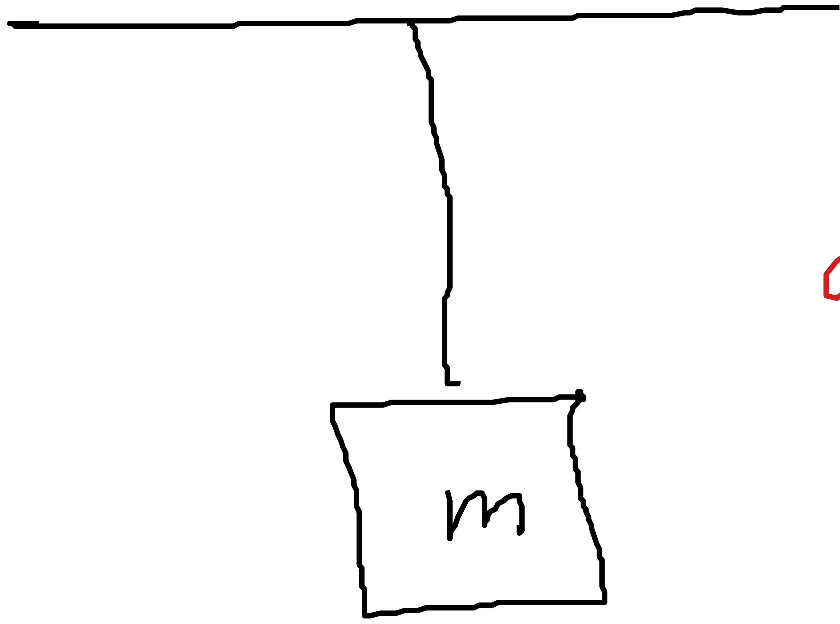
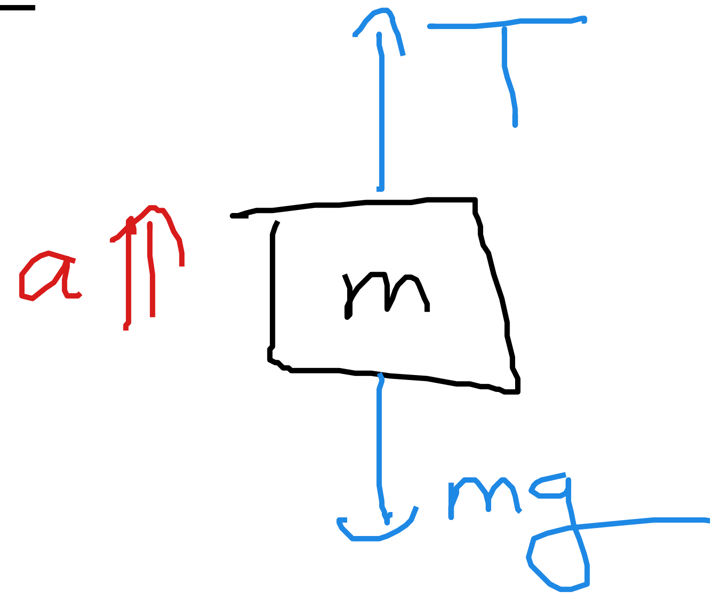




