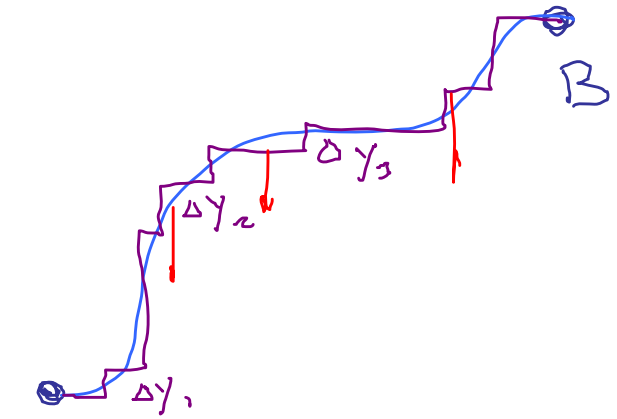
Phys 2110-5 10/10/12

Note Title 10/10/2012

Work done gravity (Potential energy)



$W_i = -mg\Delta y_i$

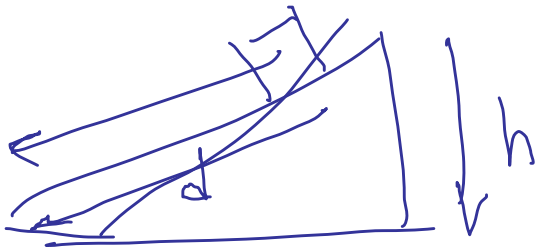
$\Rightarrow U_{gm} = mgy$

Work done by gravity

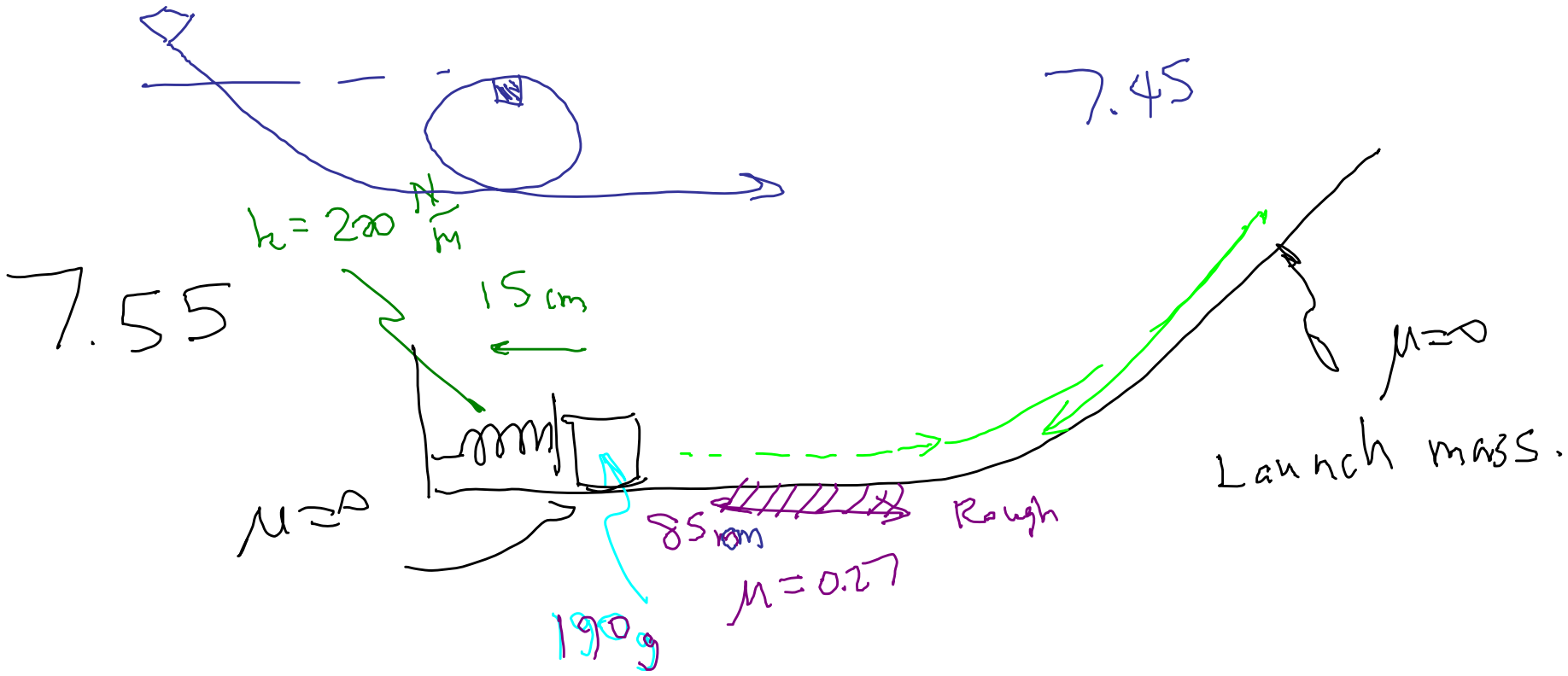
$W = -mgh$

$W = mgh$

$W = \sum_i -mg\Delta y_i = -mg\sum_i \Delta y_i = -mg(y_B - y_A)$



$\Delta U = mg\Delta y$



