

Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

Name: _____

*Whenever possible, give exact (i.e., unit circle, NOT calculator) values, or your solution will be incorrect.

1. Convert $z = -2 - 7i$ to trig form.

2. Convert $z = \frac{7}{5} \left[\cos\left(\frac{7\pi}{6}\right) + i \sin\left(\frac{7\pi}{6}\right) \right]$ to standard form.

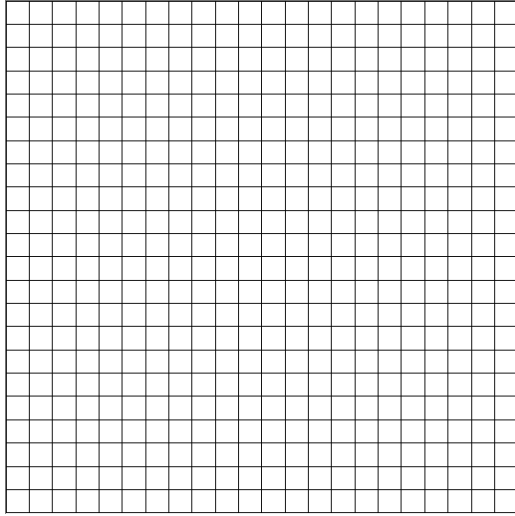
3. Given that $z_1 = \frac{3}{5} \left[\cos\left(\frac{2\pi}{3}\right) + i \sin\left(\frac{2\pi}{3}\right) \right]$ and $z_2 = \sqrt{7} \left[\cos\left(\frac{\pi}{6}\right) + i \sin\left(\frac{\pi}{6}\right) \right]$, find:

(a) $z_1 z_2$

(b) $\frac{z_2}{z_1}$

Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

4. Graph the following complex points and give their moduli.



(a) $z_1 = -4 - 6i$; $|z_1| = \underline{\hspace{2cm}}$

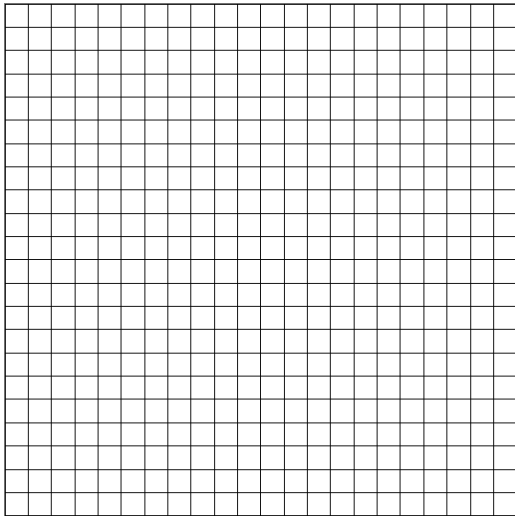
(b) $z_2 = 2 + 6i$; $|z_2| = \underline{\hspace{2cm}}$

(c) $z_3 = -2 - i$; $|z_3| = \underline{\hspace{2cm}}$

(d) $z_4 = 4 - i$; $|z_4| = \underline{\hspace{2cm}}$

BONUS (5 points): Give the area of the figure enclosed by connecting the four complex points.

5. Graph the plane curve defined by the following parametric equations (make sure to show your complete t-table and indicate the direction of the curve):



$$\begin{aligned} x &= \sqrt{t} + 3 \\ y &= 1 - t \end{aligned} \text{ for } 0 \leq t \leq 9$$

6. What is the rectangular form of the curve from the previous problem?

Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

7. For a circle of diameter 10 that has been translated right by 4 units and down by 7 units:

(a) Give the parametric equations defining the circle.

(b) Convert the parametric equations to rectangular form (please give the circle in standard form).

8. Billy Bob builds a trebuchet that launches a cow into the air where the cow's path takes on a parabolic trajectory. The equation of the cow's horizontal and vertical distance (in meters), as a function of time (in seconds), is

$$x = 20t$$

$$y = 41t - 3.39t^2$$

(a) What is the parameter in this problem? _____

(b) What is the horizontal distance the cow has traveled in 3.7 seconds? _____

(c) If a 50 meter tall safety net is placed 62 meters from the launch site, will the cow clear the safety net (to land on a large pillow, of course!)? Show all work to support your answer.

(d) Remove the parameter to write a rectangular function.

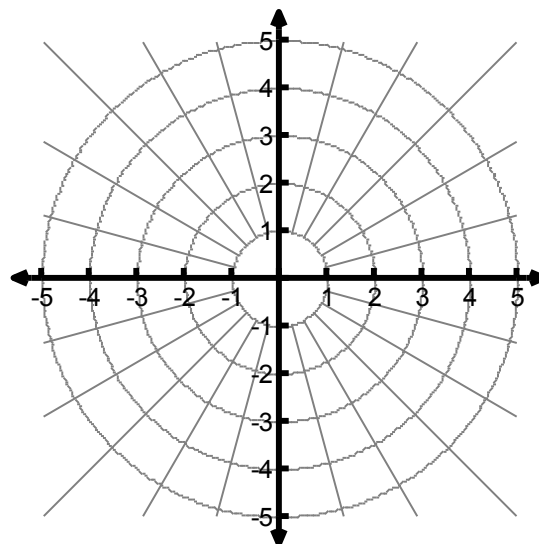
Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

9. Plot the following points on the polar grid at the right and label each point. Then, convert each polar coordinate to rectangular form (RF).

(a) $\left(3, \frac{5\pi}{6}\right)$ RF: _____

(b) $\left(-1, -\frac{\pi}{4}\right)$ RF: _____

(c) $\left(5, -\frac{3\pi}{2}\right)$ RF: _____



10. Convert $(3, -1)$ to polar form. Then find a second set of polar coordinates for the same point.

Convert each of the following to polar form.

11. $4x + 7y - 2 = 0$

12. $(x-1)^2 + (y+4)^2 = 17$

Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

Convert each of the following to rectangular form.

13. $r = -3\cos\theta$

14. $r = 3\sin\theta - 5\cos\theta$

15. $r = \frac{10}{3 + 2\sin\theta}$

Rectangular coordinates of point P are given. Find all polar coordinates of P that satisfy

(a) $0 \leq \theta \leq 2\pi$ (b) $-\pi \leq \theta \leq \pi$ (c) $0 \leq \theta \leq 4\pi$

16. $(7, 2)$

17. $(-3, -2)$

Quiz: Trig Form of Complex Numbers, Parametric Equations, Polar Coordinates & Equations

18. Graph the following two equations on the polar plane below:

(a) $\theta = \frac{5\pi}{6}$

(b) $r = 4$

