

Frame of Reference and Relative Velocity Review

A pitcher is riding on the team bus heading east at 105 km/hr. He tosses a baseball at 10 m/s to a catcher sitting at the back of the bus. Determine the velocity of the baseball that will be seen by a fan waving on the side of the highway when the bus passes.

The president's airplane, Air Force One, flies at 287 m/s to the south with respect to the air. The air is moving at 47 m/s to the west with respect to the ground. Find the velocity of Air Force One with respect to the ground.

A fishing boat with a maximum speed of 3 m/s relative to the water is in a river that is flowing at 2 m/s. What is the maximum speed the boat can obtain relative to the shore? The minimum speed? Give the direction of the boat, relative to the river's current, for the maximum speed and the minimum speed relative to the shore.

An airplane flies due north at 150 km/h relative to the air. There is a wind blowing at 75 km/h to the east relative to the ground. What is the plane's velocity relative to the ground?

An airplane flies due south at 175 km/h relative to the air. There is a wind blowing at 85 km/h to the east relative to the ground. What are the plane's velocity relative to the ground?

A boat traveling 4 m/s due east encounters a current traveling 3 m/s north. What is the magnitude & direction of the new path of the boat?

A pair of 45.6 m/s² vectors is perpendicular. Calculate the magnitude of the resultant vector.

An airplane has airspeed of 381 km/hr. The pilot wishes to fly due north in an 75.1 km/hr wind to the east. In what direction should he head?