53. We find the measure of the angle in degrees and then convert to radians. $\theta = 40.5° - 25.5° = 15°$ and $15 \cdot \frac{\pi}{180}$ rad $= \frac{\pi}{12}$ rad. Then using the formula $s = \theta r$, we have $s = \frac{\pi}{12} \cdot 3960 = 330\pi \approx 1036.725$ and so the distance between the two cities is roughly 1037 mi.

55. In one day, the earth travels $\frac{1}{365}$ of its orbit which is $\frac{2\pi}{365}$ rad. Then $s = \theta r = \frac{2\pi}{365} \cdot 93{,}000{,}000 \approx 1{,}600{,}911.3$ and so the distance traveled is approximately 1.6 million miles.

57. The central angle is 1 minute $= \frac{1}{60}° = \frac{1}{60} \cdot \frac{\pi}{180}$ rad $= \frac{\pi}{10{,}800}$ rad. Then $s = \theta r = \frac{\pi}{10{,}800} \cdot 3960$ $\approx 1.152$ and so a nautical mile is approximately 1.15 mi.