

Unit 9 Test Review
NO Calculators or Unit Circles Section

SCORE:

/

2023-2024

Name _____ Date _____ Period _____

Find the exact component form of the vector with the given magnitude and direction angle. Show work.

1. $|\mathbf{u}| = 28, \theta = 120^\circ$

2. $|\mathbf{u}| = 18.2, \theta = 30^\circ$

Find the magnitude and direction angle (to the nearest tenth) of the vector. Give the measure of the direction angle as an angle in $[0^\circ, 360^\circ)$. Show work.

3. $\langle -4\sqrt{3}, -4 \rangle$

Perform the indicated operation. Use the form $\langle a, b \rangle$ for vectors. Show work. $\mathbf{u} = \langle -1, 5 \rangle, \mathbf{v} = \langle 4, -7 \rangle$

4. Find $3\mathbf{u} - \mathbf{v}$

5. Find $\mathbf{u} \cdot \mathbf{v}$

Determine whether the vectors are parallel, perpendicular, or neither. Show work.

6. $\langle 2, -4 \rangle$ and $\langle 6, 3 \rangle$

7. $\langle 9, 1 \rangle$ and $\langle 1, 9 \rangle$

8. $\langle -1, 7 \rangle$ and $\langle 3, -21 \rangle$

Write the expression in standard form, $a + bi$. Show work.

9. $\frac{3-4i}{1+2i}$

Write the exact complex number in trigonometric form, using degree measure $[0^\circ, 360^\circ)$ for the argument. Show work.

10. $3\sqrt{3} - 3i$

Write the complex number in the form $a + bi$. Leave answers in simplest radical form. Show work.

11. $\sqrt{6}(\cos 315^\circ + i \sin 315^\circ)$

12. $\frac{1}{2}(\cos 135^\circ + i \sin 135^\circ)$

Perform the indicated operation using trigonometric form. Then write the answer in the form of $a + bi$. Show work.

13. $4(\cos 135^\circ + i \sin 135^\circ) \cdot 6(\cos 225^\circ + i \sin 225^\circ)$

14. $\frac{8\left(\cos\frac{\pi}{2} + i \sin\frac{\pi}{2}\right)}{3\left(\cos\frac{\pi}{6} + i \sin\frac{\pi}{6}\right)}$

For the point given in rectangular coordinates, convert to polar coordinates where both components are positive. Write the exact answer. Leave answer in degrees, $[0^\circ, 360^\circ)$. Show work.

15. $(5, -5)$

16. $(-2\sqrt{3}, -2)$

Convert to rectangular coordinates. Find the exact answer (no rounding). Show work.

79. $\left(-4, -\frac{\pi}{3}\right)$

18. $\left(-3, \frac{3\pi}{4}\right)$

For the given polar equation, write an equivalent rectangular equation. Show work.

19. $r = 10 \sin \theta$

For the given rectangular equation, write an equivalent polar equation. Show work.

20. $y = -2$

21. $x = 6$

Using the pair of parametric equations, find the values of A and B in the table. Show work.

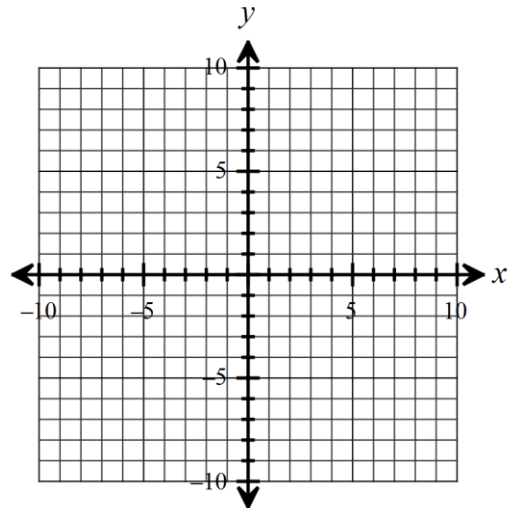
22. $x = 3t + 7, y = t + 8$, for $0 \leq t \leq 7$

t	x	y
0		
A	19	
2		B

Graph the pair of parametric equations in the rectangular coordinate system. Make a table. No graphing calculators. Show work.

