9-7

Practice

Products and Quotients of Complex Numbers in Polar Form

Find each product or quotient. Express the result in rectangular form.

1. $3\left(\cos \frac{\pi}{3} + \boldsymbol{i} \sin \frac{\pi}{3}\right) \cdot 3\left(\cos \frac{5\pi}{3} + \boldsymbol{i} \sin \frac{5\pi}{3}\right)$

2. $6\left(\cos \frac{\pi}{2} + \boldsymbol{i} \sin \frac{\pi}{2}\right) \div 2\left(\cos \frac{\pi}{3} + \boldsymbol{i} \sin \frac{\pi}{3}\right)$

3. $14\left(\cos \frac{5\pi}{4} + \boldsymbol{i} \sin \frac{5\pi}{4}\right) \div 2\left(\cos \frac{\pi}{2} + \boldsymbol{i} \sin \frac{\pi}{2}\right)$

4. $3\left(\cos \frac{5\pi}{6} + \boldsymbol{i} \sin \frac{5\pi}{6}\right) \cdot 6\left(\cos \frac{\pi}{3} + \boldsymbol{i} \sin \frac{\pi}{3}\right)$

5. $2\left(\cos \frac{\pi}{2} + \boldsymbol{i} \sin \frac{\pi}{2}\right) \cdot 2\left(\cos \frac{4\pi}{3} + \boldsymbol{i} \sin \frac{4\pi}{3}\right)$

6. $15(\cos \pi + \boldsymbol{i} \sin \pi) \div 3\left(\cos \frac{\pi}{2} + \boldsymbol{i} \sin \frac{\pi}{2}\right)$

7. ***Electricity*** Find the current in a circuit with a voltage of 12 volts and an impedance of $2 - 4\boldsymbol{j}$ ohms. Use the formula, $E = I \cdot Z$, where E is the voltage measured in volts, I is the current measured in amperes, and Z is the impedance measured in ohms.
(*Hint:* Electrical engineers use $\boldsymbol{j}$ as the imaginary unit, so they write complex numbers in the form $a + b\boldsymbol{j}$. Express each number in polar form, substitute values into the formula, and then express the current in rectangular form.)