

Pre-Calculus: Review of Vectors and Parametric Equations (Use your own paper)

Given the following coordinates, find the component form, magnitude, and direction angle of each vector.

A(-3, -5) B(5, 1) C(-3, 11)

1. Vector AB 2. Vector BC 3. Vector AC

Given $u = \langle -3, 2 \rangle$ and $v = \langle 2, 4 \rangle$ Find the following and sketch the resultant vector

4. $u + v$ 5. $u - v$

Given $u = \langle -3, 2 \rangle$ and $v = \langle 2, 4 \rangle$

Find the following.

Write the following in component form.

6. $2u - 3v$ 7. $v + 4u$ 8. $8i + 6j$ 9. $5i - 2j$

Write the following in as a standard linear combination of \mathbf{i} and \mathbf{j} .

10. $u = \langle -3, 2 \rangle$ 11. $v = \langle 2, 4 \rangle$

Find a unit vector in the direction of the given vector. Write the result in component form and as a standard linear combination of \mathbf{i} and \mathbf{j} .

12. $u = \langle -3, 2 \rangle$ 13. $v = \langle 2, 4 \rangle$

Find the component form of v given its magnitude and the direction angle.

14. $|v| = 5$ $\theta = 42^\circ$ 15. $|v| = 7$ $\theta = 142^\circ$

16. Forces with magnitudes of 2000 newtons and 900 newtons act on a machine part at angle of $\theta = 30^\circ$ and $\theta = -45^\circ$, respectively with the positive x-axis. Find the direction and magnitude of the resultant of these forces.

17. An airplane is flying in the direction 332° with an airspeed of 580 mph. The wind at the altitude of the plane, is blowing from the southwest with a velocity of 60 mph.
 a. Draw a picture that gives a visual representation of the problem.
 b. Find the speed of the jet and the direction it is flying in.

18. An airplane is flying in the direction 148° with an airspeed of 860 kmh. Because of the wind, its groundspeed and direction are, respectively, 800 kmh and 140° . Find the direction and speed of the wind.

Find the dot product of u and v and then find the angle between the 2 vectors u and v .

19. $u = \langle -3, 2 \rangle$ $v = \langle 2, 4 \rangle$

Determine whether u and v are orthogonal, parallel or neither.

20. $u = \langle 2, -2 \rangle$ $v = \langle -1, -1 \rangle$

21. $u = \langle 2, 4 \rangle$ $v = \langle -3, -6 \rangle$

Sketch the curve represented by the parametric equations. Then eliminate the parameter and write the corresponding rectangular equation whose graph represents the curve.

22. $x = 3 - 2t$ $y = 2 + 3t$

23. $x = t + 2$ $y = t^2$

Find a set of parametric equation for the line

24. Passes through $(2, -1)$ and $(5, -2)$

Find a set of parametric equation for the line segment

25. Endpoints $(1, 4)$ and $(5, -2)$

26. **Hitting a baseball:** Trevor Story, rookie shortstop of the Colorado Rockies, hits a baseball at 3 feet above the ground with an initial speed of 126ft/sec at angle of 29 degrees with the horizontal. Will the ball clear a 10 foot wall that is 375 feet away?

27. The men's horseshoe pitching court has metal stakes 45 feet apart. The stakes stand 18 inches out of the ground.

- a. Alan pitches a horseshoe at 50 feet per second, at a 15° angle to the ground. He releases the horseshoe at about 2.5 feet above the ground and 1.75 feet in front of the stake at one end. Write parametric equations modeling a typical throw.
- b. How long is the thrown horseshoe in the air?
- c. How close to 45 ft is the horizontal component when the horseshoe hits the ground?
- d. How far in the horizontal direction is the horseshoe when the horseshoe is 1.5 feet above the ground?