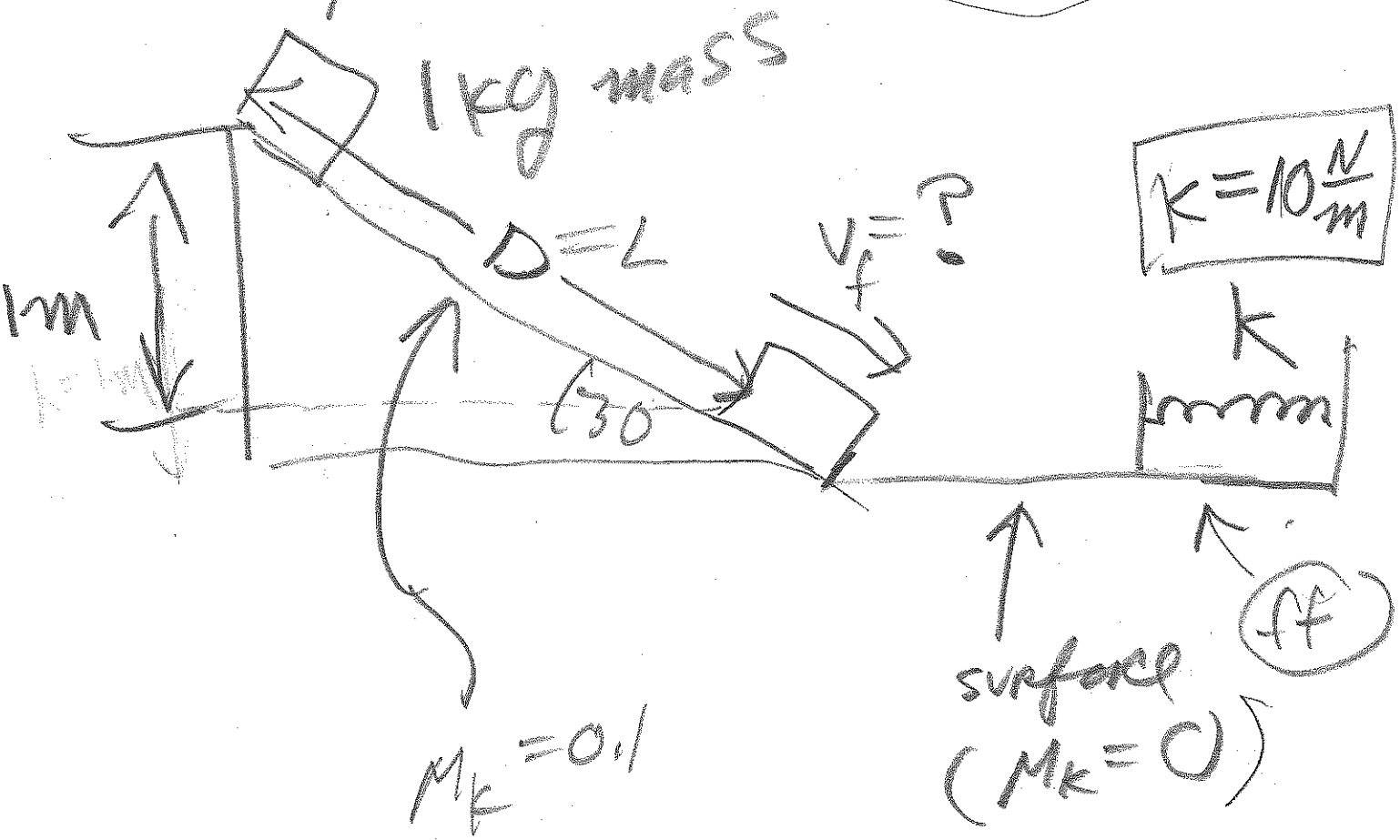
3-25-13

CHE METHOD Review

Work energy Example from 3-22-13 lecture



(a) $V_f = ?$

(b) How far does mass compress spring at maximum compression?

