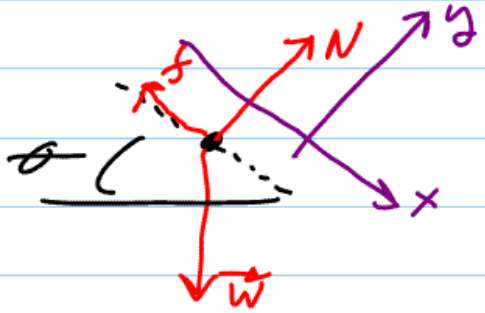
PHY138 - Mechanics - Class 6 - Sept 27/06

WEIGHT: force of gravity on an object.

stationary

model particle



$F_{net,x} = 0$

$= w \sin\theta - f$

$F_{net,y} = 0 = N - w\cos\theta$

LOOSE END!

$F = ma$

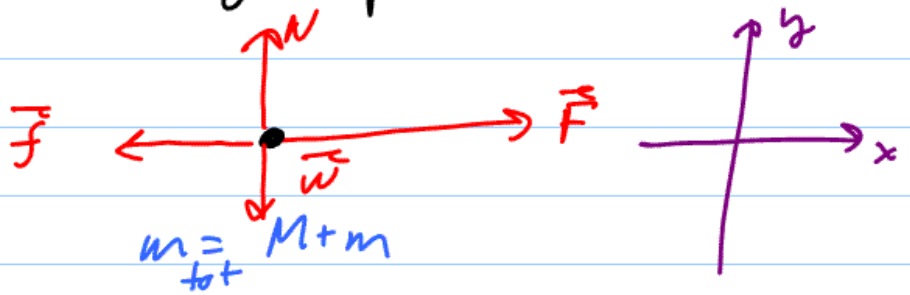
UNITS! $= kg \times \frac{m}{s^2} \equiv$ newton, N

§ 5.4 - 5.5 - Friction & Drag

omitted from syllabus.

Example System: both blocks.

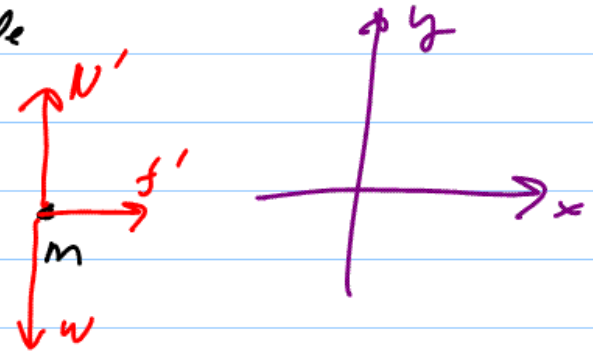
Model: single particle



$$a_x = \frac{F_{net,x}}{m_{tot}} = \frac{(F-f)}{(m+M)}$$

System: upper mass

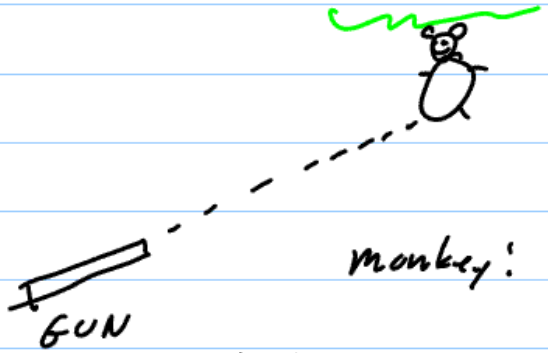
Model: particle



x: $f' = ma_x$

CHAPTER 6

- Motion' Cartesian components are independent of each other



when gun fires monkey lets go

monkey: $\frac{1}{2}gt^2$

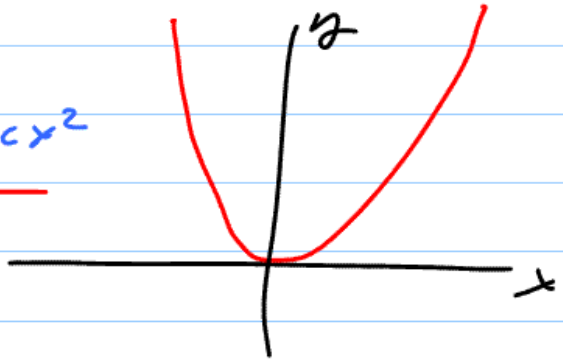
bullet: falls below "straight" line by $\frac{1}{2}gt^2$

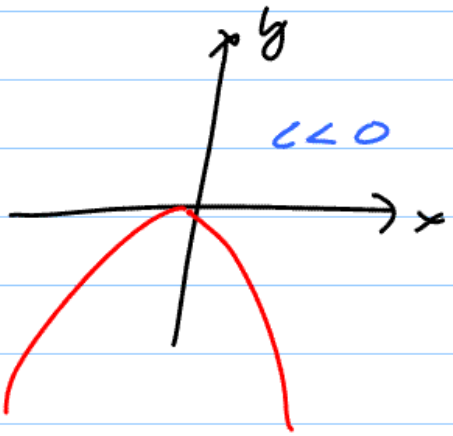
Earlier: parabolic trajectory $\Rightarrow$ $a = (\text{const}, \text{down})$

