EX 10.1 Work & Kinetic energy

$$\Delta p = F\Delta t \quad \text{(Newtons 2nd law)}$$

$$m\Delta V = F\Delta t \quad \text{(definition of momentum)}$$

$$m(v_2 - v_1) = F\Delta t \quad (\text{since } \Delta V = V_2 - V_1)$$

$$m(v_2 - v_1)\frac{(v_1 + v_2)}{2} = F\Delta t\, v_m$$

(where v_m = mean velocity during time of acceleration)

$$\frac{1}{2}mv_2^2 - \frac{1}{2}mv_1^2 = F\Delta t\,\frac{\Delta x}{\Delta t}$$

where we've multiplied out the left side and written that $v_m = \frac{\Delta x}{\Delta t}$. From here we have

$$F\Delta x = \frac{1}{2}mv_2^2 - \frac{1}{2}mv_1^2 = K_2 - K_1$$