DOWNHILL BIKE RACE
& the Mean Value Theorem

Suppose you are a professional mountain biker who is going to do a downhill race on a mountain.
The slope of the mountain will smoothly increase your speed, or accelerate you, until you reach the bottom, where your speed is the highest. Sketch a picture of the mountain slope at the top right of this page.

Assume that:
1) the mountain slope is continuous.
2) the mountain slope does not have any irregularities that interrupt the flow of time and position.
3) there are an infinite number of points available to choose from along the mountain slope.

As a biker races down the mountain, the biker's position with respect to time is modeled by the function:

$f(t) = -t^2 + 3500$ where ***f(t)*** is measured in feet and ***t*** is measured in seconds.

Answer the following questions *and* show your work: *(Round to nearest tenth. Don't forget units!)*

1. What is the biker's position at the *top* of the mountain when the race *starts* (at time=0)? Write the ordered pair.

2. How many seconds does it take for the biker to get to the *finish* line at the *bottom* (at f(t)=0)? Write the ordered pair.

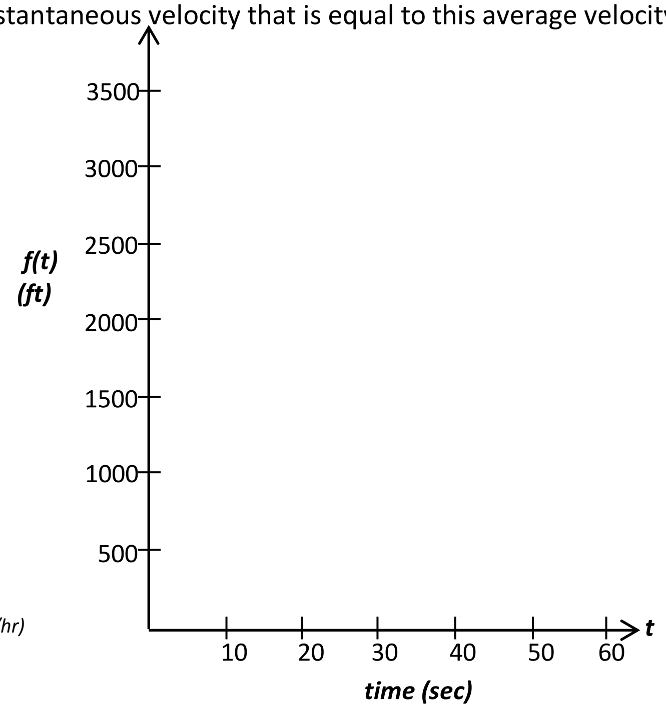
3. What is the ***average velocity*** from the beginning of the race to the end of the race? *(ft/sec <u>and</u> mi/hr)*

4. At what time during the race does the biker's ***instantaneous velocity*** equal this average velocity? Find ***f(t)***, also.

5. Complete the table and graph.

6. Draw the ***secant*** for average velocity from the race's start to finish & draw the ***tangent*** for instantaneous velocity that is equal to this average velocity.

t *(sec)*	***f(t)*** *(ft)*	***f'(t)*** *(ft/sec)*	*(mi/hr)*
0			
10			
20			
30			
40			
50			
60			



7. What is the biker's velocity at the finish line? *(ft/sec and mi/hr)*