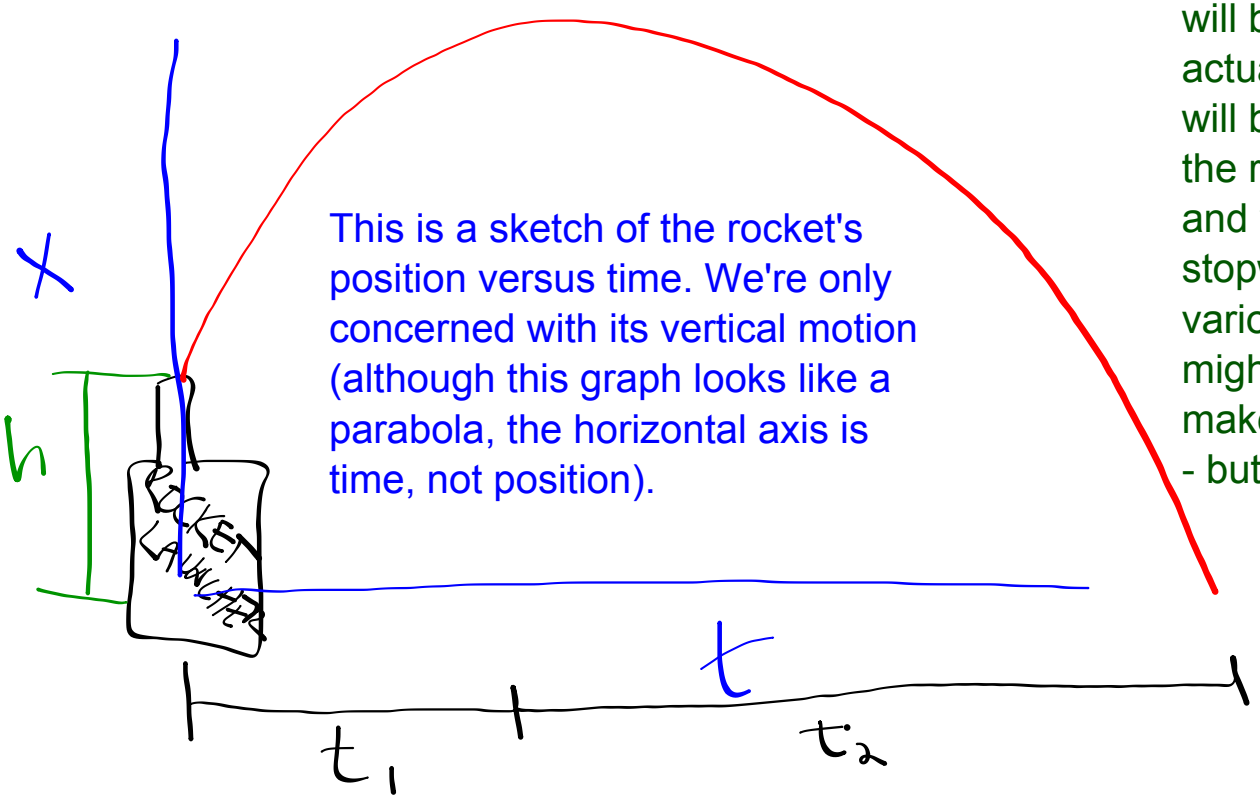
Some tips for the Lofty Heights Lab ...

- This is how ALL of our labs will work: you will need to make deductions, apply the principles of physics we discuss in class, and draw conclusions. These labs are designed to train your brains to solve problems that are often quite tricky (at least at first glance).

- We've discussed all the pieces of the puzzle you need in order to predict the height of the rocket. Finding those pieces, and putting them together, is the hard part.

- You MUST use the Big 4, and relevant measurements, to make your prediction. If you want to use a creative solution to check your work, that's fine, as long as your primary prediction is made using the Big 4



This is a sketch of the rocket's position versus time. We're only concerned with its vertical motion (although this graph looks like a parabola, the horizontal axis is time, not position).

The measurements you will be able to make are actually pretty limited. It will be easy to measure the rocket's starting height, and you can also use a stopwatch to measure various time periods. You might find that you can make other measurements - but you *don't need to!*

Sometimes people wonder if the starting velocity for the rocket is 0 m/s. Of course, it is, prior to launch, but is that the starting velocity for the actual problem? Remember that the Big 4 requires constant acceleration. Try to imagine how the rocket would move if it had an initial velocity of 0 m/s with constant

a) Zero acceleration

b) Positive acceleration

c) Negative acceleration

Does that match what you think the actual motion of the rocket will be? (Hint: no.) That means the rocket's initial velocity *cannot be zero.*

Big 4: constant a

$a = 0$?

$a = +$?

$a = -$

When you have everything figured out and understood, you should be able to express your predicted height as a function of the measurements you make and any other known variables. (In other words, you should be able to use the Big 4 along with your variable inventory to create a *formula* for the maximum height of the rocket.) This example is nonsense, but it illustrates in a general sense how your formula might appear.

$$\text{max. height} = \frac{x^2 + 2t^2}{a + v_0 t}$$