7.55 Block is launched. After it's launched where does block come to rest? Measure from left end of Frictional zone.

Initially, mech energy is

$$E_0 = \frac{1}{2}kx^2 = \frac{1}{2}\left(200\ \frac{N}{m}\right)(0.15\ m)^2$$

$$= 2.25\ J$$

$$f_k = \mu_k mg$$

Full pass over friction part

$$W_{fric} = -f_k d$$

$$= -0.427\ J$$

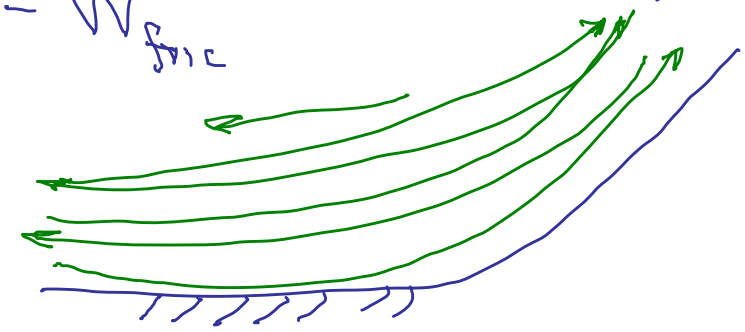
$$\#\text{passes} = \frac{2.25}{0.427} = 5.27$$

$\longrightarrow$ 5 complete pass.

