$\frac{d}{dt}\left(L\sin\left(\frac{2\pi t}{T}\right)\right) = \left(\frac{2\pi}{T}\right)\left(L\right)\left(\cos\left(\frac{2\pi t}{T}\right)\right)$

$\frac{d}{dt}\ \frac{2\pi}{T}\cdot L\cdot\cos\left(\frac{2\pi t}{T}\right) = \frac{2\pi}{T}\cdot\frac{2\pi}{T}\cdot L\cdot -\sin\left(\frac{2\pi t}{T}\right)$

~~$\frac{y-y_1}{x-x_1}$ $.845 \quad .822 \quad .6667$ $1-0$~~

1 a.) $x(t) = L\sin\left(2\pi\frac{t}{T}\right)$

$x(0)=0 \qquad x\left(\frac{T}{4}\right) = L\sin\left(2\pi\frac{\frac{T}{4}}{T}\right)$ $\frac{T}{4}\cdot\frac{1}{T}\cdot\frac{1}{4}$

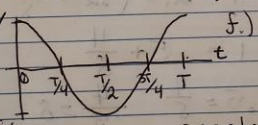
Displacement from $t=0$ to $t=\frac{T}{4}$ is L $\qquad L\sin\left(\frac{1}{2}\pi\right) = L$

b.) average velocity from $t=0$ fo $t=T$ is 0

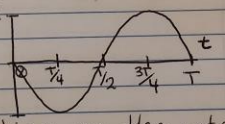
$\frac{\Delta x}{\Delta T}\ \frac{0}{T} = 0$

c.) On the interval $0\le t\le T$ Velocity is equal to 0 @ $t=\frac{T}{4}, \frac{3T}{4}$

d.)



f.)



e.) the average acceleration on the interval $0\le t\le T/4$ is $\frac{-L}{T/4}$

$V = V_0 + at$ $\quad V_0t + \frac{1}{2}at^2 - V_0t$

2.) a.) $g = 10\ m/s^2$ $\quad \Delta X = V_0t + \frac{1}{2}at^2$

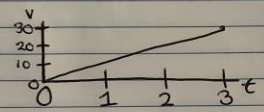
t	m	m/s
0	0	0
1	-5	-10
2	20	-20
3	45	-30

$\frac{1}{2}(10)(t^2)$

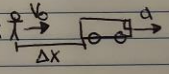
$5(t^2)$

b.) $\frac{\Delta V}{\Delta t} = \frac{-30}{3} = |-10| = 10$

c.)



3.) a.) $xs(t) = \frac{1}{2}at^2 = V_0t + \Delta X$ $\quad V_0t - \Delta X$



V_0 = Student Velocity
ΔX = distance between Student & bus
V_{B0} = Velocity bus initial = 0
a = bus ~~def~~ acceleration
t = time

b.) $xB(t) = \frac{1}{2}at^2$

c.) $\frac{V_0t - \Delta X}{t} = \frac{\frac{1}{2}at^2}{t}$ $\quad V_0 - \frac{\Delta X}{t} = \frac{1}{2}at$

$V_0t - \Delta X = \frac{1}{2}at^2$ $\quad 2a(Vt)$

$\frac{1}{2}a$

d.) the student will only catch the bus if the acceleration was low enough