

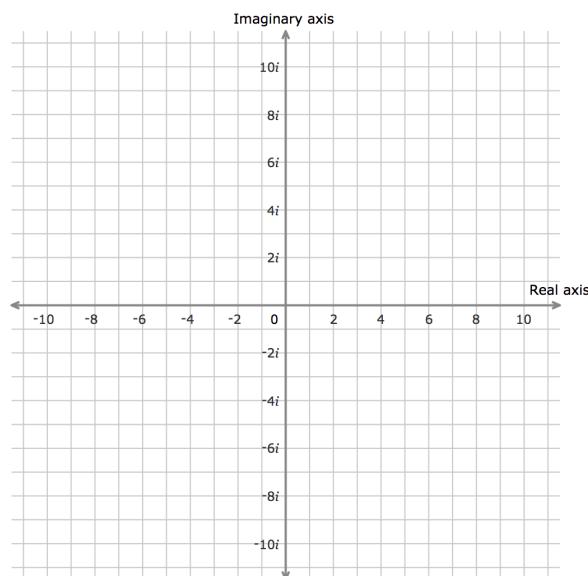
Aim: How do we convert complex numbers between rectangular and trigonometric (polar) form?**I. Do Now:**

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.

- $2 - 3i$
- $-3 + 4i$
- $-2i$
- 4

**II. Absolute Value of a Complex Number**

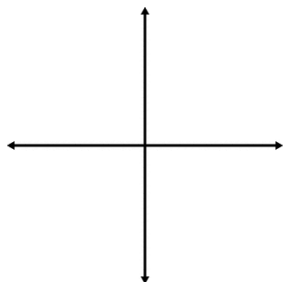
The absolute value of the complex number $z = a + bi$ is given by $|a + bi| = \sqrt{a^2 + b^2}$

Examples: Find the absolute value of each complex number.

- $2 - 3i$
- $-3 + 4i$
- $-2i$

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. $z = 8 \left(\cos\frac{\pi}{6} + i \sin\frac{\pi}{6} \right)$