

Complex Numbers Q14– Practice/Y1/E (22/5/21)

(i) How are the complex numbers z and zi related to each other geometrically?

(ii) How are the complex numbers z and $\frac{1}{z}$ related to each other geometrically?

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Solution

(i) $|i| = 1$ & $\arg(i) = \frac{\pi}{2}$; hence multiplication by i has the effect of rotating z by $\frac{\pi}{2}$ anti-clockwise.

(ii) $\left|\frac{1}{z}\right| = \frac{1}{|z|}$ and $\arg\left(\frac{1}{z}\right) = \arg(1) - \arg(z) = -\arg(z)$

So $\frac{1}{z}$ is obtained from z by reflecting in the Real axis (ie obtaining z^*), and taking the reciprocal of the modulus of z