

PreAP Precalculus Review
Vectors and Parametric Equations

Name: _____

$A = (-2, 5)$, $B = (3, -2)$ and $C = (-1, 3)$

Find the component form, magnitude, and direction of the vector.

1. \overline{BC}

2. \overline{CA}

3. \overline{AB}

4. $\overline{BC} + \overline{CA}$

5. $\overline{BA} + 2\overline{BC}$

6. $\overline{CA} - \overline{BC}$

Find the component form for the following vectors:

7. $\|v\| = 46$ $\theta = 63^\circ$

8. $\|v\| = 23$ $\theta = 125^\circ$

Find the direction of the following vectors:

9. $v = \langle -2, 5 \rangle$

10. $v = \langle -2, -5 \rangle$

11. $v = \langle 2, -5 \rangle$

12. A golf ball is hit with an initial velocity of 130 ft/sec at an angle of 32° . Find the components of the velocity vector.
13. A football is kicked off a tee with an initial velocity of 110 ft/sec at an angle of 40° . Find the components of the velocity vector.
14. An airplane is traveling in the direction of $S25^\circ E$ at 500 mph. Find the components of the velocity vector.
15. Without the wind, an airplane has an airspeed of 525 kph in an easterly direction. If the wind velocity is 50 kph in a northwesterly direction, find the speed of the airplane relative to the ground.
16. Two forces with magnitudes of 30 newtons and 75 newtons act on an object at 20° and -45° respectively. Find the magnitude and direction of the resultant force.
17. An airplane travels in a northwesterly direction at a constant rate of 200 mph, due to an easterly wind of 40 mph. How fast would the plane have gone if there had been no wind?

Eliminate the parameter and find the corresponding rectangular equation. Identify the graph.

18. $x_t = t + 2$
 $y_t = t^2 + 3$

19. $x_t = 2t + 3$
 $y_t = -3t - 5$

20. $x = 2 \cos t$
 $y = 2 \sin t$

21. $x_t = t^2 + 3$
 $y_t = -3t^2 - 5$

22. Spencer practices kicking field goals 40 yards from a goal post with a crossbar 10 feet high. If he kicks the ball with an initial velocity of 65 ft/sec at a 45° angle with the horizontal, will he make the field goal? Write the parametric equations and explain your answer.

23. Assume that Spencer kicks against a wind of 10 ft/sec. Does he make the field goal? Explain.

Review: (no calculator)

24. $\cos \frac{5\pi}{3}$

25. $\tan \frac{5\pi}{6}$

26. $\sin 5\pi$

27. $\sin^{-1} \left(-\frac{1}{2} \right)$

28. $\cos^{-1} \left(-\frac{\sqrt{2}}{2} \right)$

29. Find the exact value of $\cos \theta$ if the terminal side of θ contains the point (5, -12).

30. Solve over the interval $[0, 2\pi)$: $\cos^2 x - \cos x - 2 = 0$

Vector and Parametric Review Key:

1. $\langle -4, 5 \rangle$; 6.403; 128.66° 2. $\langle -1, 2 \rangle$; 2.23; 116.57° 3. $\langle 5, -7 \rangle$; 8.602; -54.462°

4. $\langle -5, 7 \rangle$; 8.602; 125.54° 5. $\langle -13, 17 \rangle$; 21.401; 127.41° 6. $\langle 3, -3 \rangle$; 4.243; -45°

7. $\langle 20.884, 40.986 \rangle$ 8. $\langle -13.192, 18.840 \rangle$ 9. 111.801°

10. 248.199° 11. 291.801° 12. $\langle 110.246, 68.890 \rangle$

13. $\langle 84.265, 70.707 \rangle$ 14. $\langle 211.309, -453.154 \rangle$ 15. 490.920kph

16. 91.798; 332.229° 17. 174.029 mph

18. $y = (x-2)^2 + 3$; parabola 19. $y = -\frac{3}{2}x - \frac{1}{2}$; line

20. $x^2 + y^2 = 4$; circle 21. $y = -3x + 4$; line

22. $x = 65t \cos 45$
 $y = 65t \sin 45 - 16t^2$; He makes the field goal.

At approx. 2.61 sec, the ball has traveled 119.96 feet (about 40 yds) and is 10.967 feet off the ground.

23. He makes does not make the field goal. The ball hits the ground at approx. 2.87 sec.

24. $\frac{1}{2}$ 25. $-\frac{\sqrt{3}}{3}$ 26. 0 27. $-\frac{\pi}{6}$ 28. $\frac{3\pi}{4}$

29. $\frac{5}{13}$ 30. π