

Notes 6.4 Applications of Vectors

- If a vector represents the speed & direction of an object, it is called the _____ vector.
 - If a vector represents the amount of force acting on an object & direction of an object, it is called the _____ vector.
 - Magnitude = _____ & _____
 - Direction = the direction angle
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Ex 1) A ball is thrown with an initial speed of 25 mph at an angle 30° to the horizontal. Find the vector to model this situation.

Ex 2) A child pulls a wagon with a force of 40 pounds. The handle of the wagon makes an angle of 30° with the ground. Find the force vector F in terms of i and j .

Ex 3) A car is heading 40° west of south at a speed of 72 mph. Find a vector to model the cars speed and direction.

Ex 4) A jet is flying on a bearing of 65° at 500 mph. Find the component form of the velocity of the plane.

Ex 5) A Boeing 737 aircraft maintains a constant speed of 500 miles per hour in the direction due south. The velocity of the jet stream is 80 miles per hour in a northeasterly direction. Find the actual speed and direction of the aircraft relative to the ground.

a) Find vector for the plane and the jet stream.

b) Find the resultant vector.

c) Find the actual speed of the aircraft.

d) Find the direction (angle) of the aircraft?

Ex 6) A boat travels 30mph due west if there is a 7mph current at $N30^\circ W$. Find the actual speed and direction of the boat?

a) Find the velocity vector of the boat.

b) Find the velocity vector of the current.

c) Find the actual velocity vector.

d) Find the actual speed of the boat.

e) Find the actual direction of the boat.

Ex 7) A force of 36 newtons pulls on an object 20° from standard position. A second force of 48 newtons pulls on the same object at $S48^\circ W$. Find the magnitude and the direction of the resultant force.

Now you try ☺

Ex 10) An Airbus 320 has an airspeed of 500 kilometers per hour bearing $N45^\circ E$. The wind velocity is 60 kilometers per hour in the direction $N30^\circ W$.

- a) Find the resultant vector representing the path of the plane relative to the ground.
- b) What is the ground speed of the plane?
- c) What is its direction angle?

Ex 11) An airplane has a airspeed of 600 kilometers per hour bearing $S30^\circ E$. The wind velocity is 40 kilometers per hour in the direction $S45^\circ E$.

- a) Find the resultant vector representing the path of the plane relative to the ground.
- b) What is the ground speed of the plane?
- c) What is its direction angle?