40. We adopt the positive direction choices used in the textbook so that equations such as Eq. 4-22 are directly applicable. The coordinate origin is at ground level directly below the point where the ball was hit by the racquet.

(a) We want to know how high the ball is above the court when it is at $x = 12$ m. First, Eq. 4-21 tells us the time it is over the fence:

$$t = \frac{x}{v_0 \cos\theta_0} = \frac{12}{(23.6)\cos 0^\circ} = 0.508 \text{ s} .$$

At this moment, the ball is at a height (above the court) of

$$y = y_0 + (v_0 \sin\theta_0)\, t - \frac{1}{2} g t^2 = 1.103 \text{ m}$$

which implies it does indeed clear the 0.90 m high fence.

(b) At $t = 0.508$ s, the center of the ball is $1.103 - 0.90 = 0.20$ m above the net.

(c) Repeating the computation in part (a) with $\theta_0 = -5^\circ$ results in $t = 0.510$ s and $y = 0.04$ m, which clearly indicates that it cannot clear the net.

(d) In the situation discussed in part (c), the distance between the top of the net and the center of the ball at $t = 0.510$ s is $0.90 - 0.04 = 0.86$ m.