

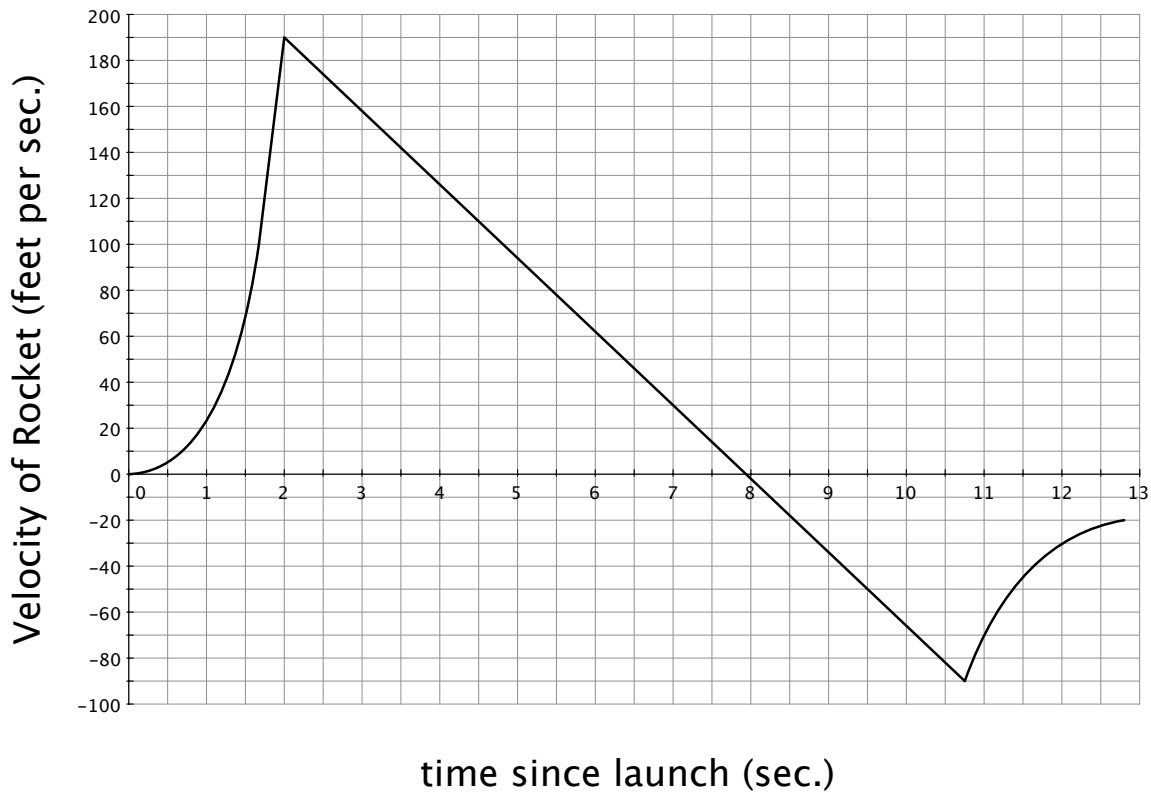
Intro to Calculus

Rocket Problem¹

Goals

I understand and can use derivatives and definite integrals from a graphical perspective.

When a model rocket is launched, the propellant burns for a few seconds, accelerating the rocket upward. After burnout, the rocket coasts upward for awhile and then begins to fall. A small explosive charge pops out a parachute shortly after the rocket starts down. The parachute slows the rocket to keep it from breaking when it lands. The graph below shows velocity data from the flight of a model rocket. Use the data to answer the questions below. Justify your answers.



1. How fast was the rocket climbing when the engine stopped?
2. For how many seconds did the engine burn?

¹ Adapted from http://bfc.sfsu.edu/cgi-bin/prob.pl?The_Sandbox

Intro to Calculus: The Rocket Problem

3. When did the rocket reach its highest point? What was its velocity there?
4. When did the parachute pop out? How fast was the rocket falling then?
5. How long did the rocket fall before the parachute opened?
6. Why is there a straight line in the middle of this graph? Should it be curved? Explain.
7. Very carefully sketch a graph of the height of the rocket (in feet) versus time (in seconds) corresponding to the graph above.
8. Write a good question that can be asked about the graph you created and answer it. Then see if other students in the class can answer your question correctly.