Question 36813

Let us denote $m_s = 3\,kg$, $v_s' = 200\,\frac{m}{s}$, $m_g = 1400\,kg$. Index “s” means shell and “g” means gun. In order to find recoil velocity, one has to use the law of conservation of linear momentum: $m_s v_s + m_g v_g = m_s v_s' + m_g v_g'$. Before firing the shell all velocities were zero, hence $0 = m_s v_s' + m_g v_g'$, from here we get $v_g' = \frac{-m_s v_s'}{m_g} \approx -0.43\,\frac{m}{s}$ - this is the recoil velocity of the gun.