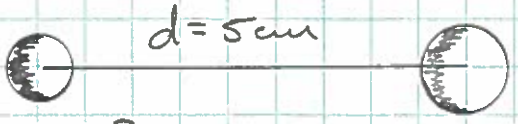


$m_1 = 2g$ $\quad$ $m_2 = 4g$

$q_1 = 2000nC = q$ $\quad$ $q_2 = 2000nC = q$

a.) $U = \frac{Kq_1q_2}{r} = \frac{Kq^2}{r} = \underline{0.7192\ J}$.

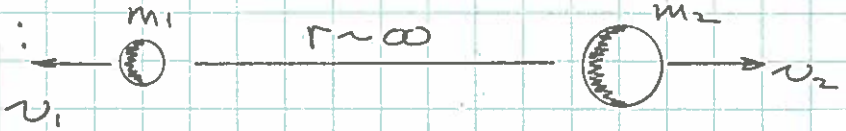
b.) for m_1, FBD

$\Sigma F_x = T - Fe = 0$

$T = Fe = \frac{Kq_1q_2}{r^2} = \frac{Kq^2}{d^2} = \underline{14.38\ N}$

c.) Initial in above with $K_i = 0$ & $U_i = 0.7192\ J$

final:



$U_f = 0$ & $K_f = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$

Conserve Energy: $\Delta E_{mech} = \Delta K + \Delta U = 0$

$(K_f - K_i) + (U_f - U_i) = 0$

$\frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 - U_i = 0$ $\quad$ (1)

Conserve Momentum: (No external forces on system)

$p_{i_x} = p_{f_x} = 0$

$-m_1v_1 + m_2v_2 = 0$

So $v_2 = \frac{m_1}{m_2}v_1$

Subst. into equn (1):

$$\frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 \left(\frac{m_1}{m_2} v_1\right)^2 = U_i$$

$$m_1 v_1^2 + \frac{m_1^2}{m_2} v_1^2 = 2U_i$$

$$v_1 = \left\{ \frac{2U_i}{\left(m_1 + \frac{m_1^2}{m_2}\right)} \right\}^{1/2} = \underline{21.9 \text{ m/s}}$$

and, $v_2 = \frac{m_1}{m_2} v_1 = \underline{10.95 \text{ m/s}}$