Muzzle Velocity for an Object Shot Straight Upwards

Solution:

The correct answer is b.)

When an object is shot straight upwards at a certain initial speed v_0, it decelerates until it reaches the apex of its trajectory, where it momentarily comes to rest, and all of its kinetic energy is converted to potential energy (reference for P.E. chosen to pass horizontally through the muzzle):

$\Uparrow$ v_0

REFERENCE LEVEL FOR P.E.

$$\left(\frac{1}{2}\right)mv_0^2 = mgh \Rightarrow v_0 = \sqrt{2gh}$$