Trig
Chapter 10 Test

Name:_____

1. Assume α is opposite side a, β is opposite side $\mathbf{b}$, and γ is opposite side c. Solve the triangle, if possible, and round each answer to the nearest tenth, given $\beta = 68°, \mathbf{b} = 21, c = 16.$

2. Find the area of the triangle in Figure 1. Round each answer to the nearest tenth.

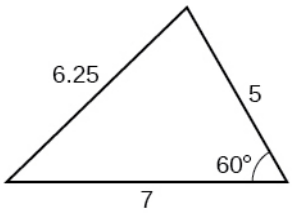

Figure 1

3. A pilot flies in a straight path for 2 hours. He then makes a course correction, heading 15° to the right of his original course, and flies 1 hour in the new direction. If he maintains a constant speed of 575 miles per hour, how far is he from his starting position?

4. Convert $(2, 2)$ to polar coordinates, and then plot the point.

5. Convert $\left(2, \frac{\pi}{3}\right)$ to rectangular coordinates.

6. Convert the polar equation to a Cartesian equation: $x^2 + y^2 = 5y.$

11. Find the absolute value of the complex number $5 - 9\mathbf{i}$.

12. Write the complex number in polar form: $4 + \mathbf{i}$.

13. Convert the complex number from polar to rectangular form: $z = 5\text{cis}\left(\frac{2\pi}{3}\right)$.

Given $z_1 = 8\,\text{cis}\,(36°)$ and $z_2 = 2\,\text{cis}\,(15°)$, evaluate each expression.

14. $z_1 z_2$

15. $\frac{z_1}{z_2}$

16. $(z_2)^3$

17. $\sqrt{z_1}$

18. Plot the complex number $-5 - \mathbf{i}$ in the complex plane.

19. Eliminate the parameter t to rewrite the following parametric equations as a Cartesian equation:

$$\begin{cases} x(t) = t + 1 \\ y(t) = 2t^2 \end{cases}.$$

20. Parameterize (write a parametric equation for) the following Cartesian equation by using $x(t) = a\cos\ t$ and $y(t) = \mathbf{b}\sin\ t$:
$\frac{x^2}{36} + \frac{y^2}{100} = 1.$

21. Graph the set of parametric equations and find the Cartesian equation:
$\begin{cases} x(t) = -2\sin\ t \\ y(t) = 5\cos\ t \end{cases}$.

22. A ball is launched with an initial velocity of 95 feet per second at an angle of 52° to the horizontal. The ball is released at a height of 3.5 feet above the ground.

ⓐ Find the parametric equations to model the path of the ball.
ⓑ Where is the ball after 2 seconds?
ⓒ How long is the ball in the air?

For the following exercises, use the vectors $\boldsymbol{u} = \boldsymbol{i} - 3\boldsymbol{j}$ *and* $\boldsymbol{v} = 2\boldsymbol{i} + 3\boldsymbol{j}$.

23. Find $2\boldsymbol{u} - 3\boldsymbol{v}$.

24. Calculate $\mathbf{u} \cdot \mathbf{v}$.

25. Find a unit vector in the same direction as $\mathbf{v}$.