9-7

NAME _____ DATE _____ PERIOD _____

Practice

Products and Quotients of Complex Numbers in Polar Form

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

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

9

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

$\frac{3\sqrt{3}}{2} + \frac{3}{2}\boldsymbol{i}$

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

$-\frac{7\sqrt{2}}{2} + \frac{7\sqrt{2}}{2}\boldsymbol{i}$

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

$-9\sqrt{3} - 9\boldsymbol{i}$

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

$2\sqrt{3} - 2\boldsymbol{i}$

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

$5\boldsymbol{i}$

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.)

1.2 + 2.4*j* amps

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NA

E

Complex C

In Lesson 9-5, you
$a + b\boldsymbol{i}$ and $a - b\boldsymbol{i}$
numbers are conju

1. Show that the s

The solutio

$a = -1$ **and**

2. Show that the s
$B^2 - 4AC < 0$.

By the quad

$-\frac{B}{2A} + i\frac{\sqrt{B}}{}$

so $a = -\frac{B}{2A}$

The conjugate of

3. $z = a + b\boldsymbol{i}$. Use

$\frac{a - bi}{a^2 + b^2}$

4. $z = r(\cos \theta + \boldsymbol{i}$

r **[cos** $(-\theta)$

Use your answer

5. Find $z \cdot \bar{z}$.

$r^2 = |z|^2$

6. Find $z \div \bar{z}$. $(z$

cos $2\theta + i$