Name Key

Vector Applications

Set up the following word problems and find the missing information. Show all work.

1. Two people are trying to collectively push a box across a room towards the door. Person A pushes with a force of 330 newtons at a 35^0 from standard position. Person B pushes with a force of 300 newtons at a -15^0 from standard position.

a. Who contributes more force towards the door?

B

$V_A = 270.32i + 189.28j$

$V_B = 289.78i - 77.65j$

b. By how much?

19.46

c. What is the total force contributed to push this box?

Total Force → 571.12 Newtons

Just towards door → 560 Newtons

2. Burt and Ernie meet up to fly a toy helicopter. At full power the airplane can fly 100 km per hour in calm air. Burt has the controls and he makes the helicopter take off heading N45^0E. After he feels comfortable with the controls he turns on full power. A steady wind begins to blow from north to south at a speed of 32 kilometers per hour. In what direction and what speed is the helicopter traveling now?

Speed = 80.61 km/hr

Direction = 28.699° from standard

OR N 61.301° E

3. A ship is traveling at a speed of 60 miles per hour with a bearing of 60° on the river with negligible water velocity. When the ship reaches a certain point, it encounters water flow with a velocity of 10 miles per hour in the direction S 45° E. What are the resultant speed and direction of the ship?

Speed = 63.329 mph

Direction = 21.227° from Standard Position

OR - Bearing 68.773°

OR - N 68.773° E

4. A commercial jet is flying from Miami to Seattle. The jet's velocity with respect to the air is 580 miles per hour and it's bearing is N28°W. The wind is blowing from the southwest with a velocity of 60 mph. What is the speed of the jet with respect to the ground? In what direction is the jet flying?

Speed ≈ 565.377 mph

Direction = 123.825° from SP

-OR- N 33.824°W

→ going SW

Speed = 600.29 mph

Direction = 112.515° from SP

From SW (going NE)

5. A plane is flying N20°W at a speed of 325 miles per hour. A wind is blowing in the direction of N50°W at 40 miles per hour. Find the planes actual speed and direction.

Speed ≈ 360.197 mph

Direction = 113.183° from SP

-OR- N 23.183°W

6. Two forces act on an object with magnitudes of 37 pounds and 42 pounds at angles of -40° and 91°, respectively, with the positive x-axis. Find the direction and magnitude of the resultant of these forces

Magnitude = 33.075 pounds

Direction = 33.407°