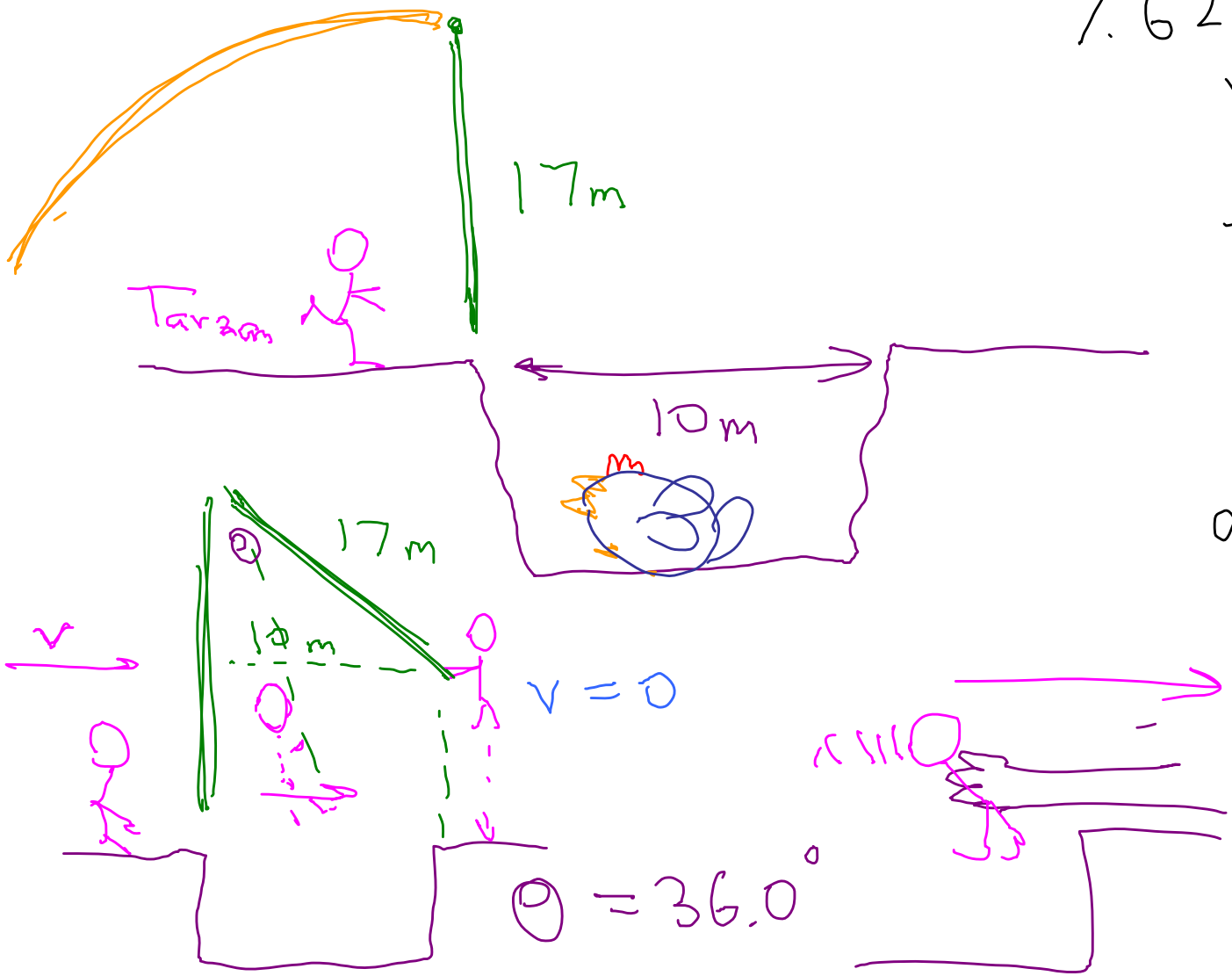
On last pass, it can go 0.27 of the way

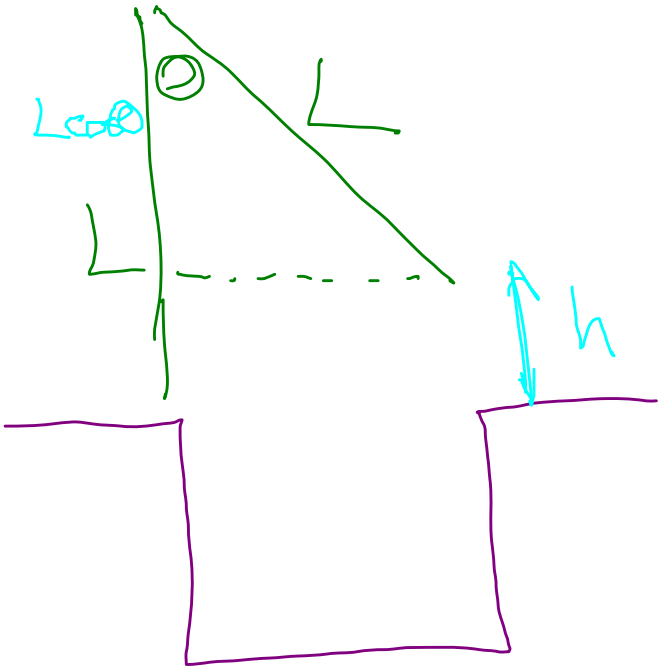
$$(0.27)(85\text{ cm}) = 22.5\text{ cm}$$

$\Delta E = W_{\text{friction}}$



7.62 17 m long vine hangs vertically Tarzan runs grabs vine Must get across, how fast hmust he runs?





