Notes 13.4 Complex Numbers in Polar Form

A complex number: **z = a + b*i*** where *a* is real part of z, *b* is imaginary part

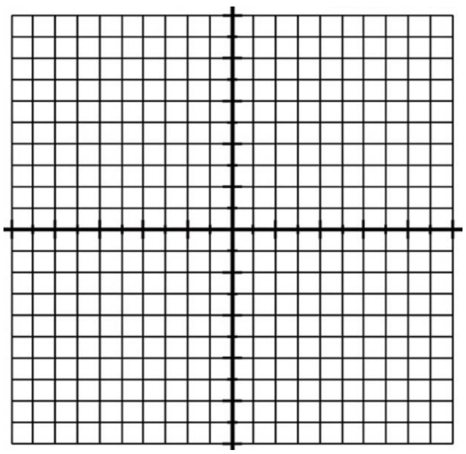
$i = \sqrt{-1}$ imaginary number

$i^2 = -1$ squaring an imaginary removes the radical (so i^2 is real!)

Graph just like graphing (x, y) but there is a real axis and an imaginary axis.

imaginary axis (y)

Real axis (x)



Plot:

1. z = -1 + *i*
2. z = 3 + 5*i*
3. z = 4*i*
4. z = -2
5. z = 6 – 2*i*

Review of adding and multiplying complex numbers:

6. (4 + 3*i*) – (5 – 2*i*)

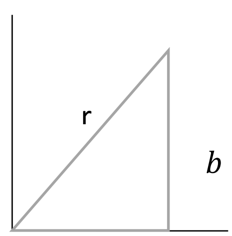
7. (4 + 3*i*)(5 – 2*i*)

z = a + b*i*

$z = r\cos\theta + r\sin\theta\, i$

$z = r(\cos\theta + i\sin\theta)$

written as "cis θ" pronounced "sis"



$b = r\sin\theta$

$a = r\cos\theta$

any **complex # can be written in Polar Form**

$z = rcis\theta = r(\cos\theta + i\sin\theta)$

r is magnitude (or called modulus)

θ is argument (or angle in degrees or radians)
Write in Polar form.

8. z = $-5 + 7i$

9. z = $\sqrt{3} - i$

10. z = $-4 - 3i$

Write the complex number in $a + bi$ form.

11. 5cis144°

12. 8cis90°

Evaluate the expressions.

13. (3cis83°)(2cis41°)
multiply magnitudes, add θ

14. $\frac{5cis71°}{2cis29°}$
divide magnitudes, subtract θ

15. $(2\text{cis}29°)^5$
raise magnitude to given exponent,
multiply θ by the given exponent

16. $(8\text{cis}60°)^{\frac{1}{3}}$

17. $(81\text{cis}64°)^{\frac{1}{4}}$