

<b>Student:</b> _____	<b>Instructor:</b> Joe Better's	<b>Assignment:</b> 9.3 Classwork Day 1
<b>Date:</b> _____	<b>Course:</b> Pre-Calculus Pre AP (Master Course)	

1. Write the complex number in rectangular form.

$$9(\cos 210^\circ + i \sin 210^\circ)$$

$$9(\cos 210^\circ + i \sin 210^\circ) = \underline{\hspace{2cm}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

ID: 9.3.23

2. Write the complex number in rectangular form.

$$0.3(\cos 280^\circ + i \sin 280^\circ)$$

$$0.3(\cos 280^\circ + i \sin 280^\circ) = \underline{\hspace{2cm}}$$

(Do not round until the final answer. Then round to the nearest thousandth as needed.)

ID: 9.3.29

3. Find  $zw$  and  $\frac{z}{w}$ . Leave your answers in polar form.

$$z = 10(\cos 140^\circ + i \sin 140^\circ)$$

$$w = 5(\cos 290^\circ + i \sin 290^\circ)$$

What is the product?

$$\underline{\hspace{2cm}} [\cos \underline{\hspace{2cm}}^\circ + i \sin \underline{\hspace{2cm}}^\circ]$$

(Simplify your answers. Type any angle measures in degrees. Use angle measures greater than or equal to 0 and less than 360.)

What is the quotient?

$$\underline{\hspace{2cm}} [\cos \underline{\hspace{2cm}}^\circ + i \sin \underline{\hspace{2cm}}^\circ]$$

(Simplify your answers. Type any angle measures in degrees. Use angle measures greater than or equal to 0 and less than 360.)

ID: 9.3.35

4. Write the expression in the standard form  $a + bi$ .

$$\left[ 4 \left( \cos \frac{\pi}{15} + i \sin \frac{\pi}{15} \right) \right]^5$$

(Simplify your answer, including any radicals. Type your answer in the form  $a + bi$ . Use integers or fractions for any numbers in the expression.)

ID: 9.3.43

5. Find all the complex roots. Leave your answer in polar form with the argument in degrees.

The complex cube roots of  $\sqrt{3} + i$ .

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$$z_0 = \underline{\hspace{2cm}} \left( \cos \underline{\hspace{2cm}}^\circ + i \sin \underline{\hspace{2cm}}^\circ \right)$$

(Simplify your answer, including any radicals. Type an exact answer, using radicals as needed. Type any angle measures in degrees.)

$$z_1 = \underline{\hspace{2cm}} \left( \cos \underline{\hspace{2cm}}^\circ + i \sin \underline{\hspace{2cm}}^\circ \right)$$

(Simplify your answer, including any radicals. Type an exact answer, using radicals as needed. Type any angle measures in degrees.)

$$z_2 = \underline{\hspace{2cm}} \left( \cos \underline{\hspace{2cm}}^\circ + i \sin \underline{\hspace{2cm}}^\circ \right)$$

(Simplify your answer, including any radicals. Type an exact answer, using radicals as needed. Type any angle measures in degrees.)

ID: 9.3.53

1.  $\frac{1}{2}(-9\sqrt{3} - 9i)$

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2.  $0.052 - 0.295i$

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3. 50

70

70

2

210

210

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4.  $512 + 512\sqrt{3}i$

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5.  $\sqrt[3]{2}$

10

10

$\sqrt[3]{2}$

130

130

$\sqrt[3]{2}$

250

250

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## 9.3 classwork day 1

$$\textcircled{1} 9(\cos 210^\circ + i \sin 210^\circ)$$

write in  
rectangular  
form

$$9 \cos 210^\circ + 9i \sin 210^\circ$$

$$9\left(-\frac{\sqrt{3}}{2}\right) + 9i\left(-\frac{1}{2}\right)$$

$$\del{-9\sqrt{3} - 4.5i} \quad \boxed{-\frac{9\sqrt{3}}{2} - \frac{9}{2}i}$$

$$\textcircled{2} .3(\cos 280^\circ + i \sin 280^\circ)$$

$$.3 \cos 280^\circ + .3i \sin 280^\circ$$

$$\boxed{.092 - .295i}$$

### 9.3 classwork day 1 continued

$$\textcircled{3} Z = 10 (\cos 140^\circ + i \sin 140^\circ)$$

$$W = 5 (\cos 290^\circ + i \sin 290^\circ)$$

$$\begin{aligned} ZW &= r_1 r_2 \left[ \cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2) \right] \\ &= (10)(5) \left[ \cos(140 + 290) + i \sin(140 + 290) \right] \\ &= 50 \left[ \cos 430 + i \sin 430 \right] \\ &= 50 \left[ \cos 70 + i \sin 70 \right] \end{aligned}$$

$$\begin{aligned} \frac{Z}{W} &= \frac{r_1}{r_2} \left[ \cos(\theta_1 - \theta_2) + i \sin(\theta_1 - \theta_2) \right] \\ &= \frac{10}{5} \left[ \cos(140 - 290) + i \sin(140 - 290) \right] \\ &= 2 \left[ \cos(-150) + i \sin(-150) \right] \\ &= 2 \left[ \cos 210 + i \sin 210 \right] \end{aligned}$$

9.3 classwork  
day 1 continued

$$\textcircled{4} \left[ 4 \left( \cos \frac{\pi}{15} + i \sin \frac{\pi}{15} \right) \right]^5$$

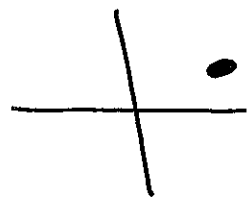
$$= (4)^5 \left[ \cos \left( 5 \cdot \frac{\pi}{15} \right) + i \sin \left( 5 \cdot \frac{\pi}{15} \right) \right]$$

$$= 1024 \left[ \frac{1}{2} + i \left( \frac{\sqrt{3}}{2} \right) \right]$$

$$= \boxed{512 + 512\sqrt{3}i}$$

### 9.3 classwork day 1 continued

⑤ Complex cube roots of  $\sqrt{3} + i$



$$r = \sqrt{x^2 + y^2} = \sqrt{(\sqrt{3})^2 + (1)^2} = 2$$

$$\tan \theta = \frac{y}{x} = \frac{1}{\sqrt{3}} \quad \theta = \pi/6 \text{ or } 30^\circ$$

$$Z_k = \sqrt[n]{r} \left( \cos \left( \frac{\theta_0}{n} + \frac{2\pi k}{n} \right) + i \sin \left( \frac{\theta_0}{n} + \frac{2\pi k}{n} \right) \right)$$

$$Z_0 = \sqrt[3]{2} \left[ \left( \cos \left( \frac{30}{3} + \frac{2\pi(0)}{3} \right) + i \sin \left( \frac{30}{3} + \frac{2\pi(0)}{3} \right) \right) \right]$$

$$= \sqrt[3]{2} (\cos 10 + i \sin 10)$$

$$Z_1 = \sqrt[3]{2} \left( \cos \left( \frac{30}{3} + \frac{360(1)}{3} \right) + i \sin \left( \frac{30}{3} + \frac{360(1)}{3} \right) \right)$$

$$= \sqrt[3]{2} (\cos 130 + i \sin 130)$$

$$Z_2 = \sqrt[3]{2} \left( \cos \left( \frac{30}{3} + \frac{360(2)}{3} \right) + i \sin \left( \frac{30}{3} + \frac{360(2)}{3} \right) \right)$$

$$= \sqrt[3]{2} (\cos 250 + i \sin 250)$$