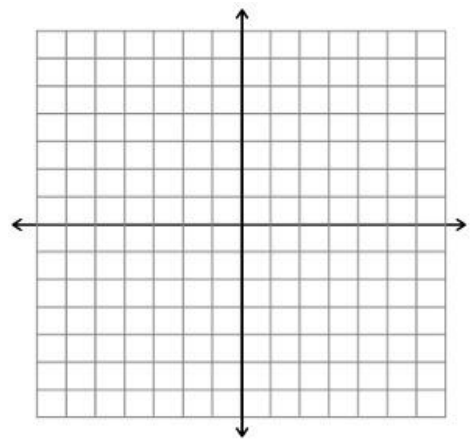
Entry #: ______

Lesson 8.3: Polar Form of Complex Numbers & De Moivre's Theorem

Graphing Complex Numbers

Example:

1. Graph the complex numbers $z_1 = 2 + 3i$, $z_2 = 3 - 2i$, and $z_1 + z_2$.



Modulus of a Complex Number

Recall that the absolute value of a real number is its ______________________ from the origin.

We define the absolute value of a complex number in a similar fashion using the

__________________________________ .

Example: Find the moduli of the numbers $3 + 4i$ and $8 - 5i$.

Polar Form of Complex Numbers

Examples: Write the following complex numbers in polar form.

1. $1 + i$

2. $-1 + \sqrt{3}i$

3. $-4\sqrt{3} - 4i$

4. $3 + 4i$

Multiplication & Division of Complex Numbers

Examples: Let $z_1 = 2\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$ and $z_2 = 5\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)$.

1. Find $z_1 z_2$.

2. Find $\frac{z_1}{z_2}$.

De Moivre's Theorem

Example: Find $\left(\frac{1}{2} + \frac{1}{2}i\right)^{10}$.

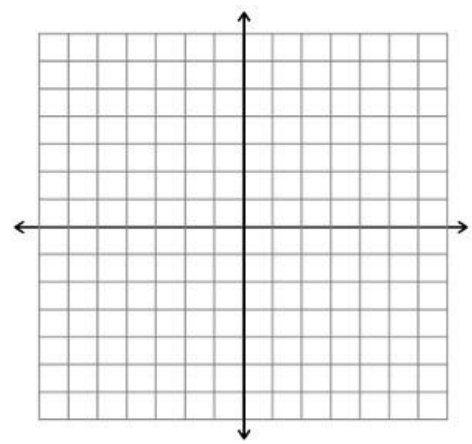
n_{th} Roots of Complex Numbers

Finding the nth Roots of $z = r(\cos(\theta) + i\sin(\theta))$

Step 1	
Step 2	
Step 3	

Examples:

1. Find the six 6th roots of $z = -64$, and graph the roots in the complex plane.



2. Find the three cube roots of $z = 2 + 2i$, and graph these roots in the complex plane.