

## Up and Down Deer park

In this lab I had to find the amount of Joules it takes to climb a hill. I took the Joules and found out my power of climbing the hill in watts. I also found that power that the gravity did for me to take me down the hill in watts.

### The Procedures.

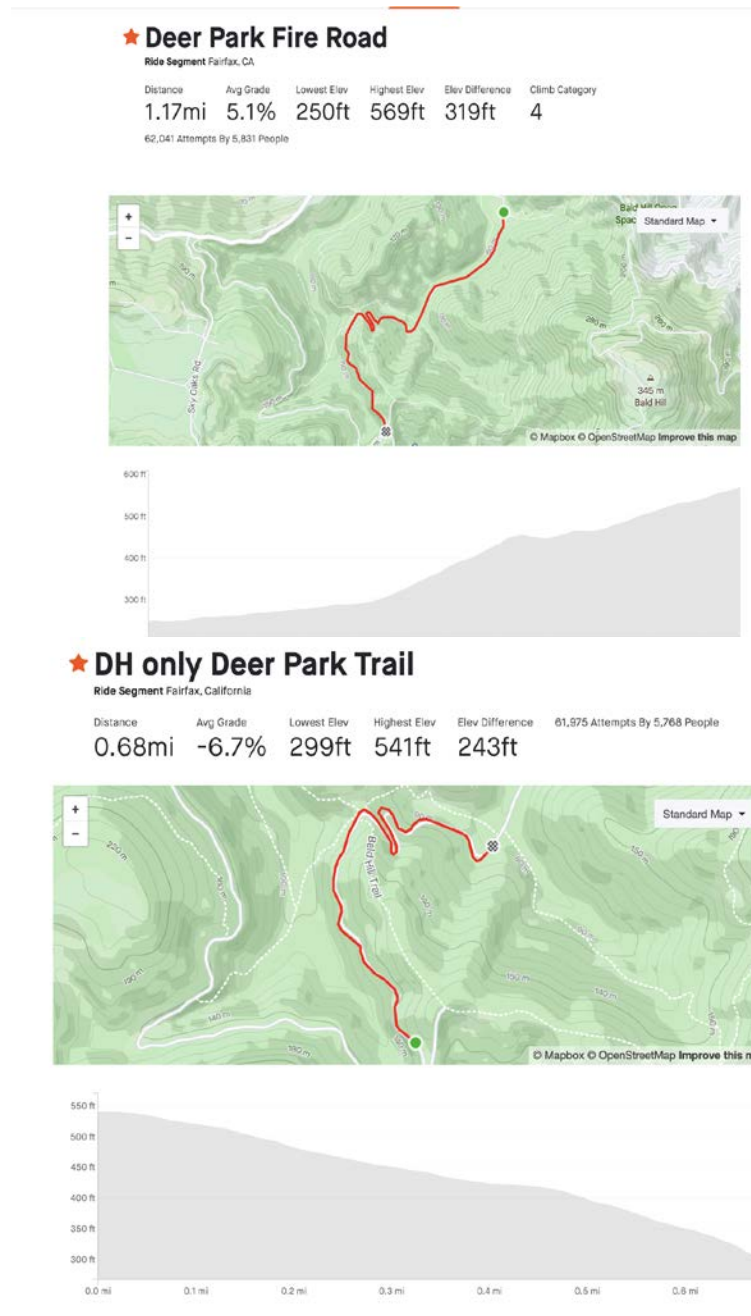
Step 1 Deciding The hill. I went to a local mountain bike trail. I thought that this would be interesting to see how much power it took to get up.

Step 2 Finding the Data. I used this app on my phone called Strava to find the data for this lab. I was able to use public segments on the app which show how long, how many feet and the distance. The climb was around 570 feet with a 5.1% grade and around 1.17 miles long, but the trail levels out in some parts. I was able to climb the hill in 10 minutes and 35 seconds and decent in 2 minutes and 52 seconds. I weigh around 130 lbs and my bike is around 26 lbs.

Step 3 What equations i will be using. I will be using the equation  $Work = Force \times Distance$ . The force is my weight in newtons (n). The distance is the vertical distance in meters (m). Multiplying these together will give you the power in joules (j). To get the power in watts (w). Divide your joules by the time of either the up or the down.

### Step 4 The math

Up: I used the equation  $work = force \times distance$ . I plugged in my numbers



For newtons and height in meters. Then I divided the power in joules by the time to find the power in watts.

$$\text{Work} = 578.269\text{n} \times 167.64\text{m} = 96941.01516\text{j.}$$

$$96941.01516\text{j} / 635 \text{ seconds} = 152.66\text{w}$$

Down: now instead of using my energy to go down hill I let gravity take me down.

$$\text{Work} = 96941.01516\text{j} / 180 \text{ seconds} = 538.56\text{w}$$

