Total Time of Flight of a Projectile

Solution:

The correct answer is a.)

Since the x - component of motion is not affected by gravity, and since the x and y components can be considered individually, we can reduce the problem to the case where the object is shot straight upwards. Clearly, the total time of flight is given by (**ref:** Question 2):

$$T = \left(\frac{2v_{0y}}{g} \right)$$

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Note that choice c.) is incorrect, because the speed v_0 in that case is the initial speed of the object, as opposed to just the y - component of initial speed.

Also note that if launch height ≠ final height and the ball is shot from an initial height h above the floor, and lands at a height h_0 above the floor (h_0 < h), the time of flight t would have to be found by solving the quadratic:

$$(h - h_0) = v_{0y}t + \left(\frac{1}{2}\right)(-g)t^2 = (v_0 \sin\theta)t - \left(\frac{1}{2}\right)gt^2$$