

Student: Cole Lamers Date: 07/27/19	Instructor: Kelly Galarneau Course: CA&T Internet (70263) Galarneau	Assignment: 7.7 Polar Form of Complex Numbers; DeMoivre's The
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1. Complete the following sentence.

If $z = a + b i$, with $a > 0$, then $|z| =$ _____ and $\arg z = \theta =$ _____.

If $z = a + b i$, with $a > 0$, then $|z| = \sqrt{a^2 + b^2}$ and $\arg z = \theta = \tan^{-1} \frac{b}{a}$.

2. Select the correct choice that completes the sentence below.

If $|z| = r$ and $\arg z = \theta$, then the polar form of z is $z = r(\cos \theta + i \sin \theta)$.

3. Complete the following sentence.

To multiply two complex numbers in polar form, multiply their _____ and _____ their arguments.

To multiply two complex numbers in polar form, multiply their moduli and add their arguments.

4. De Moivre's Theorem states that $[r(\cos \theta + i \sin \theta)]^n =$ _____.

De Moivre's Theorem states that $[r(\cos \theta + i \sin \theta)]^n = r^n(\cos n\theta + i \sin n\theta)$.

5. Determine whether the following sentence is true or false.

If $z = r(\cos \theta + i \sin \theta)$ then $\frac{1}{z} = z^{-1} = \frac{1}{r}(\cos \theta - i \sin \theta)$.

Is the sentence true or false?

- ☒ True
- ☐ False

6. Plot the complex number and determine its absolute value.

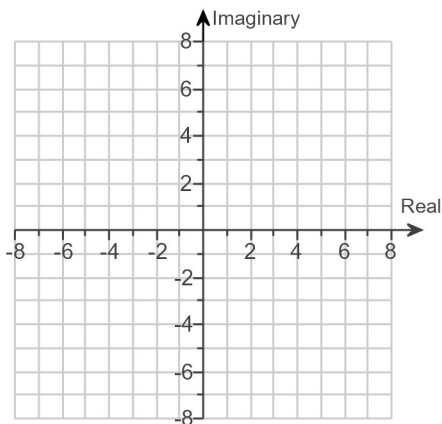
$z = -4 i$

Plot the complex number on the complex plane to the right.

What is the absolute value of this complex number?

$|z| =$

(Simplify your answer. Type an exact answer, using radicals as needed.)



7. Plot the complex number and find its absolute value.

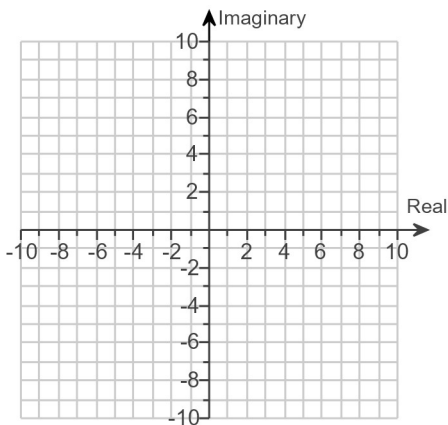
$-3 - 4 i$

Plot the complex number on the complex plane to the right.

What is the absolute value of this complex number?

$|-3 - 4 i| =$

(Simplify your answer. Type an exact answer, using radicals as needed.)



8. Plot the complex number and find its absolute value.

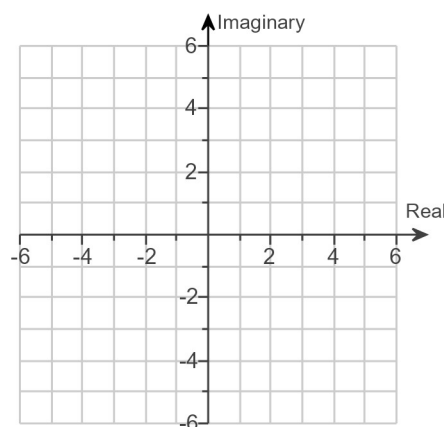
$$-2 - 4i$$

Plot the complex number on the complex plane to the right.

What is the absolute value of this complex number?

$$|-2 - 4i| = 2\sqrt{5}$$

(Simplify your answer. Type an exact answer, using radicals as needed.)



