P.6 Complex Numbers

Target 2B: Find Real and Complex Zeroes of Polynomials by Synthetic and Long Division

Two complex numbers are equal if and only if their real and imaginary parts are equal.

Example

Find the numbers x and y that make the equation true: $(5 - 2i) - 7 = x - (3 + yi)$

$5 - 2i - 7 = x - 3 - yi$

$-2 - 2i = x - 3 - yi$

$+3 \qquad +3$

$1 - 2i = x - yi$

real parts = Im parts =

$-2i = -yi$

$\div i \quad \div i$

$-2 = y$

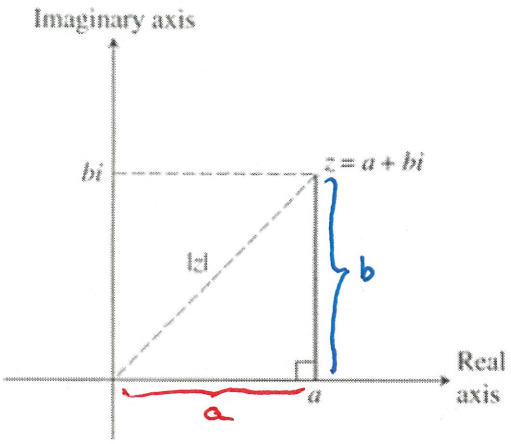
$\therefore$, $\boxed{x = 1}$

DEFINITION Absolute Value (Modulus) of a Complex Number

The **absolute value** or **modulus** of a complex number $z = a + bi$ is

$$|z| = |a + bi| = \sqrt{a^2 + b^2}.$$

In the complex plane, $|a + bi|$ is the distance of $a + bi$ from the origin.



$a^2 + b^2 = c^2$

$\sqrt{a^2 + b^2} = c$

$\sqrt{a^2 + b^2} = |z|$

Example

Evaluate and simplify: $|-3 + 6i|$

$|-3 + 6i| = \sqrt{(-3)^2 + 6^2}$

$a = -3$

$b = 6$

$= \sqrt{9 + 36}$

$= \sqrt{45}$

$= \sqrt{9} \cdot \sqrt{5}$

$= \boxed{3\sqrt{5}}$

$\sqrt{45}$

$\sqrt{9} \cdot \sqrt{5}$