$$L = \frac{h}{\sin 30} = 2\,(m)$$

$$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 = W_g + W_{f_K}$$

$$0 = +mgh + (-f_K \cdot L)$$

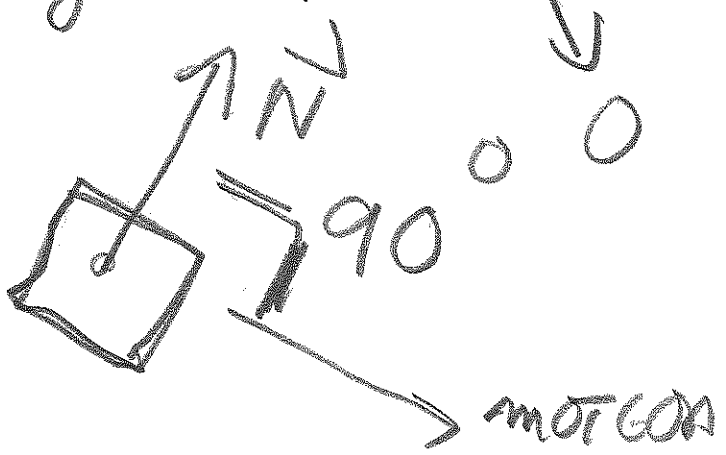
CH5 $f_K = \mu_K \cdot N$ and CH4

$N = mg\cos\theta$

ch6

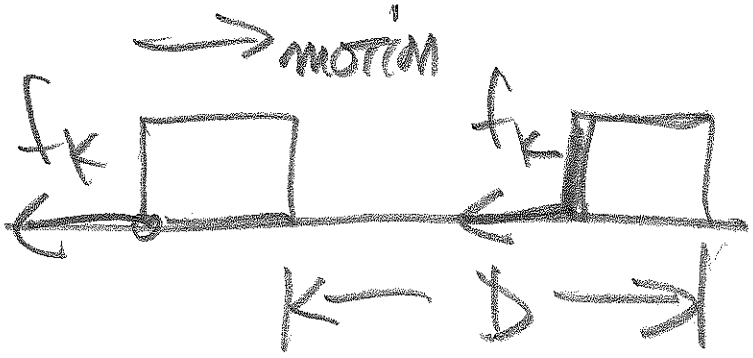
(a) $v_f = ?$ $\quad W_{net} = \sum W = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

$$\sum_{i\to f} W = W_g + W_{f_K} + W_N$$



$$W_N = 0 = N \cdot \cos 90 \cdot L$$
$$= 0$$

Note: $W_{f_K} \leq 0 \Leftrightarrow -f_K \cdot D \leq 0$



$$W_{f_K} = f_K \cdot \cos 180 \cdot D$$
$$= f_K \cdot (-1) \cdot D$$
$$= -f_K \cdot D$$

