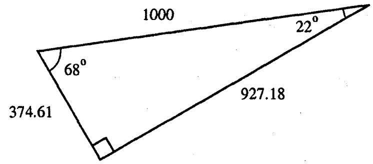
30. The adjacent leg $= 1000 \cos 68° = 374.61$, opposite leg $= 1000 \sin 68° = 927.18$, and the other angle $= 90° - 68° = 22°$



34. (a) Let r be the distance, in feet, between the plane and the Gateway Arch. Therefore, $\sin 22° = \frac{35{,}000}{r} \quad \Leftrightarrow \quad r = \frac{35{,}000}{\sin 22°} \approx 93{,}431$ ft.

(b) Let x be the distance, also in feet, between a point on the ground directly below the plane and the Gateway Arch. Then $\tan 22° = \dfrac{35{,}000}{x} \quad \Leftrightarrow \quad x = \dfrac{35{,}000}{\tan 22°} \approx 86{,}628$ ft.

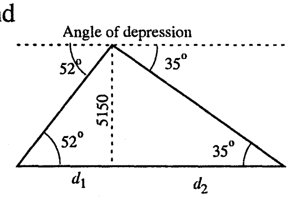
36. Let x be the distance, in feet, of the ship from the base of the lighthouse. Then $\tan 23° = \dfrac{200}{x} \quad \Leftrightarrow \quad x = \dfrac{200}{\tan 23°} \approx 471$ ft.

38. Let θ represent the angle of elevation of the ladder. Let h represent the height, in feet, that the ladder reaches on the building. Then $\cos\theta = \frac{6}{20} = 0.3 \quad \Leftrightarrow \quad \theta = \cos^{-1} 0.3 \approx 1.266 \text{ rad} \approx 72.5°$. By the Pythagorean Theorem $h^2 + 6^2 = 20^2 \quad \Leftrightarrow \quad h = \sqrt{400 - 36} = \sqrt{364} \approx 19$ ft.

40. Let h be the height, in feet, of the communication tower. Then $\sin 65° = \dfrac{h}{600} \quad \Leftrightarrow \quad h = 600 \cdot \sin 65° \approx 544$ ft.

42. From triangle ABC we get $\tan 50° = \dfrac{|AC|}{58.2} \quad \Leftrightarrow \quad |AC| = 58.2 \cdot \tan 50° \approx 69.36$ m. Then $\tan 76.3° = \dfrac{|CD|}{|AC|} \quad \Leftrightarrow \quad |CD| = |AC| \cdot \tan 76.3° \approx 69.36 \cdot \tan 76.3° \approx 285$ m.

44. Let d_1 be the distance, in feet, between a point directly below the plane and one car, and d_2 be the distance, in feet, between the same point and the other car. Then $\tan 52° = \dfrac{5150}{d_1} \quad \Leftrightarrow \quad d_1 = \dfrac{5150}{\tan 52°} \approx 4023.62$ ft, and $\tan 35° = \dfrac{5150}{d_2} \quad \Leftrightarrow \quad d_2 = \dfrac{5150}{\tan 35°} \approx 7354.96$ ft. So the distance between the two cars is about $d_1 + d_2 \approx 4023.62 + 7354.96 \approx 11{,}379$ ft.



46. Let x be the distance, in feet, between a point directly below the balloon and the first mile post. Let h be the height, in feet, of the balloon. Then $\tan 22° = \dfrac{h}{x}$ and $\tan 20° = \dfrac{h}{x + 5280}$. So $h = x \tan 22° = (x + 5280) \tan 20° \quad \Leftrightarrow \quad x = \dfrac{5280 \cdot \tan 20°}{\tan 22° - \tan 20°} \approx 47{,}977$ mi. Therefore $h \approx 47{,}976.9 \cdot \tan 22° \approx 19.384 \approx 3.7$ mi.