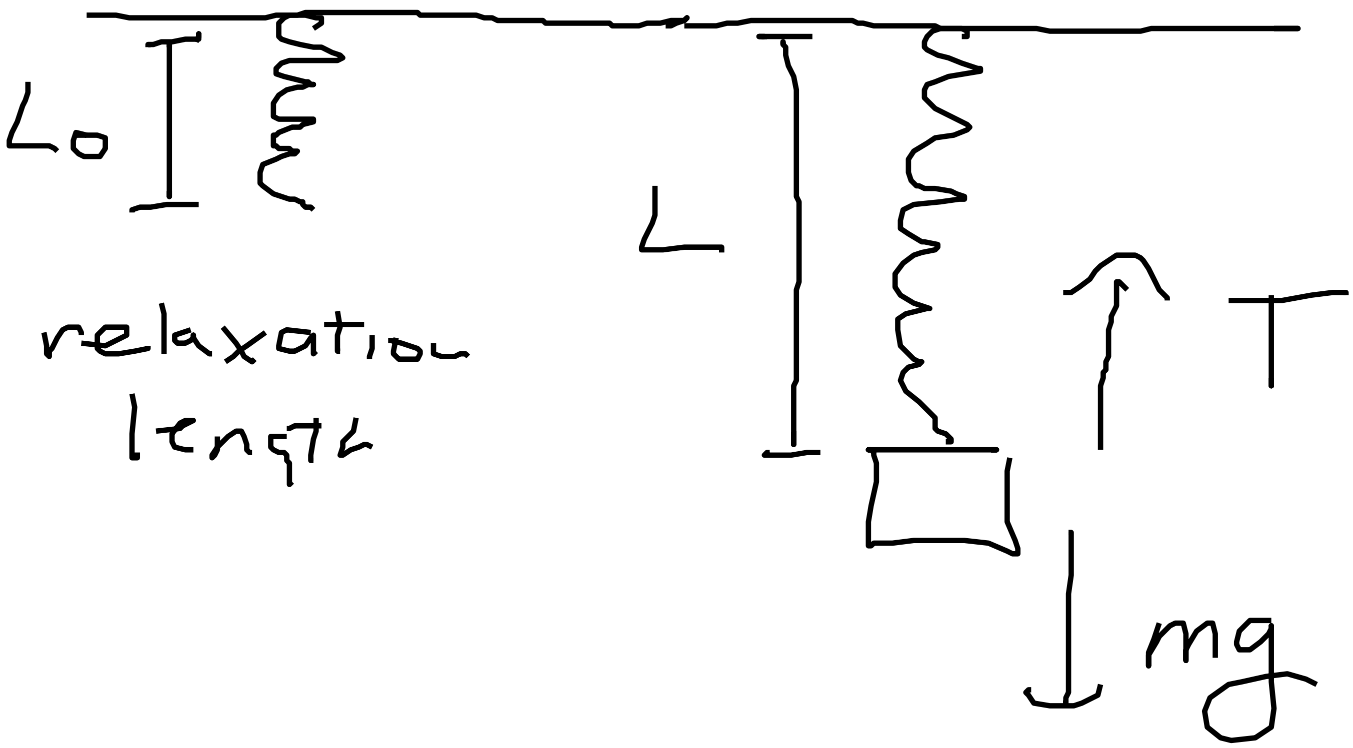
If it accelerates upward

$$\vec{a} = \frac{\vec{F}_{net}}{m}$$

$$\vec{F}_{net} = T\uparrow + mg\downarrow$$

$$= (T - mg)\uparrow$$

$$T > mg$$



$$T = k\overbrace{(L - L_0)}^{\Delta L}$$

At equilibrium (no motion)

how long is the spring?

(in terms of m, g, k, L_0)

