50. (a) $s = r\theta \quad \Leftrightarrow \quad \theta = \dfrac{s}{r} = \frac{6155}{3960} \approx 1.5543 \text{ rad} \approx 89.05°$

(b) Let d represent the distance, in miles, from the center of the earth to the moon. Since $\cos\theta = \dfrac{3960}{d}$, we have $d = \dfrac{3960}{\cos\theta} \approx \dfrac{3960}{\cos 89.05°} \approx 239{,}961.5$. So the distance AC is $239{,}961.5 - 3960 \approx 236{,}000$ mi.

52. Let d represent the distance, in miles, from the earth to Alpha Centauri. Since $\sin 0.000211° = \dfrac{93{,}000{,}000}{d}$, we have $d = \dfrac{93{,}000{,}000}{\sin 0.000211°} \approx 25{,}253{,}590{,}022{,}410$. So the distance from the earth to Alpha Centauri is about 2.53×10^{13} mi.

54. Let d be the length of the base of the $60°$ triangle. Then $\tan 60° = \dfrac{85}{d} \quad \Leftrightarrow$ $d = \frac{85}{\tan 60°} \approx 49.075$, and so $\tan 30° = \dfrac{85}{d+x} \quad \Leftrightarrow \quad d + x = \dfrac{85}{\tan 30°} \quad \Leftrightarrow$ $x = \frac{85}{\tan 30°} - d \approx 98.1$.

56. Let h be the hypotenuse of the top triangle. Then $\sin 30° = \dfrac{5}{h} \quad \Leftrightarrow \quad h = \dfrac{5}{\sin 30°} = 10$, and so $\tan 60° = \dfrac{h}{x} \quad \Leftrightarrow \quad x = \dfrac{h}{\tan 60°} = \dfrac{10}{\tan 60°} \approx 5.8$.