

MODULE 11**COMPLEX NUMBERS
AND VECTORS**

Name: _____ Points: _____

Exercise 1. Find the **absolute value** and the **angle** of the complex number below.

(a) $-3 + 4i$

(b) $6 - 6i$

Exercise 2. Perform the operation and write your answer in standard $a + bi$ form.

(a)
$$\frac{4\left(\cos \frac{10\pi}{21} + i \sin \frac{10\pi}{21}\right)}{6\left(\cos \frac{\pi}{7} + i \sin \frac{\pi}{7}\right)} =$$

$$(b) \quad 4 \left(\cos \frac{\pi}{8} + i \sin \frac{\pi}{8} \right) \cdot 9 \left(\cos \frac{5\pi}{8} + i \sin \frac{5\pi}{8} \right) =$$

$$(c) \quad \frac{21(\cos(165^\circ) + i \sin(165^\circ))}{15(\cos(195^\circ) + i \sin(195^\circ))} =$$

$$(d) \quad \left[5 \left(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12} \right) \right]^2 =$$

$$(e) \quad \left[5 \left(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12} \right) \right]^3 =$$

The above generalizes to the so called **De Moivre formula**:

$$\boxed{\left[r \left(\cos(\theta) + i \sin(\theta) \right) \right]^n = r^n \left(\cos(n \cdot \theta) + i \sin(n \cdot \theta) \right)}$$

Exercise 3. Find the **magnitude** and the **direction angle** of the vector below.

(a) $\vec{v} = \langle -2, -2\sqrt{3} \rangle$

(b) $\vec{v} = \langle \sqrt{15}, -\sqrt{5} \rangle$

Exercise 4. Perform the operation for $\vec{v} = \langle -4, 6 \rangle$ and $\vec{w} = \langle -1, -3 \rangle$.

(a) $6\vec{v} - 4\vec{w} =$

(b) $\vec{w} + 7\vec{i} + 8\vec{j} =$