COMPLEX NUMBERS: POLAR FORM REFERENCE

1. Basic Conversions

Rectangular: $z = x + iy$
Polar: $z = r(\cos\theta + i\sin\theta) = re^{i\theta}$

To Polar (r)	$r = \sqrt{(x^2 + y^2)}$
To Polar (θ)	$\theta = \tan^{-1}(y/x)$
To Rect (x)	$x = r\cos\theta$
To Rect (y)	$y = r\sin\theta$

2. Operations (Polar)

Multiplication	$r_1 r_2 \angle(\theta_1 + \theta_2)$
Division	$(r_1/r_2) \angle(\theta_1 - \theta_2)$
Exponent (n)	$r^n \angle(n\theta)$
Conjugate	$r \angle(-\theta)$

3. Common Unit Circle Values

θ (Deg)	θ (Rad)	cos θ	sin θ	Exponential Form (r=1)
0	0	1	0	e^{i0}
30	π/6	√3/2	1/2	$e^{i\pi/6}$

θ (Deg)	θ (Rad)	cos θ	sin θ	Exponential Form (r=1)
45	π/4	√2/2	√2/2	$e^{i\pi/4}$
60	π/3	1/2	√3/2	$e^{i\pi/3}$
90	π/2	0	1	$e^{i\pi/2}$
180	π	-1	0	$e^{i\pi}$

4. De Moivre's Theorem

$$[r(\cos\theta + i\sin\theta)]^n = r^n(\cos n\theta + i\sin n\theta)$$

5. Euler's Identity

$$e^{i\pi} + 1 = 0$$