Chap 9-6 pg 469-70 # 5, 9-17 odd

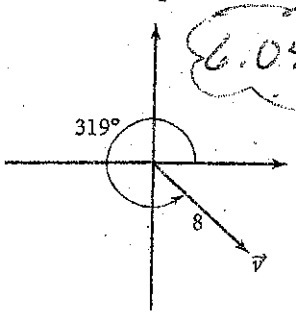
5. *Displacement Vector Problem:* Lucy walks on a bearing of 90° (due east) for 100 m and then on a bearing of 180° (due south) for 180 m. 150.95°

   a. What is her bearing from the starting point?

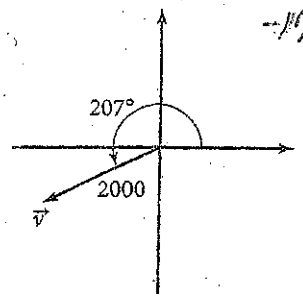
   b. What is the starting point's bearing from where she stops? 180+150.95 = 330.95°

   c. How far along the bearing in part b must Lucy walk in order to go directly back to the starting point? 205.91 m

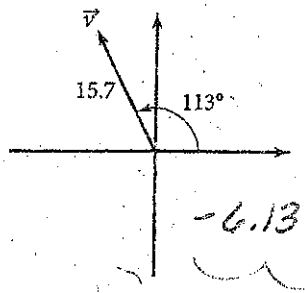
For Problems 9–12, resolve the vector into horizontal and vertical components.

9. 

6.04$\vec{i}$ − 5.25$\vec{j}$

10. 

−1752.04$\vec{i}$ − 907.98$\vec{j}$

11. 

−6.13$\vec{i}$ + 14.45$\vec{j}$

#12 797.64$\vec{i}$ + 306.12$\vec{j}$

13. *Airplane Vector Components Problem:* A jet plane flying with a velocity of 500 mi/h through the air is climbing at an angle of 35° to the horizontal (Figure 9-6n).

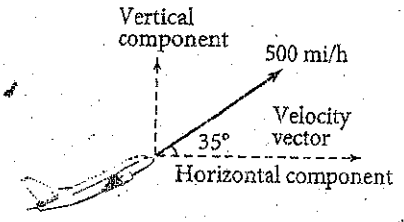


Figure 9-6n

409.58 ≈ 410 mi/hr

   a. The magnitude of the horizontal component of the velocity vector represents the plane's ground speed. Find this ground speed.

   b. The magnitude of the vertical component of the velocity vector represents the plane's climb rate. How many feet per second is the plane climbing? (Recall that a mile is 5280 ft.)

282.79 mph ⇒ 421 ft/sec.

15. If $\vec{r}$ = 21 units at 70° and $\vec{s}$ = 40 units at 120°, find $\vec{r} + \vec{s}$

   a. As a sum of two components −12.82$\vec{i}$ + 54.37$\vec{j}$

   b. As a magnitude and direction $|\vec{v}|$ = 55.86 units, θ = 103.26°

17. A ship sails 50 mi on a bearing of 20° and then turns and sails 30 mi on a bearing of 80°. Find the resultant displacement vector as a distance and a bearing.

$|\vec{v}|$ = 70 mi at a bearing of 41.79°

pg 462–470 # 5, 7–17 odd

5) East (90°) 100m

South (180°) 180m

a) SE

$\theta = 90^\circ + \tan^{-1}\left(\frac{180}{100}\right)$

$\theta = 90^\circ + 60.95 = 150.95^\circ$

b) $360 - (90 - 60.95)$

Bearing = 330.95°

c) $r = \sqrt{100^2 + 180^2} = 205.91$ m

7) 300 lb, 40°, 150 lb

$150\cos 0\,\vec{i} + 150\sin 0\,\vec{j} + 300\cos 40\,\vec{i} + 300\sin 40\,\vec{j}$

$150\vec{i} + 0\vec{j} + 153.21\vec{i} + 128.56\vec{j}$

$= 303.21\vec{i} + 128.56\vec{j}$

$\sqrt{i^2 + j^2} = 329.34$

Not 229.34?

9) 8, 319°

$6.04\vec{i} - 5.25\vec{j}$

$\sin 41^\circ = \frac{y}{8}$

$y = 8\sin 41$

$x = 8\cos 41$

11) 15.7, 113°

$x = 15.7\cos 113 = -6.13$

$y = 15.7\sin 113 = 14.45$

$-6.13\vec{i} + 14.45\vec{j}$

13) 500 cos 35

a) ground speed = 409.58 mph

b) $500\sin 35 = 286.79\,\frac{mi}{hr} \cdot \frac{5280\ ft}{1\ mile} \cdot \frac{1hr}{60min} \cdot \frac{1min}{60sec}$

420.62 ft/sec

15) $\vec{r} = 21$ @ 40°

$\vec{s} = 40$ @ 120°

$21\cos 40 \quad 21\sin 40$

$+ 40\cos 120 \quad + 40\sin 120$

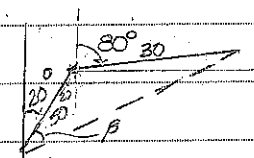
$-12.82\vec{i} + 54.37\vec{j}$

b) 55.86 @ units

$\tan^{-1}\left(\frac{54.37}{-12.82}\right)$ calc (−76.73)

$180 - 76.73 = 103.27^\circ$

17)



90 + 10 + 20 = 120

70 mi @ 41.78°

$r^2 = 50^2 + 30^2 - 2(50)(30)\cos 120$

$= 4900$

$r = 70$ miles

$b^2 = a^2 + c^2 - 2ac\cos\beta$

$b^2 - a^2 - c^2 = -2ac\cos\beta$

$\cos\beta = \frac{b^2 - a^2 - c^2}{-2ac}$

$B = \cos^{-1}\left(\frac{30^2 - (70)^2 - 50^2}{-2(70)(50)}\right)$

$B = 21.79^\circ$

Bearing = 20 + 21.79° = 41.79°

17 new

$x_1 = 50\sin 20 = 17.101$

$x_2 = 30\cos(90-80)^\circ = 29.544$

$x = 46.645$

$y_1 = 50\cos 20 = 46.984$

$y_2 = 30\sin(90-80)^\circ = 5.209$

$y = 52.193$

$mag = \sqrt{(x)^2 + (y)^2} = \sqrt{4899.86} \approx 70$ mi

$\theta = \tan^{-1}\left(\frac{52.193}{46.645}\right) = 48.21^\circ$

Bearing = 90 − 48.21 = 41.79°