

Physics Two Dimensional Study Guide

1. Know the difference between a scalar and a vector.
2. Recognize which are scalars, and which are vectors in speed, velocity, acceleration, displacement, distance, volume, temperature, and mass.
3. Be able to find the resultant displacement or velocity of added vectors.
4. Understand how to assign the x,y coordinate system to problem to use in solving.
5. Know that the path of a projectile is a parabola.
6. Know how to calculate the adjacent side, opposite side, and hypotenuse and angles of a right triangle, using sine, cosine, and tangent.

Example math problems:

- 1) For the winter, a duck flies 11.0 m/s due south against a gust of wind with a velocity of 2.4 m/s. What is the resultant velocity of the duck?
- 2) A jogger jogs 15 blocks east, two blocks south, and 8 blocks back west, what is the resultant displacement of the jogger, and what equilibrant would return him home in the shortest distance?
- 3) An athlete runs 80 meters across a level playing field at 30 degrees north of east, what are the parallel and perpendicular components of the displacement?
- 4) Vector A is 3 units in length and points along the positive x-axis. Vector B is 4 units in length and points along a direction of 150 degrees from the positive x-axis. What is the direction of the resultant with respect to the positive x-axis?
- 5) A track star in the broad jump goes into the jump at 14 m/s and launches him at a 30 degree angle above the horizontal. How long is the jumper in the air? How far does the jumper travel? What maximum height does the jumper attain?
- 6) A 0.50 kg soccer ball is kicked from the top of a 10.0-meter cliff with a horizontal speed of 8.0 m/s. What distance from the bottom of the cliff does the ball land and how long is the ball in the air? What is the ball's final vertical velocity?(3 pts)
- 7) A football is kicked with an initial velocity of 15 m/s at an angle of 35-degrees with the horizontal. Determine the time of flight, the horizontal distance, and the peak height of the football. (3 pts)