

# WATER ROCKET EXPERIMENT

PHYSICS 211

- Jan 18, 2008

We had three launches. Let's not include the first launch since the rocket hit a tree on the way down

| <u>Trial</u> | <u><math>t_{up}</math></u> | <u><math>t_{down}</math></u> |                |
|--------------|----------------------------|------------------------------|----------------|
| 1            | $2.4s \pm 0.2s$            | $3.4s \pm 0.2s$              | } in agreement |
| 2            | $2.4s \pm 0.3s$            | $3.7 \pm 0.3s$               |                |

[N=4 for both  $t_{up}$  &  $t_{down}$ ]

## PHASES of the trajectory

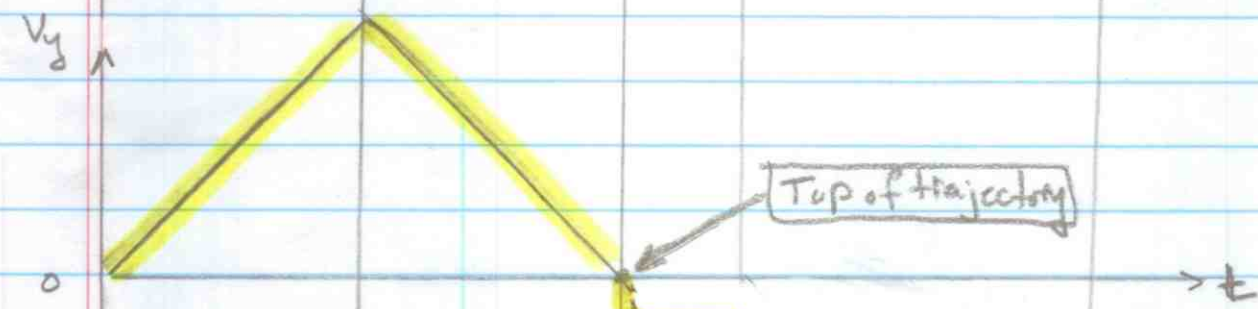
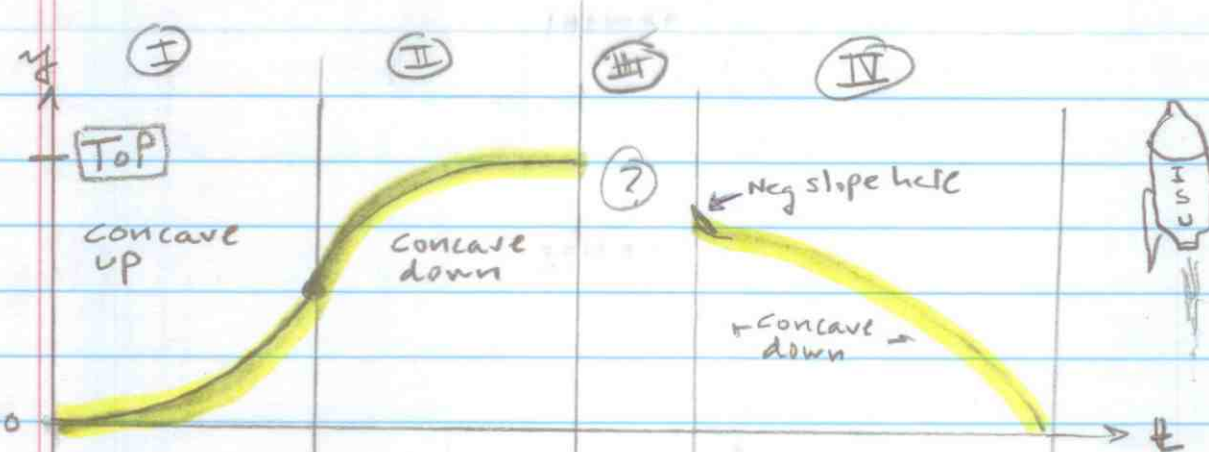
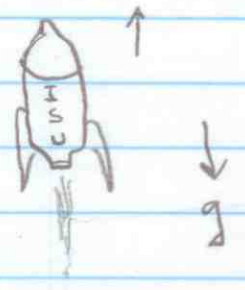
|                  |        |
|------------------|--------|
| I. Rocket thrust | } UP   |
| II. "Free fall"  |        |
| III. Tumble      | } DOWN |
| IV. "Free fall"  |        |

## Assumptions for GRAPHING.

1. Rocket thrust constant (probably not so good)
2. Air friction independent of speed of rocket (again probably not so good)

## What we do not know

1. Thrust phase - (time &  $\Delta y$ )
2. Tumbling phase - (time &  $\Delta y$ )
3. Max height.
4. Time in free fall (going up after thrust phase and coming down after tumbling phase)



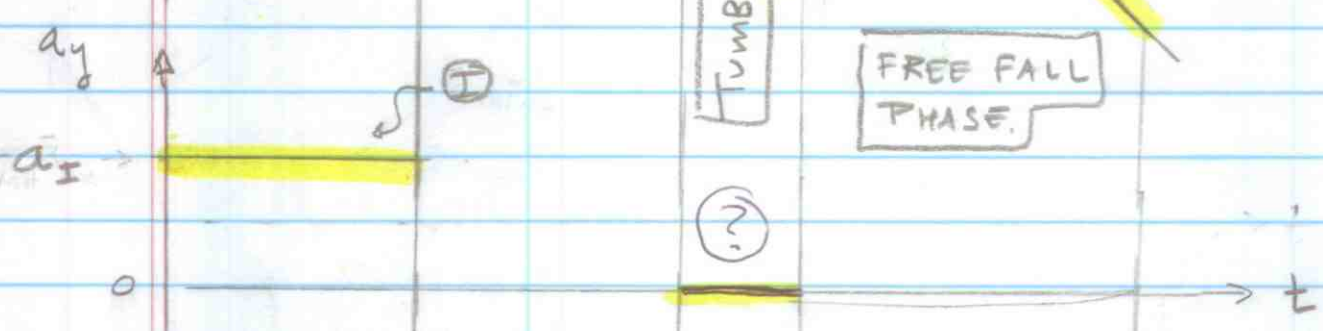
THRUST PHASE

FREE FALL PHASE

TUMBLE PHASE

FREE FALL PHASE

Note Slope II = Slope IV



$a_I = \bar{a}_{thrust} - g$  (positive quantity)  
 $a_{II} = a_{IV} = -g$  (negative quantity) Note that  
 [we are neglecting air friction]