Name: _____ **Precalculus Unit 10, Lesson 13**

Aim: How do we convert complex numbers between rectangular and trigonometric (polar) form?

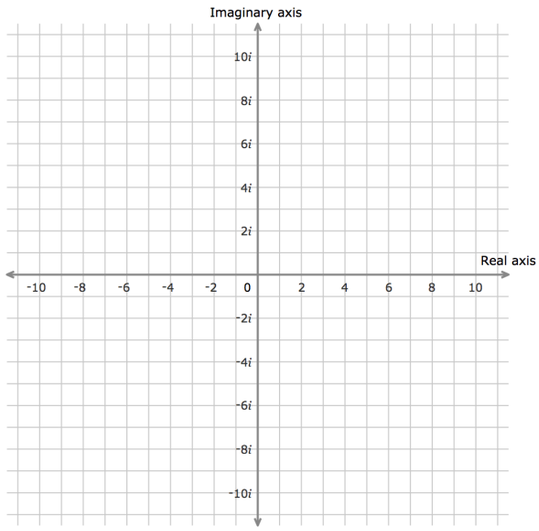
I. Do Now:

Recall that a complex number has the form $a+bi$, where a and b are real numbers and $i=\sqrt{-1}$.

Every complex number $a+bi$ can be associated with the point (a, b) on the complex plane.

Plot each complex number below on the complex plane to the right.

(a) $2-3i$
(b) $-3+4i$
(c) $-2i$
(d) 4



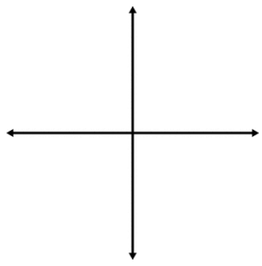
II. Absolute Value of a Complex Number

The absolute value of the complex number $z=a+bi$ is given by $|a+bi|=\sqrt{a^2+b^2}$

Examples: Find the absolute value of each complex number.
(a) $2-3i$
(b) $-3+4i$
(c) $-2i$

III. The Trigonometric Form of a Complex Number

Sometimes it is helpful to convert complex numbers to *trigonometric (or polar) form*.



If θ is the angle from the positive x-axis to the line segment connecting the origin and the point (a, b), then:

The Trigonometric (or Polar) Form of the Complex Number $z=a+bi$ is:

IV. Convert from $a + bi$ form to polar form:

1. $z=-2-2i\sqrt{3}$
2. $z=-\sqrt{3}-i$

V. Convert from polar form to $a + bi$ form:

3. $z=\sqrt{8}\left[\cos\left(-\frac{\pi}{3}\right)+i\sin\left(-\frac{\pi}{3}\right)\right]$
4. $z=8\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right)$

HW36
• Read pages 443 – 445.
• p. 452: 8, 9, 11, 19, 22, 24, 37, 50, 55, 56