equilibrium

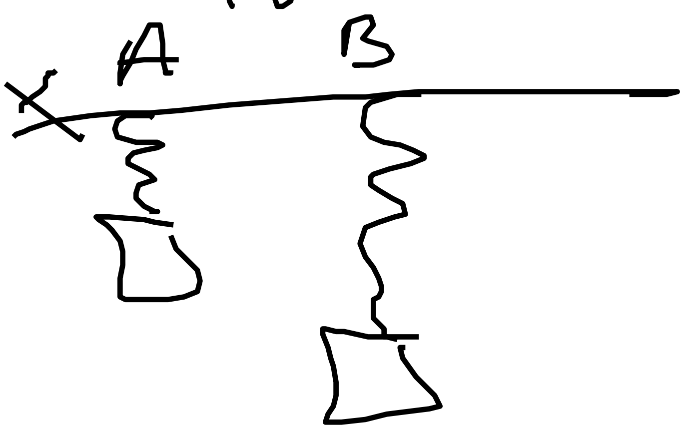
$$T = mg$$

$$k(\underline{\underline{L}} - L_0) = mg$$

$$L - L_0 = \frac{mg}{k}$$

$$\boxed{L = L_0 + \frac{mg}{k}}$$

Bigger $m \longrightarrow$ bigger L



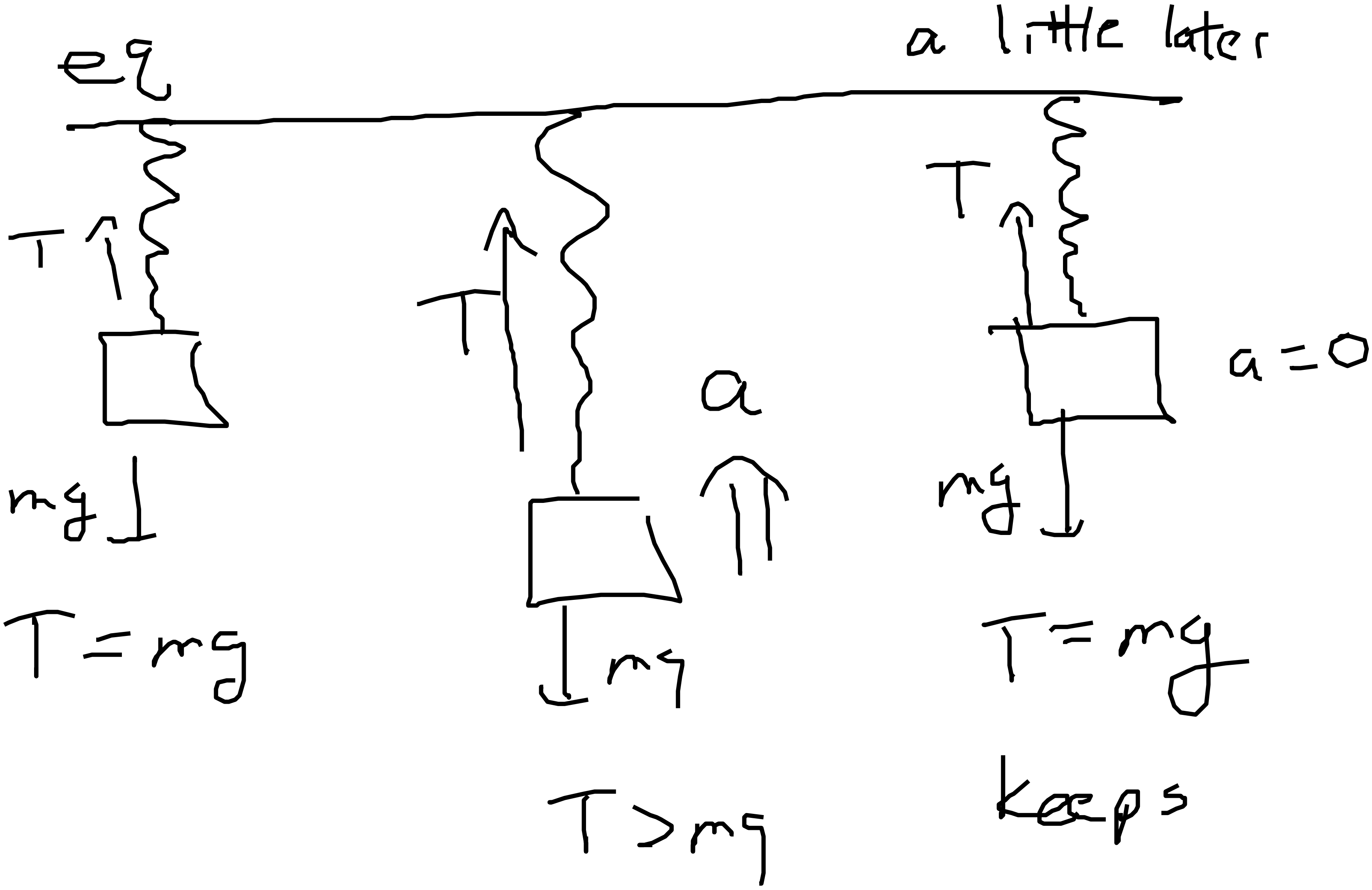
which has larger spring constant k → A

k : spring constant
stiffness

units: N/m

"How much force do you need to stretch spring by a meter?"

