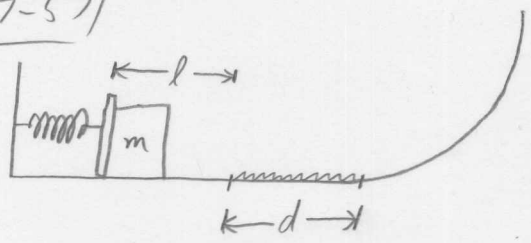
Physics 111
Homework

Ch 7-57



$l = 15\,cm = 0.15\,m$
$\mu_k = 0.27$
$d = 85\,cm = 0.85\,m$
$k = 200\ N/m$
$m = 190\,g = 0.19\,kg$

The block will leave the spring, cross the friction spot, and rise up the frictionless curve. It will then slide down, across the friction patch again (losing more energy), and compress the spring. Repeat until all energy is gone.

$U_I = \frac{1}{2}kl^2 \qquad U_F = 0$

$K_I = 0 \qquad K_F = 0$

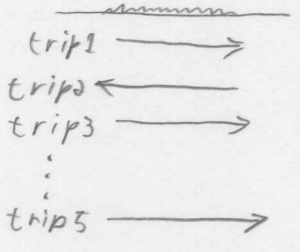
$$W_f = \int_0^{\overset{NCF}{d}} \vec{F}_f \cdot d\vec{s} = -\int_0^d \mu_k mg\, ds = -\mu_k mgd$$

For one pass.

$$\frac{1}{2}kl^2 - n\mu_k mgd = 0$$

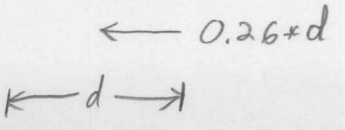
$$n = \frac{kl^2}{2\mu_k mgd} \rightarrow \text{number of passes}$$

$$n = \frac{(200)(.15)^2}{2(.27)(.19)(9.8)(.85)} = 5.26$$



measured from left edge:

$d_F = d - 0.26 \cdot d = d(1 - 0.26) = 0.74 \cdot d$



$\boxed{d_F = 63\,cm}$