BA SANGAM COLLEGE
YEAR 13
MATHEMATICS
WORKSHEET 4

STRAND 1 **COMPLEX NUMBERS**

1. For the complex number $Z = 3\ CIS\frac{3\pi}{2}$

   (a) Find: (i) Arg(z)

   ii) $|z|$, the modulus of of z

   (b) Plot the points Z and $\bar{Z}$ on an argand diagram. (1½ marks)

2. For the complex number $W = -\sqrt{2} - 1$

   i) Write W in polar form.

   ii) Use De Moivre's Theorem to find W^3 and express the answer in rectangular from.

3. State whether each statement given below is true or false.

   a) $i^3 + i^5 = 0$ ☐

   b) $3\ cis\ 20^0 \times 2\ cis\ 10^0 = 6\ cis\ 200^0$ ☐

   c) If $Arg(z) = 90^0$ then $Arg(\bar{z}) = 180^0$ ☐

   d) $\sqrt{-1} = i$ ☐

4. In the complex plane, shade the region where $-1 < \text{Im}(z) \leq 2$ **(2 marks)**

5. If $v = 2+3i$ and $w = 5+4i$, find:

   (a) $|v|$ **(1 mark)**

   (b) $v+w$ **(1 mark)**

   (c) $\bar{w}$ **(½ mark)**

6. Solve the equation $Z^4 = -64$

   Express your answer in **rectangular form**. **(4 marks)**

1. Find the **unit vector** that has the same direction as $\underset{\sim}{v} = 2i - j - 2k$

unit vector = _____

(2 marks)

iii) Hence, calculate the **angle** between $\underset{\sim}{a}$ and $\underset{\sim}{b}$ **(1½ marks)**

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

2. Write the symmetric equation of the line passing through $(1, -2, -4)$ in the direction of $\begin{pmatrix} 3 \\ 5 \\ -1 \end{pmatrix}$ **(2 marks)**

3. The vector form of the equation of a line is given as

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} + t\begin{pmatrix} 4 \\ -5 \\ 6 \end{pmatrix}$$

(i) Give the coordinates of a **point** that lies on this line. **(½ mark)**

(ii) Give a **direction vector** of this line. **(½ mark)**

4. If P is the point (1, 1, 0) and R is the point (1, 6, –5), find the coordinates of a point Q on the line PR given that $\overline{PQ} : \overline{QR} = 3 : 2$. **(2 marks)**

$$\underset{\sim}{P} = \frac{m\underset{\sim}{B} + n\underset{\sim}{A}}{m + n}$$