Name: _____ **Precalculus Unit 10, Lesson 15**

Aim: What is DeMoivre's Theorem?

I. Do Now:

1. Multiply
   (a) $(4i)(4i)$

   (b) $(4i)(4i)(4i)$

2. Multiply and convert to $a+bi$ form.
   (a) $4\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)\cdot 4\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)$

   (b) $\left[4\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)\right]^3$

II. DeMoivre's Theorem [named after the French mathematician Abraham DeMoivre (1667–1754)]

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

$z^2 =$

$z^3 =$

$z^4 =$

$z^5 =$

If $z=r\left(\cos\theta+i\sin\theta\right)$ is a complex number and n is a positive integer, then:

$z^n=\left[r\left(\cos\theta+i\sin\theta\right)\right]^n =$

To raise a complex number to a power:

i)

ii)

III. Applications

3. Use DeMoivre's Theorem to find $\left(-1+i\sqrt{3}\right)^{12}$

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4. Evaluate $(-1+i)^8$

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5. Find $\sqrt{i}$ in $a+bi$ form.

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- Read page 448.
- p. 453: 72, 73, 107, 108
- p. 460: 110
- Find $\sqrt[3]{i}$ in $a+bi$ form.