Precalc Honor

11-4 Roots of Complex Numbers

Name: _____

So far:

- Graphing
- Multiplying
- Dividing
- Raising to power
- Conjugates
- Absolute value

1. Find the three cube roots of -1.

"Roots of a Complex Number" Theorem: There are n distinct nth roots of z=rcis θ. They are

$$z^{\frac{1}{n}} = r^{\frac{1}{n}} cis\left(\frac{\theta}{n} + \frac{360^{\circ}}{n}k\right)$$ for k = 0, 1, …, n-1

Graph the three complex roots from the example above.

2. Find the square roots of -2+2i$\sqrt{3}$. Plot both -2+2i$\sqrt{3}$ and its square roots on the Argand plane.

3. Find the cube roots of 8i and graph them on the Argand plane (the complex plane). What shape do the roots seem to form in the Argand plane?

4. Find the 4^{th} roots of $-8 + 8\sqrt{3}i$ and graph them on the Argand plane. What shape do the roots seem to form in the polar coordinate plane?

Graphing Observation: For n>2, the n^{th} roots of a complex number form: