Answer on Question #61054, Physics / Classical Mechanics

Let us denote initial velocity of first and second vehicle v_1, v_2, and choose x direction so that $v_1 = 50\frac{km}{h}$, $v_2 = -5\frac{km}{h}$. Let the velocities after impact be ${v_1}', {v_2}'$.
Using law of conservation of momentum, obtain $mv_1 + mv_2 = m{v_1}' + m{v_2}'$, from where ${v_1}' = 45 - {v_2}'$. Using law of conservation of energy, obtain $\frac{mv_1^2}{2} + \frac{mv_2^2}{2} = \frac{m{v_1}'^2}{2} + \frac{m{v_2}'^2}{2}$, from where $v_1^2 + v_2^2 = {v_1}'^2 + {v_2}'^2$. Substituting ${v_1}' = 45 - {v_2}'$and numerical values of v_1, $v_2$into last expression, obtain ${v_2}'^2 - 45{v_2}' - 250 = 0$. Solving quadratic equation, obtain ${v_2}' = 50$, and ${v_1}' = 45 - {v_2}' = -5$, hence the first car will be moving back with velocity $5\frac{km}{h}$and the second car will be moving forward with velocity $50\frac{km}{h}$.