

## Chapter 3 Algebraic Vector Resolution

Vectors at perpendicular angles can be resolved using simple math. We can use trigonometry and the Pythagorean theorem to solve any problem where vectors are at 90 degrees to each other.

**Example:** A plane flies 100 miles east then 225 miles north. Find the magnitude and direction of the resultant.



What if they only give you the resultant?

**Example:** A plane flies 650 miles/hr at a direction 30 degrees north of east. Find the  $V_{\text{north}}$  and  $V_{\text{east}}$  components.

What if the vectors are not in quadrant I?

**Example:** A balloon drops a package that falls a distance of 1250 m but encounters a crosswind from the west that pushes the package 300 m off course. Find the resultant displacement the package travels.

**Practice problems:**

Directions: for each of the following, sketch a simple graph and find the required resultant or components. Make sure to circle your answers.

1. A long distance runner travels 6 miles north, then abruptly turns west and travels an additional 2 miles. What is his/her resultant displacement?

2. A car travels west at 135 miles/hr and then south at 76 miles/hr. What is the cars resultant velocity?

3. A motorcycle travels 156 miles/hr at an angle of 36 degrees north of west. Find the components of the cycle's velocity.

4. Due to a current, a boat travels 48 degrees south of east for 26 km. Find the components of the resultant.

