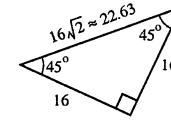
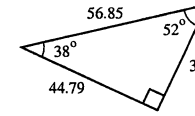
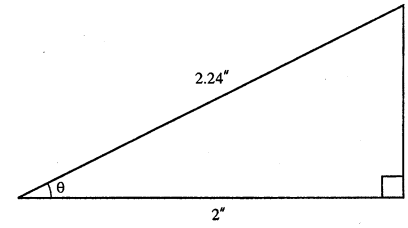
27. This is an isosceles right triangle, so the other leg $= 16 \tan 45° = 16$,
hypotenuse $= \frac{16}{\sin 45°} = 16\sqrt{2} \approx 22.63$, and
other angle $= 90° - 45° = 45°$



29. The other leg $= 35 \tan 52° = 44.80$,
hypotenuse $= \frac{35}{\cos 52°} = 56.85$, and
other angle $= 90° - 52° = 52°$.



31. $\sin\theta \approx \frac{1}{2.24} \approx 0.45$. $\cos\theta \approx \frac{2}{2.24} \approx 0.89$,
$\tan\theta = \frac{1}{2}$, $\csc\theta \approx 2.24$, $\sec\theta \approx \frac{2.24}{2} \approx 1.12$,
$\cot\theta \approx 2.00$.



33. Let h be the height, in feet, of the Empire State Building. Then $\tan 11° = \dfrac{h}{5280} \quad \Leftrightarrow$
$h = 5280 \cdot \tan 11° \approx 1026$ ft.

35. (a) Let h be the distance, in miles, that the beam has diverged. Then $\tan 0.5° = \dfrac{h}{240{,}000} \quad \Leftrightarrow$
$h = 240{,}000 \cdot \tan 0.5° \approx 2100$ mi.

(b) Since the deflection is about 2100 mi whereas the radius of the moon is about 1000 mi, the beam will not strike the moon.

37. Let h represent the height, in feet, that the ladder reaches on the building. Then $\sin 72° = \dfrac{h}{20} \quad \Leftrightarrow$
$h = 20 \cdot \sin 72° \approx 19$ ft.

39. Let θ be the angle of elevation of the sun. Then $\tan\theta = \frac{96}{120} = 0.8 \quad \Leftrightarrow$
$\theta = \tan^{-1} 0.8 \approx 0.675 \approx 38.7°$.

41. Let h be the height, in feet, of the kite above the ground. Then $\sin 50° = \dfrac{h}{450} \quad \Leftrightarrow$
$h = 450 \cdot \sin 50° \approx 345$ ft.

43. Let h_1 be the height of the window in feet and h_2 be the height from the window to the top of the tower. Then $\tan 25° = \dfrac{h_1}{325} \quad \Leftrightarrow \quad h_1 = 325 \cdot \tan 25° \approx 152$ ft. Also, $\tan 39° = \dfrac{h_2}{325} \quad \Leftrightarrow$
$h_2 = 325 \cdot \tan 39° \approx 263$ ft. Therefore, the height of the window is approximately 152 ft and the height of the tower is approximately $152 + 263 = 415$ ft.

45. 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 $\tan 52° = \dfrac{d_1}{5150} \quad \Leftrightarrow$
$d_1 = 5150 \cdot \tan 52° \approx 6591.7$ ft. Also, $\tan 38° = \dfrac{d_2}{5150} \quad \Leftrightarrow \quad d_2 = 5150 \cdot \tan 38° \approx 4023.6$ ft.
So the distance between the two cars is now about 2570 ft.