$$\frac{1}{2}mv_f^2 = mgh - \mu_k mg\cos 30 \cdot L$$

$$\frac{1}{2}(a)v_f^2 = (a)(9.8)(1) - (0.1)(1)(9.8)(0.867)(2)$$

$$\frac{v_f^2}{2} = 9.8 - 1.73$$

$$\frac{1}{2}(a)\frac{v_f^2}{2}$$

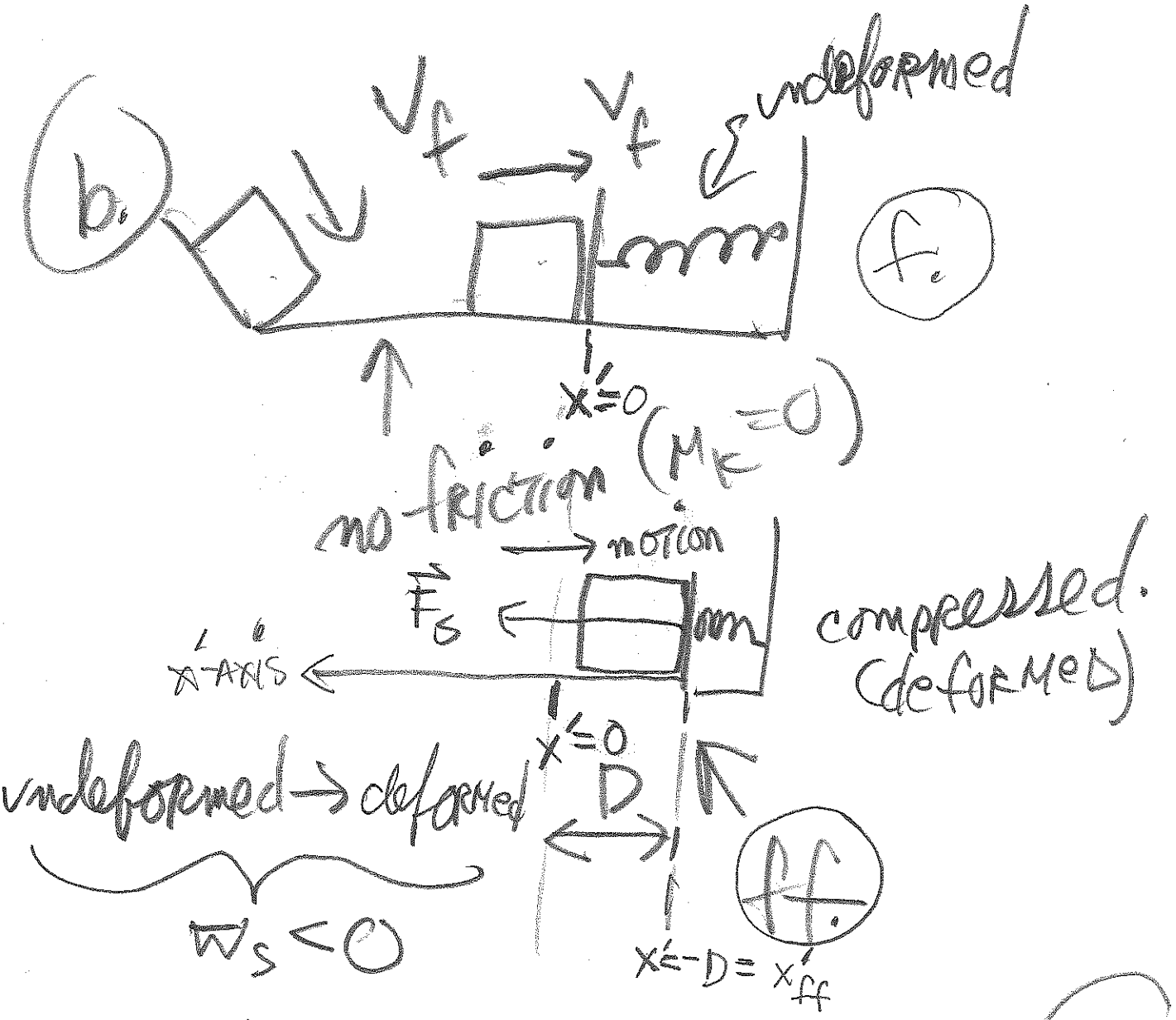
$$v_f = \sqrt{2(8.07)}$$

$$v_f = 4.0 \frac{m}{s}$$

$$= 4.02 \text{ m/s}$$

computation

$4.02 \frac{m}{s}$

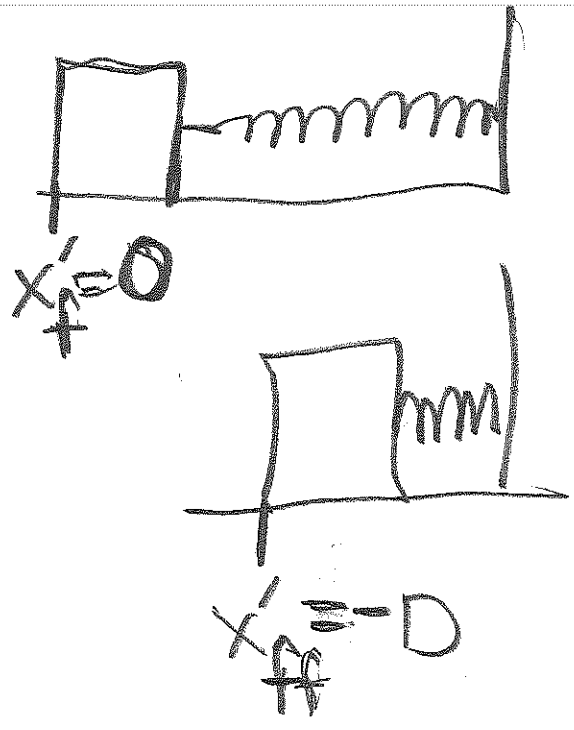


$$W_{net}_{f\to ff} = W_g + W_N + W_{fK} + W_S$$

W_g: 0 ($h=0$)

W_N: 0 ($\vec{N} \perp$ motion)

W_{fK}: $\neq 0$ ($\mu_K \neq 0$)



$$W_s = \frac{1}{2}kx_f'^2 - \frac{1}{2}kx_{ff}'^2$$

$$= 0 - \frac{1}{2}kD^2 < 0.$$

$$\Delta KE_{f \to ff} = W_s$$

$$\frac{1}{2}mv_{ff}^2 - \frac{1}{2}mv_f^2 = -\frac{1}{2}kD^2$$

$$0 - \frac{1}{2}mv_f^2 = -\frac{1}{2}kD^2 \quad \left(k = 10\frac{N}{m}\right)$$

$$-\frac{1}{2}(1)V_f^2 = -\frac{1}{2}(10)D^2$$

$$D = \sqrt{\frac{1}{10}} \cdot V_f$$

$$D = \sqrt{0.1} \cdot \left(4.02 \frac{m}{s}\right)$$

$$\approx (0.3162)(4.02)$$

$$= \boxed{1.27 \text{ (m)}}$$