Today: $a = (g, \text{down}) \Rightarrow$ parabolic trajectory

Parabulas

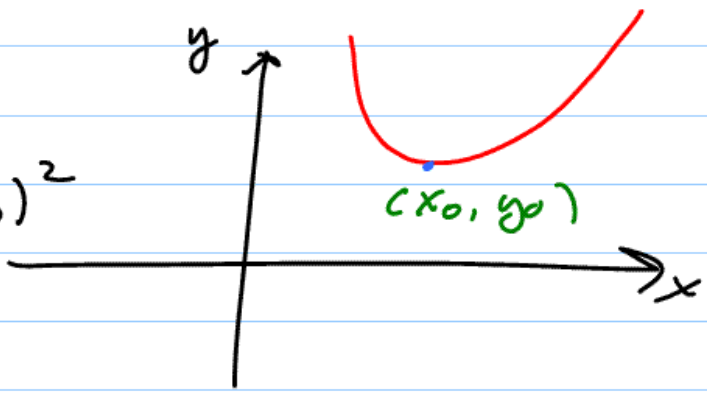
$y = cx^2$



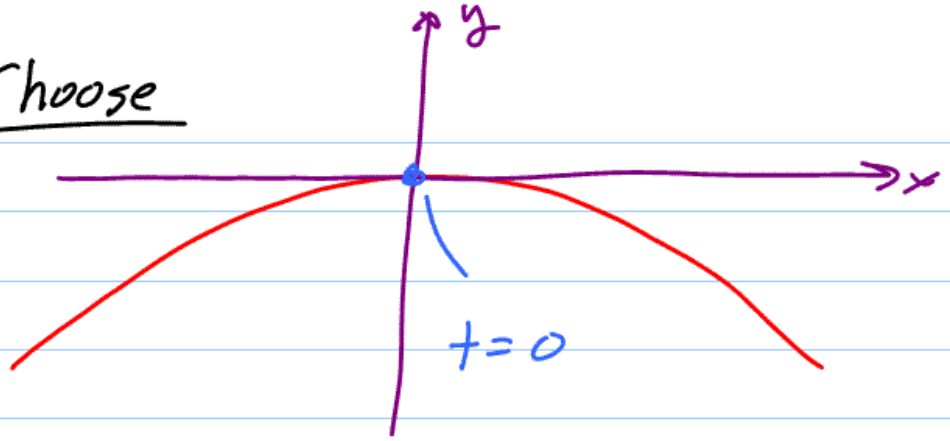


Generic Parabula

$(y - y_0) = c(x - x_0)^2$



Choose



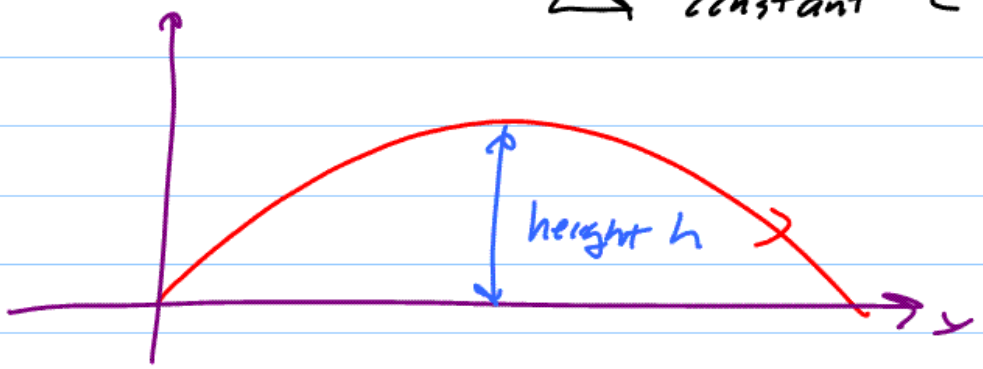
$x = v_i \cos\theta \, t$

$y = -\frac{1}{2} g t^2$

} eliminate t

$$y = \left(\frac{-g}{2 v_i^2 \cos^2\theta} \right) x^2$$

$\hookrightarrow$ constant c



height is same as object straight up $\overline{c}$ speed

$v_i \sin\theta$

Eqn 2.22: $v_{s,s}^2 = v_{is}^2 + 2 a_s \Delta s$

$s = \frac{1}{2} g t^2$ $\quad a = \frac{\Delta v}{\Delta t}$

$\Delta v = (v_i \sin\theta - 0) = g_i$

$h = \frac{v_i^2 \sin^2\theta}{2g}$