Worksheet 2
Year 13 Mathematics
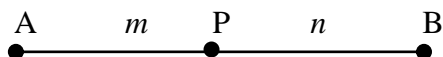
Write the answers in your Exercise Book.

1. Find $\begin{pmatrix} -4 \\ 5 \\ 7 \end{pmatrix} + 3 \begin{pmatrix} 0 \\ -5 \\ 3 \end{pmatrix}$ **(1½ marks)**

2. Find the **unit vector** that has the same direction as $\begin{pmatrix} 6 \\ 0 \\ 8 \end{pmatrix}$ **(2 marks)**

3. Determine the **symmetric equation** of a line passing through the points

$$(0, 6, -1) \text{ and } (2, 0, 9) \qquad \textbf{(3 marks)}$$

4. If P is any point on a line segment AB which divides it in the ratio $m : n$, then

$$P = \frac{mB + nA}{m + n}$$

Let point A $= (-3, 4, 1)$ and point B $= (5, 0, -3)$. Find the **coordinates**
of point P on the line AB given that AP: PB $= 3 : 1$ **(2 marks)**

5. 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 $\underset{\sim}{a} . \underset{\sim}{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$
$$= |\underset{\sim}{a}||\underset{\sim}{b}| \cos \theta$$

Using the above formulae, calculate the **angle** between

$$\underset{\sim}{a} = \begin{pmatrix} 1 \\ 2 \\ 6 \end{pmatrix} \text{ and } \underset{\sim}{b} = \begin{pmatrix} 0 \\ 1 \\ -3 \end{pmatrix} \qquad \textbf{(3 marks)}$$