

§10.8

#29) $\langle 6, 5 \rangle$

magnitude: $\|\langle 6, 5 \rangle\| = \sqrt{6^2 + 5^2} = \sqrt{36 + 25} = \sqrt{61}$

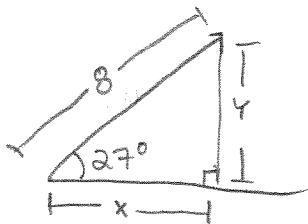
dir: $\theta = \arctan\left(\frac{5}{6}\right) \approx 39.81^\circ$

#31) $\langle -4, -6 \rangle$

mag: $\|\langle -4, -6 \rangle\| = \sqrt{(-4)^2 + (-6)^2} = \sqrt{16 + 36} = \sqrt{52}$

dir: $\theta = \pi + \arctan\left(\frac{-6}{-4}\right) \approx 4.124 \text{ rad}$
 $= 236.30^\circ$

#57)



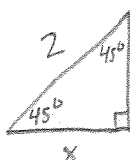
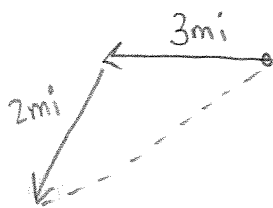
$\sin(27^\circ) = \frac{y}{8} \rightarrow y = 8\sin(27^\circ) \approx 3.632$ ← mag of vertical comp

$\cos(27^\circ) = \frac{x}{8} \rightarrow x = 8\cos(27^\circ) \approx 7.128$ ← mag of horiz comp

#61)

3 miles west $\leftrightarrow \langle -3, 0 \rangle$

2 miles southwest



$$\sin(45^\circ) = \frac{y}{2} \rightarrow y = 2 \sin(45^\circ) = \sqrt{2}$$

$$\cos(45^\circ) = \frac{x}{2} \rightarrow x = 2 \cos(45^\circ) = \sqrt{2}$$

\Rightarrow 2 mi southwest $\leftrightarrow \langle -\sqrt{2}, -\sqrt{2} \rangle$

Therefore add the vectors corresponding to her journey to get

$$\langle -3, 0 \rangle + \langle -\sqrt{2}, -\sqrt{2} \rangle = \langle -3-\sqrt{2}, -\sqrt{2} \rangle$$

distance to walk home: $\| \langle -3-\sqrt{2}, -\sqrt{2} \rangle \| = \sqrt{(-3-\sqrt{2})^2 + (-\sqrt{2})^2}$
 ≈ 4.6352

direction to home: given by direction of vector

$$-\langle -3-\sqrt{2}, -\sqrt{2} \rangle = \langle 3+\sqrt{2}, \sqrt{2} \rangle$$

$$\downarrow$$
$$\theta = \arctan\left(\frac{\sqrt{2}}{3+\sqrt{2}}\right) \approx 17.76^\circ$$

"north of east"