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

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

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

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

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

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

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