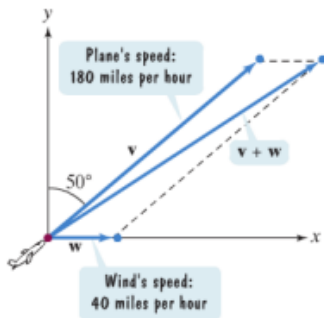


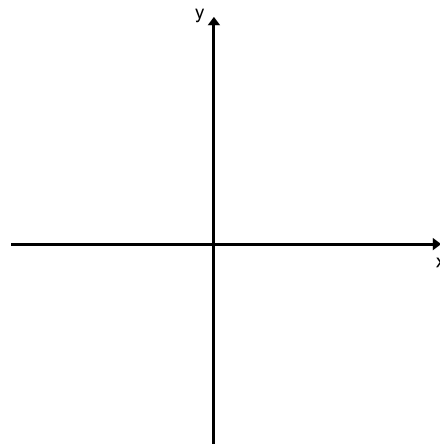
The figure shows a small plane flying at a speed of 180 miles per hour on a bearing of $N50^\circ E$. The wind is blowing from west to east at 40 miles per hour. The figure indicates that \mathbf{v} represents the velocity of the plane in still air and \mathbf{w} represents the velocity of the wind.



- a. Express \mathbf{v} and \mathbf{w} in terms of their magnitudes and direction angles.
- b. Find the resultant vector, $\mathbf{v} + \mathbf{w}$.
- c. The magnitude of $\mathbf{v} + \mathbf{w}$, called the **ground speed** of the plane, gives its speed relative to the ground. Approximate the ground speed to the nearest mile per hour.
- d. The direction angle of $\mathbf{v} + \mathbf{w}$ gives the plane's true course relative to the ground. Approximate the true course to the nearest tenth of a degree. What is the plane's true bearing?

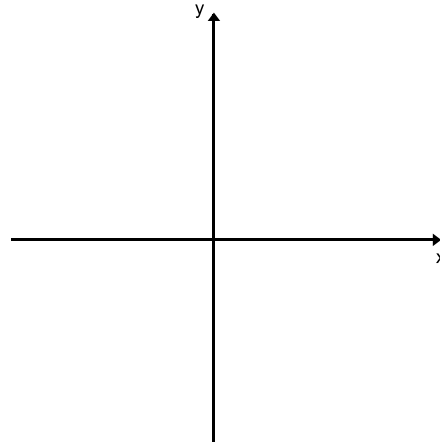
An airplane is traveling at a fixed altitude with a negligible wind factor. The airplane is headed $N 30^\circ W$ at a speed of 500 miles per hour. As the airplane reaches a certain point, it encounters a wind with a velocity of 70 mph in the direction of $N 45^\circ E$.

- a) What is the resultant speed of the airplane?
- b) What is direction of the airplane?



An airplane's velocity with respect to the air is 580 mph and it is headed N 58° W. The wind, at the altitude of the plane, is from the southwest and has a velocity of 60 mph.

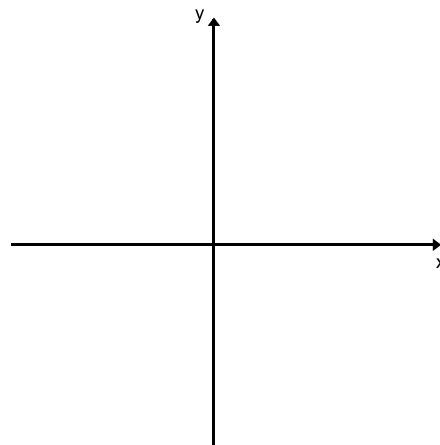
a) What is the resultant speed of the airplane?



a) What is direction of the airplane?

A plane's heading is 160 degrees (which implies to measure from North) and its air speed is 350 mph. If a west wind (which implies a wind from the west) is blowing at 20 mph, what are the resultant speed and direction of the airplane?

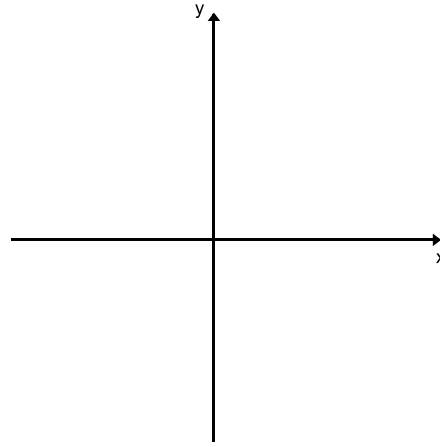
a) What is the resultant speed of the airplane?



b) What is direction of the airplane?

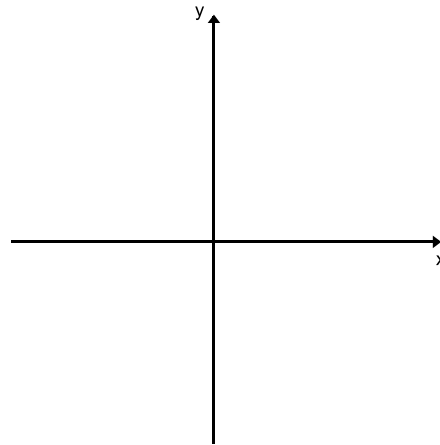
A jet is heading due north (which implies to the North) with an airspeed of 500 mph, and the wind is blowing to the southeast at 50 mph. What is the resultant speed of the jet?

- a) What is the resultant speed of the jet?



A plane is flying at a speed of 320 mph on a bearing N 70° E. Its resultant speed is 370 mph and resultant direction is 60° . Find the speed and direction of the wind.

- a) What is the speed of the plane?



- b) What is direction of the airplane?