9. Write the complex number in polar form. Express the argument θ in degrees, with $0 \leq \theta < 360^\circ$.

$$2\sqrt{2} + 2\sqrt{2}i$$

$$2\sqrt{2} + 2\sqrt{2}i = 4 (\cos 45^\circ + i \sin 45^\circ)$$

10. Write the following complex number in polar form. Express the argument θ in degrees, with $0^\circ \leq \theta < 360^\circ$.

$$-4 + 4i$$

$$z = 4\sqrt{2} (\cos 135^\circ + i \sin 135^\circ)$$

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

11. Write the following complex number in rectangular form.

$$4(\cos 60^\circ + i \sin 60^\circ)$$

$$4(\cos 60^\circ + i \sin 60^\circ) = 2 + 2\sqrt{3}i$$

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

12. Write the complex number in rectangular form.

$$7\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$$

$$7\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right) = 7i$$

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

13. Find $z_1 z_2$ and $\frac{z_1}{z_2}$ for $z_1 = 3(\cos 55^\circ + i \sin 55^\circ)$, $z_2 = 2(\cos 16^\circ + i \sin 16^\circ)$. Write each answer in polar form.

$$z_1 z_2 = 6 [\cos 71^\circ + i \sin 71^\circ]$$

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

$$\frac{z_1}{z_2} = \frac{3}{2} [\cos 39^\circ + i \sin 39^\circ]$$

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

14. Find $z_1 z_2$ and $\frac{z_1}{z_2}$ for $z_1 = -4 + 4i$, $z_2 = -4 - 4i$. Write each answer in polar form.

$$z_1 z_2 = 32 [\cos 0^\circ + i \sin 0^\circ]$$

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

$$\frac{z_1}{z_2} = 1 [\cos 270^\circ + i \sin 270^\circ]$$

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

15. Use DeMoivre's theorem to compute the following power in polar form, with θ in degrees, with $0 \leq \theta < 360^\circ$

$$(1 - i\sqrt{3})^{12}(5 + 5i)^{-4}$$

Type the answer in polar form.

$$(1 - i\sqrt{3})^{12}(5 + 5i)^{-4} = \frac{1024}{625} (\cos 180^\circ + i \sin 180^\circ)$$

(Type an exact answer, using radicals as needed. Round to the nearest degree as needed.)

16. Use DeMoivre's theorem to compute the following power in polar form, with θ in degrees, and $0 \leq \theta < 360^\circ$.

$$\left(\sin \frac{7\pi}{4} + i \cos \frac{7\pi}{4} \right)^{-9}$$

Choose the correct answer below.

- ☒ A. $\cos 225^\circ + i \sin 225^\circ$
☐ B. $\sin 135^\circ + i \cos 135^\circ$
☐ C. $\sin 225^\circ + i \cos 225^\circ$
☐ D. $\cos 135^\circ + i \sin 135^\circ$

17. Watch the video and then solve the problem below.

[Click here to watch the video.](#)¹

Find the absolute value of the complex number $24 - 7i$.

$$|24 - 7i| = 25 \quad (\text{Simplify your answer. Type an exact answer, using radicals as needed.})$$

1: http://mediaplayer.pearsoncmg.com/assets/lq_z5t60KQUdLdwIFFKqEvbKsJqypyz?clip=2

18. Watch the video and then solve the problem below.

[Click here to watch the video.](#)²

Write the complex number $z = 5 \left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right)$ in rectangular form.

$$5 \left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right) = -\frac{5}{2} + 5\frac{\sqrt{3}}{2}i$$

(Simplify your answer. Type an exact answer, using radicals and i as needed.)

2: http://mediaplayer.pearsoncmg.com/assets/lq_z5t60KQUdLdwIFFKqEvbKsJqypyz?clip=3

19. Watch the video and then solve the problem below.

[Click here to watch the video.](#)³

Let $z_1 = 9(\cos 75^\circ + i \sin 75^\circ)$ and $z_2 = 6(\cos 42^\circ + i \sin 42^\circ)$. Find $z_1 z_2$ and $\frac{z_1}{z_2}$. Leave the answers in polar form.

Find $z_1 z_2$. Choose the correct answer below.

- ☐ A. $54(\cos 33^\circ + i \sin 33^\circ)$
- ☒ B. $54(\cos 117^\circ + i \sin 117^\circ)$
- ☐ C. $54(\cos 117^\circ - i \sin 117^\circ)$
- ☐ D. $\frac{3}{2}(\cos 33^\circ + i \sin 33^\circ)$

Find $\frac{z_1}{z_2}$. Choose the correct answer below.

- ☐ A. $54(\cos 33^\circ + i \sin 33^\circ)$
- ☐ B. $\frac{3}{2}(\cos 33^\circ - i \sin 33^\circ)$
- ☒ C. $\frac{3}{2}(\cos 33^\circ + i \sin 33^\circ)$
- ☐ D. $\frac{3}{2}(\cos 117^\circ + i \sin 117^\circ)$

3: http://mediaplayer.pearsoncmg.com/assets/lq_z5t60KQUdLdwIFFKqEvbKsJqypyjz?clip=4
