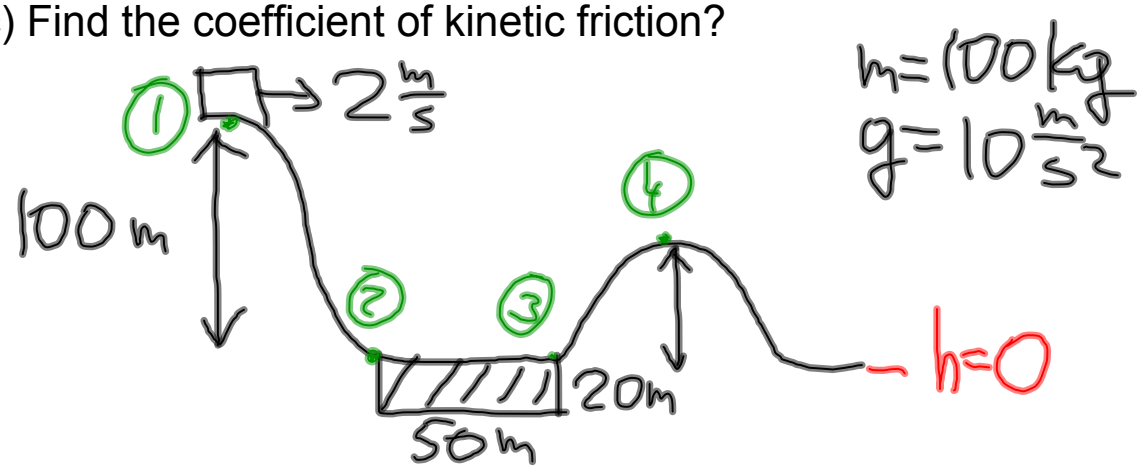
Review/warm-up problem.

1. Find the speed of the cart at the top of the second hill assuming that there is no friction.
2. The setup was tested in real life and the speed at the top of the second hill was 30 m/s.

a) Find the work done by force of friction W_{FFk}?
b) Find the average force of kinetic friction F_{Fk}?
c) Find the coefficient of kinetic friction?



Jan 12-9:37 AM

1) $K_1 + U_{g1} = K_4 + U_{g4}$

$V_4 = 40.0 \frac{m}{s}$

2) SYSTEM: CART, EARTH, SURFACES

$K_1 + U_{g1} = K_4 + U_{g4} + \Delta U_{INT}$

$\Delta U_{INT} = 35{,}200\,J$

$W_{F_{Fk}} = -\Delta U_{INT}$ $\quad W_{F_{Fk}} = -35{,}200\,J$

Jan 12-9:59 AM

b) $W_{F_{FK}} = F_{FK} \cdot d_{23} \cos(180°)$

$-35{,}200 = F_{FK} \cdot (50)(-1)$

$\boxed{F_{FK} = 704\,N}$

OR $\Delta U_{INT} = 35{,}200$

$F_{FK} \cdot d_{23} = 35{,}200$

$\boxed{F_{FK} = 704\,N}$

Jan 12-10:09 AM

c) $F_{FK} = \mu_K \cdot F_N$ $\quad F_N = F_g$

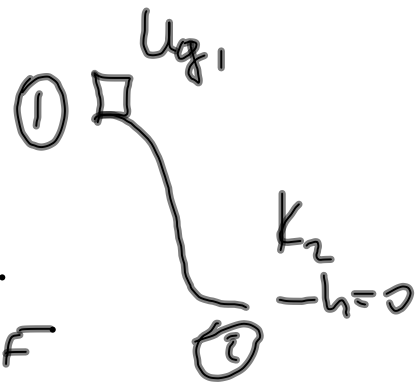
$\boxed{\mu_K = 0.70}$

Jan 12-10:17 AM

$E_i = E_F$

$F_{F_k} = 0$ $F_{Net\ Ext} = 0$

$ME_i = ME_F$



(1) OBJECT, EARTH, BOTH SURFACES

$ME_i = ME_F + \Delta U_{INT}$

Jan 12-10:25 AM

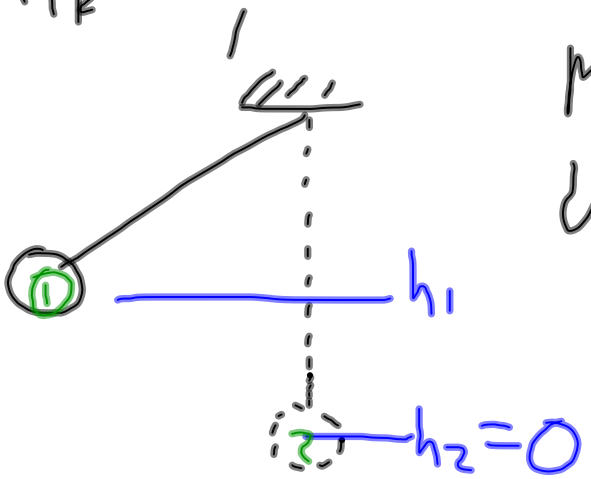
(2) OBJECT, EARTH

$ME_i + W_{F_{FK}} = ME_F$

Jan 12-10:33 AM

PENDULUM. (IDEAL)

① $F_{fk}=0$ · NO AIR RESISTANCE.



$ME_1 = ME_2$

$K_{g_1} = K_2$

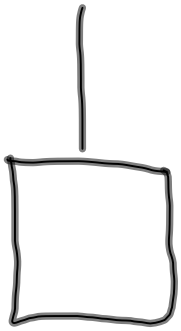
Jan 12-10:34 AM

② REAL PEND.

$ME_1 = ME_2 + \Delta U_{INT}$

Jan 12-10:38 AM

$ME_i + W = ME_F$



elevator problem

Jan 12-10:40 AM