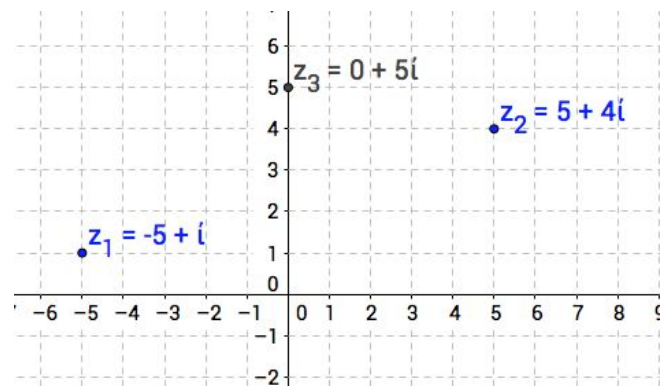


For the addition of two complex numbers to be a real number only, I have observed that Z_1 and Z_2 have to be positioned symmetrically in the Argand Diagram, where the x-axis is the mirror line.

This can also be proofed algebraically. When this phenomena occurs, If $Z_1 = a + bi$ and $Z_2 = c + di$, where a, b, c and d are real numbers, then: If $b = -d$, then the sum of Z_1 and Z_2 is a real number. This is due to the fact that when both complex numbers are added, bi and di are equal in magnitude but opposite in direction so their sum is equal to zero.



Similarly, to obtain only an imaginary number from the sum of two complex ones, the position of Z_1 and Z_2 need to be symmetrically opposite in the Argand Diagram, where the y-axis is the mirror line. Again this occurs because the magnitude of the real part of Z_1 and Z_2 are equal in magnitude but opposite in direction.

If we take that $Z_1 = a + bi$ and $Z_2 = c + di$, where a, b, c and d are real numbers then $c = -a$ for the $Z_1 + Z_2$ to give an imaginary number uniquely.