrix} = \begin{pmatrix} 5 \\ -5 \\ 9 \end{pmatrix}$ **(2 marks)**

2. Consider the line $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix} + t\begin{pmatrix} 1 \\ -1 \\ 9 \end{pmatrix}$

    (a) Give a **vector** which is parallel to the line. **(1 mark)**

    (b) Give the **coordinates** of a point which lies on this line. **(1 mark)**

3. Describe the following line:

    $$\frac{x-5}{6} = \frac{y+9}{3} = \frac{2z}{3}$$ **(3 marks)**

4. If $\underset{\sim}{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix}$ and $\underset{\sim}{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$ then $\underset{\sim}{a}.\underset{\sim}{b} = a_1b_1 + a_2b_2 + a_3b_3$

    $$= |\underset{\sim}{a}||\underset{\sim}{b}|\cos\theta$$

    Consider $\underset{\sim}{a} = \begin{pmatrix} 2 \\ k \\ -4 \end{pmatrix}$ and $\underset{\sim}{b} = \begin{pmatrix} 1 \\ 2 \\ -2 \end{pmatrix}$

    Find the value of k if

    (a) $\underset{\sim}{a}$ and $\underset{\sim}{b}$ are **orthogonal**. **(2 marks)**

    (b) $\underset{\sim}{a} = 2\underset{\sim}{b}$ **(2 marks)**