1200 N/m



keeps moving upward b/c inerfia

Oscillations:

- "equilibrium point" where forces balance
- "restoring force" pushes system back to equilibrium
- "inertia" when system reaches equilibrium, it keeps going

period of oscillation

time it takes to undergo 1 cycle

$$T = 5s = 5\ s/cyc$$

"How long does it take to go through 7 cycles?"

$$5 \frac{s}{\cancel{cyc}} \times 7 \cancel{cyc} = 35s$$

$$\frac{1}{T} = \frac{1}{5\ s/cyc} = \frac{1}{5}\frac{cyc}{s}$$

frequency $f =$

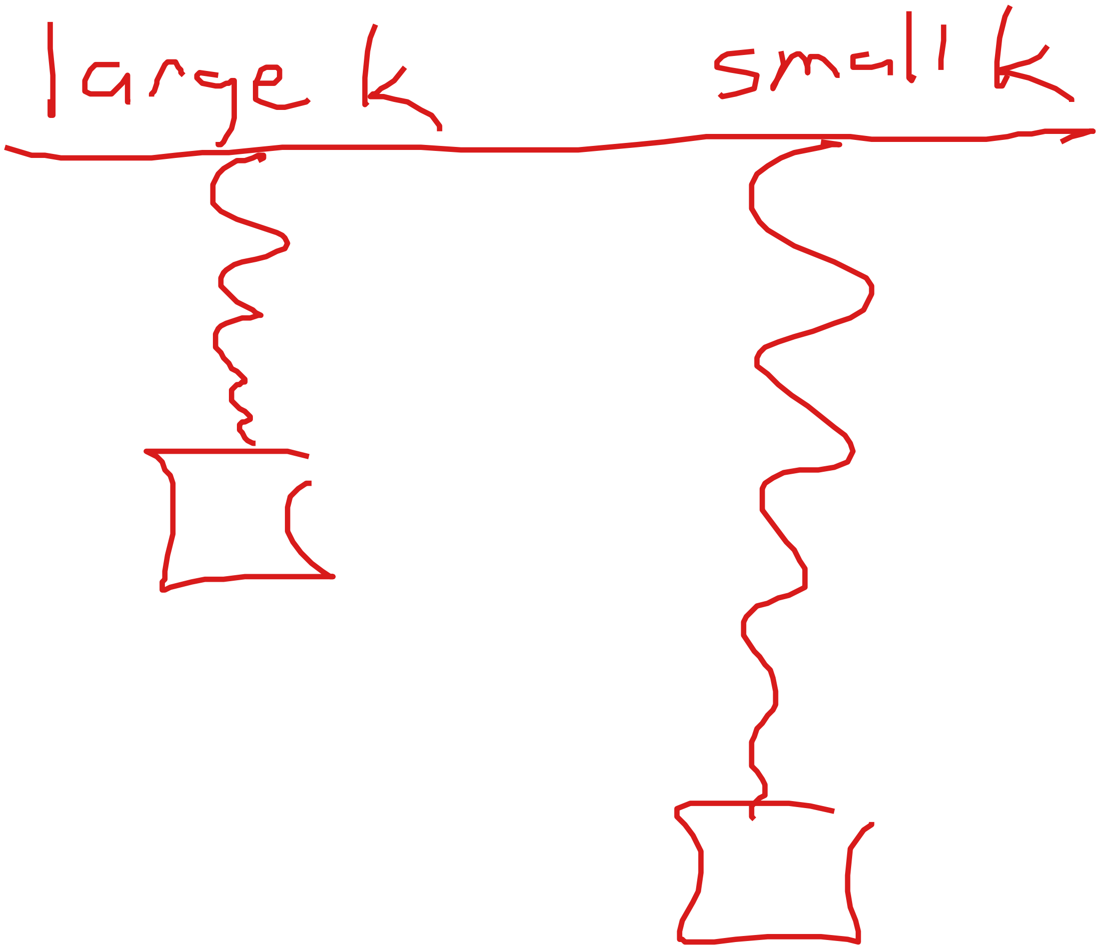
$$f = 0.2\ \frac{cyc}{s}$$

$$= 0.2/s$$

$$= 0.2\ Hz$$

Hertz

(In class demo)



Which has larger f?

larger f

"faster" oscillation

smaller f

"slower" oscillation