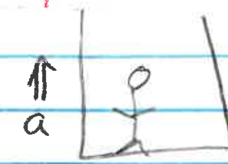
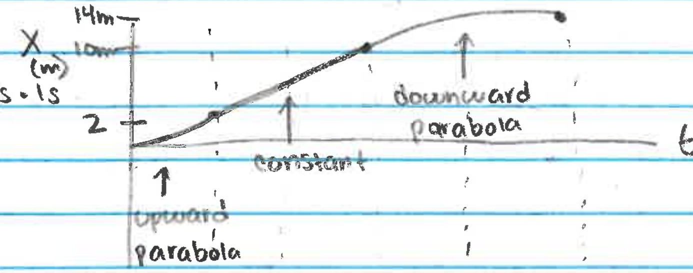
Test Corrections

#1

*I am choosing a kinematics lens because we are looking at each component as an explicit function of time

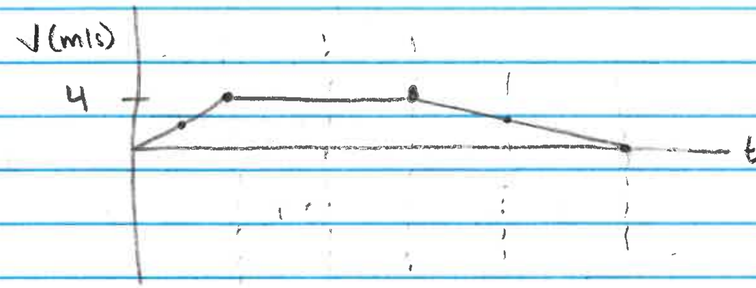




$t = 1s \rightarrow x = v_a \Delta t \quad v_a = \frac{v_f - v_i}{2} \quad v_a = 2m/s \cdot 1s$

$t = 2\text{-}3s \rightarrow x = 4m/s \cdot 2s \quad \Delta x = 8m$

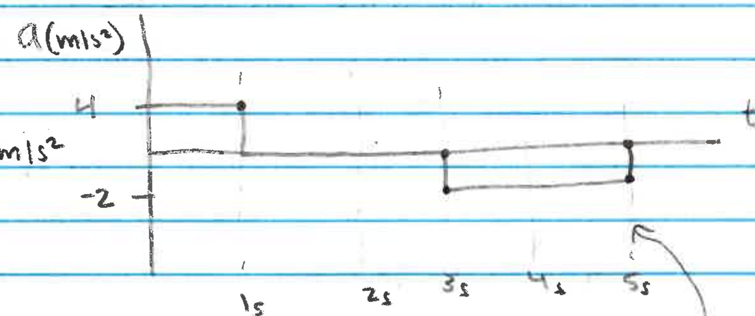
$t = 4\text{-}5s \rightarrow x = 2m/s \cdot 2s \quad \Delta x = 4m$



$t = 1s \rightarrow V = 0m/s$ to $4m/s$

$t = 2\text{-}3s \rightarrow V = 4m/s$

$t = 4\text{-}5s \rightarrow V = 4m/s$ to $\emptyset m/s$



$t = 1s \rightarrow a = 4m/s^2$

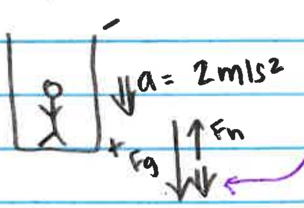
$t = 2\text{-}3s \rightarrow a = 0m/s^2$

$t = 4\text{-}5s \rightarrow a = -2m/s^2 \quad a = \frac{-4m/s}{2s} = -2m/s^2$

A+

#2

*I am choosing a dynamics lens because the deceleration of your body is caused by the normal force being less than gravity.



$m = 100kg \quad \Sigma F = F_n + F_g \quad t = 3.5s \rightarrow a = -2m/s^2$

*From previous problem

$\Sigma F = 100kg(2m/s^2)$

$\boxed{\Sigma F = 200N}$

$F_g = mg \quad F_g = 100kg(10m/s^2)$

$\boxed{F_g = 1000N}$

$F_n = \Sigma F - F_g \quad F_n = 200N - 1000N$

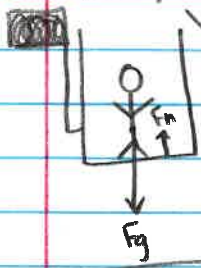
$F_n = -800N \quad \boxed{F_n = 800N \uparrow \text{upwards}} \quad m = F_n/g \quad m = \frac{800N}{10m/s^2}$

A

$\boxed{m = 80kg}$ ← Scale reads

#3

*I am going to use the energy lens because power is the rate of change of energy or work. $m_1 = 100kg$ $m_2 = 900kg$



$\cancel{E_{k_1}} + W = E_{kf} + E_g$

@ t=0s v=0m/s $E_{k_1} = \emptyset J$

@ t=2s v=4m/s

$W = E_{kf} + E_{pg}$ $E_{kf} = 1/2\, m (v_f)^2$ $E_{pg} = mgh$

$E_{kf} = 1/2 (1000kg)(4m/s)^2$ $E_{pg} = 1000kg(10m/s^2)(6m)$

$E_{kf} = 8000J$ $E_{pg} = 60,000J$

$W = 68,000J$ $P = \frac{W}{\Delta t}$

$P = \frac{68,000J}{2s}$ $P = 34,000W$ → $P = 46\ Hp$

#4 ·→ [1kg] → heat loss, F_f ←, 2m →, heat loss $V_0 = 1000m/s$ F_f ⇄ F_a

*I am going to use a momentum lense first in order to find the final velocity because momentum is conserved within the system. I will then use an energy lens to find the amount of work done which will give me force needed to use a dynamics lens in order to find μ.

why?

$E_{k_1} \longrightarrow E_{th} + E_{k_2} - W_f$ $m_1 v_1 = m_{1+2} V_f$ $E_{k_1} = 1/2(.005kg)(1000m/s)^2$

$.005kg(1000m/s) = 1kg(v_f)$ $E_{k_1} = 2,500J$

$E_{kf} = 1/2(1.005kg)(5m/s)^2$ $5\ kgm/s = 1.005kg\,(vf)$

$E_k = 12.6J$ $V_f = 5\cancel{kg}$ *m/s* $N = mg$ $N = 1.005kg(10m/s^2)$

$N = 10.05N$

F_f is equal & opposite to force applied. $F_f = \mu N$

$\mu = \frac{F_f}{N}$ $\mu = \frac{6.3N}{10.05N}$

$E_{kf} = W_f$ $W_f = F_f \Delta x$ $F_f = \frac{12.6J}{2m}$ $F_f = 6.3N$ $\mu = .63$

$F_f = W_f/\Delta x$

using E

Kinematics → $V_a = \frac{5m/s - 0m/s}{2} = 2.5m/s$ $t = \frac{\Delta x}{v}$ $t = \frac{2m}{2.5m/s}$ $t = .8s$

$a = \frac{5m/s}{.8s}$ $a = 6.25m/s^2$

using dynamics + kinematics

Dynamics → $F = ma$ $F = 1.005kg(6.25m/s^2)$

$F_f = 6.3N$ $\mu = \frac{F_f}{N}$ $\mu = \frac{6.3N}{10.05N}$ $\mu = .63$