8. On the one hand, we could perform the vector addition of the displacements with a vector capable calculator in polar mode $((75 \angle 37^\circ) + (65 \angle -90^\circ) = (63 \angle -18^\circ))$, but in keeping with Eq. 3-5 and Eq. 3-6 we will show the details in unit-vector notation. We use a 'standard' coordinate system with $+x$ East and $+y$ North. Lengths are in kilometers and times are in hours.

   (a) We perform the vector addition of individual displacements to find the net displacement of the camel.

$$\begin{aligned} \Delta\vec{r}_1 &= 75\cos(37^\circ)\,\hat{\mathrm{i}} + 75\sin(37^\circ)\,\hat{\mathrm{j}} \\ \Delta\vec{r}_2 &= -65\,\hat{\mathrm{j}} \\ \Delta\vec{r}_1 + \Delta\vec{r}_2 &= 60\,\hat{\mathrm{i}} - 20\,\hat{\mathrm{j}} \quad \text{km} \ . \end{aligned}$$

   If it is desired to express this in magnitude-angle notation, then this is equivalent to a vector of length $\sqrt{60^2 + (-20)^2} = 63$ km, which is directed at 18° south of east.

   (b) We use the result from part (a) in Eq. 4-8 along with the fact that $\Delta t = 90$ h. In unit vector notation, we obtain

$$\vec{v}_{\text{avg}} = \frac{60\,\hat{\mathrm{i}} - 20\,\hat{\mathrm{j}}}{90} = 0.66\,\hat{\mathrm{i}} - 0.22\,\hat{\mathrm{j}}$$

   in kilometers-per-hour. This result in magnitude-angle notation is $\vec{v}_{\text{avg}} = 0.70$ km/h at 18° south of east.

   (c) Average speed is distinguished from the magnitude of average velocity in that it depends on the total distance as opposed to the net displacement. Since the camel travels 140 km, we obtain $140/90 = 1.56$ km/h.

   (d) The net displacement is required to be the 90 km East from A to B. The displacement from the resting place to B is denoted $\vec{r}_3$. Thus, we must have (in kilometers)

$$\vec{r}_1 + \vec{r}_2 + \vec{r}_3 = 90\,\hat{\mathrm{i}}$$

   which produces $\vec{r}_3 = 30\,\hat{\mathrm{i}} + 20\,\hat{\mathrm{j}}$ in unit-vector notation, or $(36 \angle 33^\circ)$ in magnitude-angle notation. Therefore, using Eq. 4-8 we obtain

$$|\vec{v}_{\text{avg}}| = \frac{36 \text{ km}}{120 - 90 \text{ h}} = 1.2 \text{ km/h}$$

   and the direction of this vector is the same as $\vec{r}_3$ (that is, 33° north of east).