

38. We assume the ball's initial velocity is perpendicular to the plane of the net. We choose coordinates so that $(x_0, y_0) = (0, 3.0)$ m, and $v_x > 0$ (note that $v_{0y} = 0$).

(a) To (barely) clear the net, we have

$$y - y_0 = v_{0y}t - \frac{1}{2}gt^2 \implies 3.0 - 2.24 = 0 - \frac{1}{2}(9.8)t^2$$

which gives $t = 0.39$ s for the time it is passing over the net. This is plugged into the x -equation to yield the (minimum) initial velocity $v_x = (8.0 \text{ m})/(0.39 \text{ s}) = 20.3 \text{ m/s}$.

- (b) We require $y = 0$ and find t from $y - y_0 = v_{0y}t - \frac{1}{2}gt^2$. This value ($t = \sqrt{2(3.0)/9.8} = 0.78$ s) is plugged into the x -equation to yield the (maximum) initial velocity $v_x = (17.0 \text{ m})/(0.78 \text{ s}) = 21.7 \text{ m/s}$.