$$h = L - L\cos\theta$$
$$= L(1 - \cos\theta)$$

Cons of energy

$$\frac{1}{2}mv^2 = mgh$$

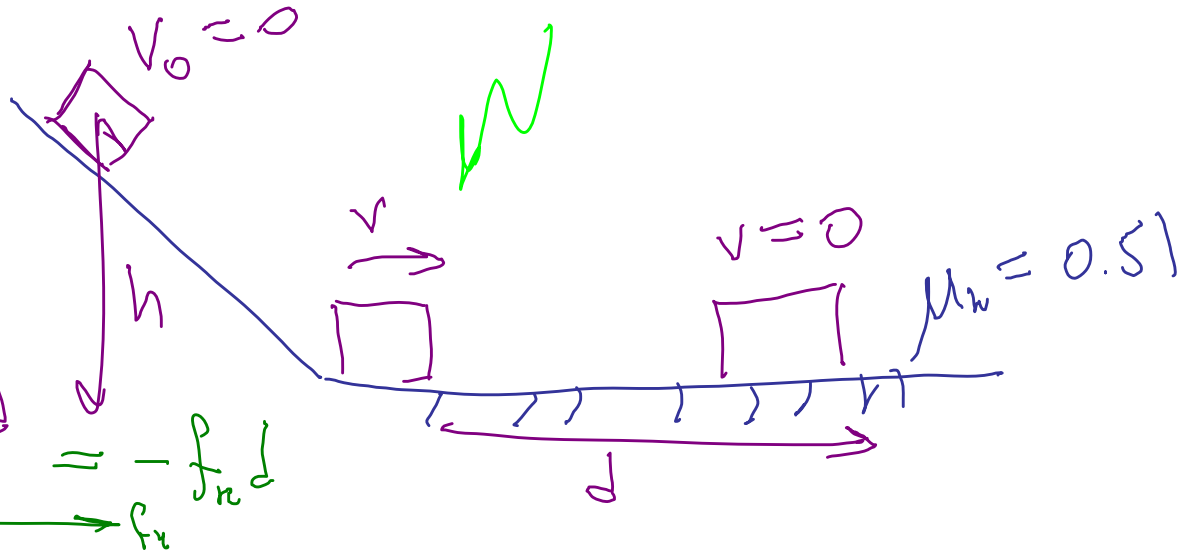
$$v = 7.98\ \frac{m}{s}$$

7.59 A child sleds down frictionless hill whose vertical drop is 7.2m. At bottom is a level but rough stretch where $\mu_k = 0.51$ How far does sled slide across level stretch

$\Delta E = W_{fric}$

$(0+0) - (mgh)$

$= W_{fric} = -\mu_k mg\, d = -f_k d$

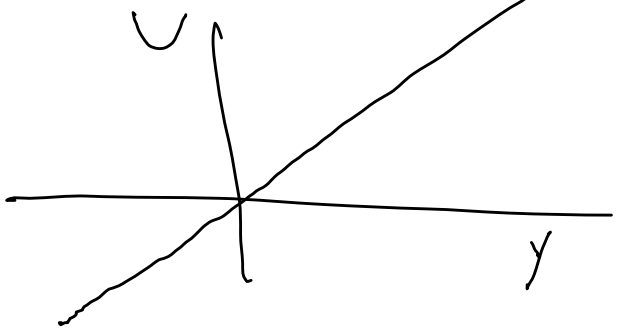


$$mgh = \mu_k mgd$$

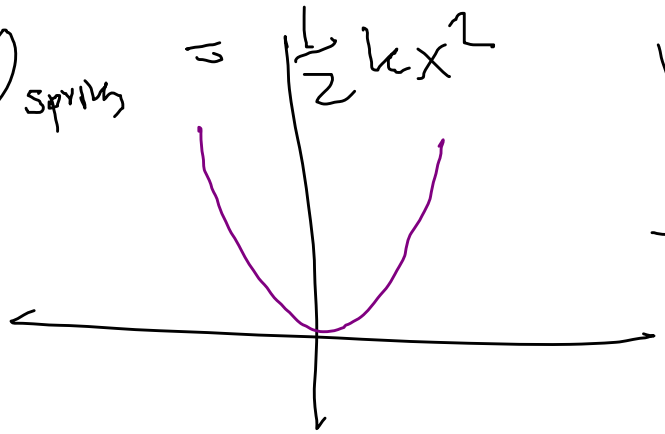
$$d = \frac{h}{\mu_k} = \frac{7.2\,m}{0.51} = \boxed{14.1\,m}$$

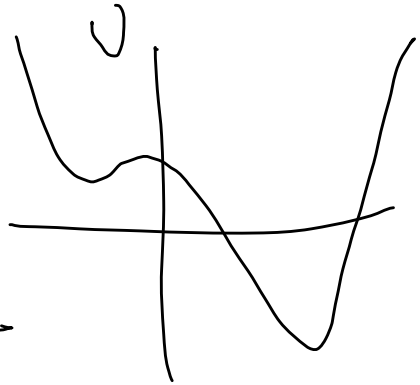
General features of $U(x)$ potential functi

$U_{grav} = mgy$



$U_{spring} = \frac{1}{2}kx^2$





$$\Delta U = -W_{ab}$$

$$= -\int_0^x F(x')\,dx'$$