

Key

Vector Review

1. An airplane flies at 65 m/s in the direction 125° counterclockwise from east. What are the north and east components of the velocity. East = -37. m/s North = 53 m/s

2. A car moving east at 45 km/h turns and travels west at 30 km/h. What are the magnitude and direction of the change in velocity? 15 m/s East or (+x)

3. You are riding in a bus moving slowly through heavy traffic at 2.0 m/s. You hurry to the front of the bus at 4.0 m/s. What is your speed relative to the street? 6.0 m/s

4. A boat is rowed directly upriver at a speed of 2.5 m/s relative to the water. Viewers on the shore find that it is moving at only 0.5 m/s relative to the shore. What is the speed of the river? -2.0 m/s

5. A motorboat heads due east at 11 m/s relative to the water across a river that flows due north at 5.0 m/s. What is the velocity of the motorboat with respect to the shore? v = 12 m/s

6. Two horizontal forces, 225N and 165N, are exerted in the same direction on a crate. Find the net horizontal force on the crate. 390 N

7. If the same two forces are exerted in opposite directions, what is the net horizontal force on the crate? 60.0 N

8. The 225 N force is exerted on the crate toward the north and the 165N force is exerted toward the east. Find the magnitude and direction of the net force. R = 279 N θ = 53.7

9. A student travels 30 degrees South of West for 40. m then turns and travels due west for 11 more meters to get to their car. Find Δx and Δy.

a. Solve by a scaled diagram

b. Solve algebraically

Δx = -46 m Δy = -20. m

10. A hiker walks 14.7 m at an angle 15 degrees north of east. Then turns and walks due north 6 meters. Find Δx and Δy.

a. Solve by a scaled diagram

b. Solve algebraically

Δx = 14 m Δy = 9.8 m

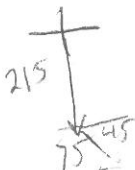
11. A powerboat heads due northwest at 13 m/s with respect to the water across a river that flows due north at 5.0 m/s. Find the change in x and the change in y of the velocity of the motor boat with respect to shore?

a. Solve by a scaled diagram

b. Solve algebraically

Δx = -9.2 m/s Δy = 14. m/s

12. An airplane flies due south at 215 km/h with respect to the air. There is a wind blowing at 75 km/h to the southeast with respect to the ground. Find the horizontal change of the plane's speed?



Δx = 53 km/hr

13. A weather station releases a balloon that rises at a constant 15 m/s relative to the air, but there is a wind blowing at 6.5 m/s to the northwest. Find the vertical change of the weather's stations velocity?

$\Delta y = 20 \text{ m/s}$



14. A boat is traveling at 25.0 km/h 40 degrees north of east. The current is 15.0 km/h 20.0 degrees north of east. What is the boats resulting velocity? Solve by a scaled diagram.

$R = 39.4 \text{ km/hr}$

$\theta = 32.6^\circ$

15. An airplane is traveling 755 km/h in a direction 40.5° west of north (Figure 3-31).

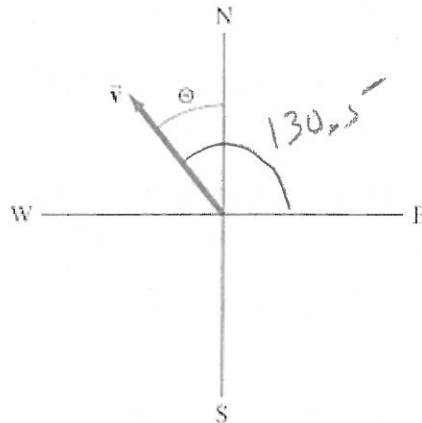


Figure 3-31

(a) Find the components of the velocity vector in the northerly and westerly directions.

Northerly 574 westerly -490

(b) How far north and how far west has the plane traveled after 3.00 h?

North ~~_____~~ west ~~_____~~

16. Three vectors are shown in Fig. 3-32 ($A = 66.0$, $\theta_B = 54.0^\circ$). Their magnitudes are given in arbitrary units. Determine the sum of the three vectors.

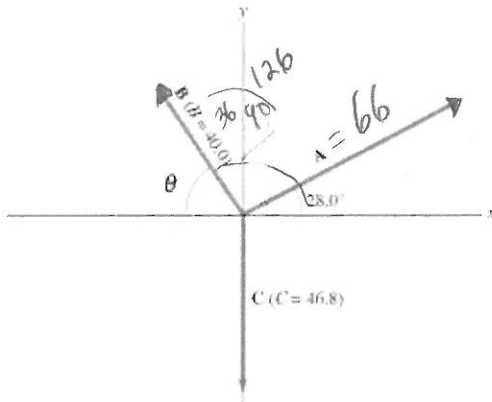


Figure 3-32

(a) Give the resultant in terms of components.

$\Delta x = 34.8 \text{ units}$ $\Delta y = 16.5 \text{ units}$

$A_x + B_x + C_x$

$59.3 + (-23.5) + 0$