(d) When the block loses contact with the platform, its acceleration is $g$.
So the condition for the platform is $a = g$. This simply means when the spring comes back to the its original length.
Energy conservation:

$$\frac{k}{2}x_0^2 + \frac{1}{2}(m+m')v'^2 = (m+m')g x_0 + \frac{1}{2}(m+m')v''^2$$

Kinetic energy of block: $E_K = \frac{1}{2}mv''^2 = 1.23\ \mathrm{J}$

(e) Energy conservation:

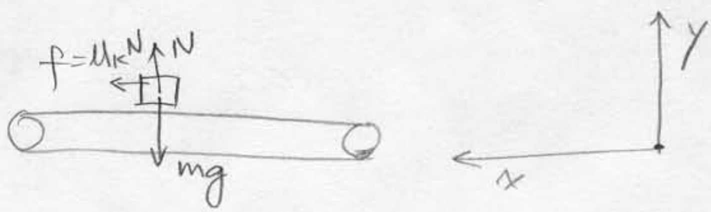
$$E_K + mgx_0 = mgh' \Rightarrow h' \doteq 0.549\ \mathrm{m}$$

(f) Thermal energy:

$$\frac{1}{2}mv^2 - \frac{1}{2}(m+m')v'^2 = 0.876\ \mathrm{J}$$

The rest of the initial potential energy will change to kinetic energy of the platform periodically.
The platform will oscillating up and down.

7. (a)

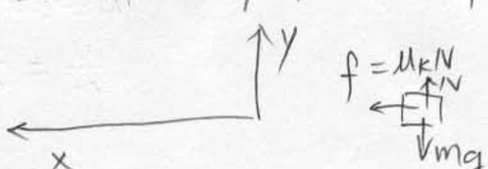



$$\begin{cases} N = mg \\ f = \mu_K N \end{cases} \Rightarrow f = \mu_K mg \quad a = \frac{f}{m} = \mu_K g$$

$$W = \int \vec{f}\cdot d\vec{s} = f\cdot s = f\cdot\frac{1}{2}at^2 = f\cdot\frac{1}{2}a\left(\frac{v}{a}\right)^2 = f\,\frac{v^2}{2a} = \frac{mv^2}{2} = \frac{3.5\times(0.75)^2}{2}$$
$$= 0.98\ \mathrm{J}$$

The work done by friction is positive.

(b)




In this coordinate, the package has initial velocity $v$ in the $-x$ direction.

$$W = \int \vec{f}\cdot d\vec{s} = -f\cdot s = -\frac{mv^2}{2} = -0.98\ \mathrm{J}$$

The work done by friction is negative.

(c) Part (a). The energy will transfer to thermal energy through friction