23. $x = 2t, y = t + 5, -2 \leq t \leq 3$

t	x	y



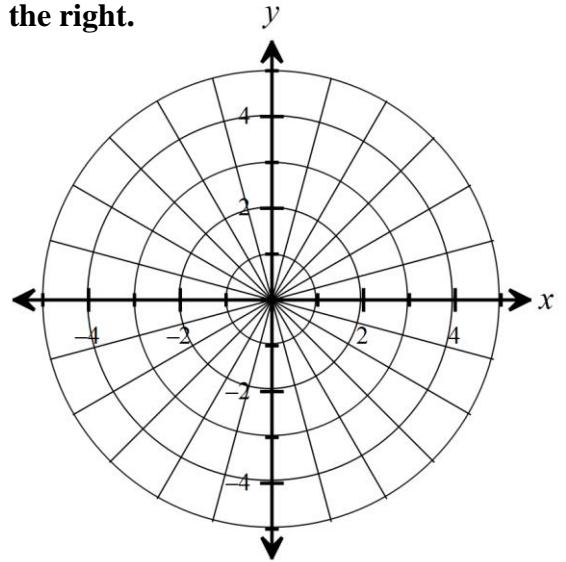
Eliminate the parameter of the pair of parametric equations. What type of equation does it make? Write your answer in standard form.

24. $x = t - 3, y = t^2 + 5$

What type of equation? _____

Graph and label the following polar coordinates on the graph to the right.

- 25. $A\left(2, \frac{\pi}{4}\right)$
- 26. $B\left(-4, -\frac{\pi}{3}\right)$
- 27. $C\left(5, \frac{3\pi}{4}\right)$
- 28. $D\left(-3, \frac{\pi}{2}\right)$



Find the absolute value (modulus) of the complex number. Leave the answer in simplest radical form. Show work.

29. $-4 + 3i$

30. $2 - 5i$

Calculator Section

Find the exact component form of the vector with the given magnitude and direction angle. Round answers to the nearest tenth. Show work.

31. $|\mathbf{v}| = 20.6, \theta = 102.5^\circ$

Find the smallest positive angle between the given vectors to the nearest tenth of a degree. Show work.

32. $\langle -1, 5 \rangle$ and $\langle 2, 7 \rangle$

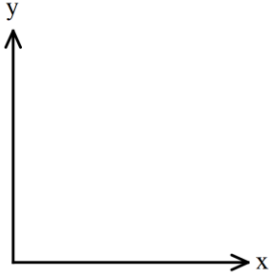
33. $\langle -2, -4 \rangle$ and $\langle -1, 6 \rangle$

Solve the following story. Define the variable and show work. Round all answers to the nearest tenth.

34. A projectile is fired from the ground, with an initial velocity of 300 feet per second at an angle of 30° with the horizontal. The parametric equations for the path of the projectile are:

$$x = (300 \cos 30^\circ)t \quad \text{and} \quad y = -16t^2 + (300 \sin 30^\circ)t$$

a) Sketch and label the parametric graph. (You don't need numbers just a general shape of the graph).



b) When is the projectile at its maximum height? Determine the maximum height of the projectile.

c) How long is the projectile in the air?

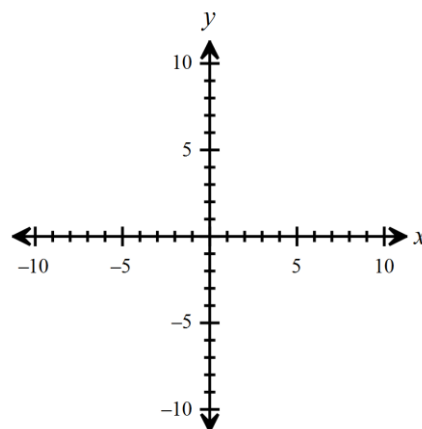
d) Determine the distance the projectile traveled.

Write the complex number in trigonometric form, using degree measure $[0^\circ, 360^\circ)$ for the argument. Round to the nearest tenth. Show work.

35. $6 + 8i$

Graph the polar equation. Use at least 5 points to graph.

36. $r = 2(1 + 3 \sin \theta)$



Solve the problems. Round to the nearest tenth. Draw a picture, define the variable, and show work.

37. One rope pulls a barge due east with a force of 75 N, and another rope pulls the barge due south with a force of 87 N. Find the magnitude of the resultant force acting on the barge.

38. A force of 689 lb is required to pull a boat up a ramp inclined at 16.0° to the horizontal. How much does the boat weigh?

39. An airplane flies on a compass heading of 90.0° at 375 mph. The wind affecting the plane is blowing from 295° at 43 mph. What is the true course and ground speed of the airplane?

40. Two forces of 50 N and 80 N (Newtons) act on an object. The angle between the forces is 56° . Find the magnitude of the resultant and the angle that it makes with the larger force to the nearest tenth.

Perform the indicated operation using trigonometric form. Then write the answer in the form of $a + bi$. Round to the nearest hundredth if necessary. Show work.

41.
$$\frac{6(\cos 120^\circ + i \sin 120^\circ)}{8(\cos 315^\circ + i \sin 315^\circ)}$$