

Physics....Not Just a Good Idea, It's the Law

By: Mark Dvorak

The stage was set.

Mark Fellows, a fellow (pun intended) Cycle Folsom member, threw down the gauntlet in late July by posting his best time for climbing a local signature climb, Beatty Road, on the Cycle Folsom website.

Since Mark's initial challenge, a number of Cycle Folsomites posted equally impressive times. I knew I had my work cut out for me because the riders posting the numbers were the guys whose rear wheels always seemed to disappear off into the distance whenever the road pitched up on group rides.

I knew that to even come close to them I would need to pull out all of the stops. Realizing that my level of fitness and degree of determination might be lacking I sought alternative angles to make myself more competitive.

I decided to explore the fundamental element of the challenge. Ultimately the climb up Beatty Road was going to be a battle between me and gravity. So, that said, I dusted off an old textbook to refresh myself with Newton's Law of Universal Gravitation.

$$F_G = G \frac{M_1 M_2}{R^2}$$

Newton's Law of Universal Gravitation is expressed by the equation above where:

- F_G = the force of gravity (my Beatty Road opponent)
- G = a gravitational constant
- M_1 = The point mass of the earth (roughly 6×10^{24} kg)
- M_2 = The point mass of me (roughly 80 kg)
- R = The distance between the two point masses

So, all I needed to do was decrease F_G to give myself a leg up on my fellow Cycle Folsomites. I decided to tackle the more accessible elements of the equation first. M_2 was easy. I decided to eat a light lunch making me a little less than 80 kg. There wasn't much I could do to alter R without altering the course, so I decided to raise my seat $\frac{1}{4}$ inch, thereby making R a tiny bit bigger (don't forget I needed all the help I could get).

Next I focused on M_1 , the mass of the earth. If I could decrease M_1 before I went out on my ride that day, I would have a better chance of posting a good time.

I decided to call NASA and ask for help. After quite a runaround I finally got in touch with someone who I thought might be able to help me. I asked the NASA representative if he good launch a whole bunch of rockets filled with as much mass as possible before I went out on my ride. Strangely enough he seemed reluctant to help me with my request. I told him he didn't understand the gravity of my situation. He told me that, by the nature of my request, I didn't appear to understand gravity. As a passing thought he asked me what Specific Impulse prompted me to make this request. I told him he wouldn't understand my answer because he wasn't a cyclist. He told me that I obviously didn't understand his question because I wasn't a rocket scientist. I ended the discussion by complaining about where my tax dollars were going when NASA was unwilling to support such a worthy cause.

Having basically struck out on almost all of the elements of the equation, I turned my attention to G, the gravitational constant. The problem with a mathematical constant is it's just that...constant. I figured there was nothing I could do by earthly means to reduce the gravitational constant so I decided to appeal to the gods.

I decided to take a two pronged approach to get some relief from the God of Gravity. I first looked to see if there was a Gravity Games segment on ESPN that day. To my amazing luck there was a show scheduled at the same time I planned to ride. I figured that the God of Gravity would need to keep his focus on the Gravity Games and might just take his "eye off the ball" when it came to my ride (maybe the gravitational constant would be less than constant for my ride).

Just in case the God of Gravity remained focused on my ride in spite of the Gravity Games I tried a second approach. I decided to wear my Terrible Two Double Century jersey. It was a blatant attempt to suck up to the God of Gravity by showing him that I dealt with 16,500 feet of gravity drenched climbing in one day and...well...maybe deserved some slack for my ride up Beatty.

With all elements of the equation addressed I had nothing left to do but go out for the ride. I took off from my house on what turned out to be a fairly hot August day. I rode for about 30 minutes in the Empire Ranch area to warm up before taking on the climb.

As I approached the base of Beatty excuses began to pile up in my head. It was pretty hot that day (106 degrees) and there would be a slight wind in my face on the way up Beatty. Those two factors, as well as the price of Oryza Sativa in Guandong, weighed heavily on my motivation.

I decided to make a go for it anyway. I paused at the stop sign at the base of the climb and then began to stomp on the pedals. I usually climb seated, but that day it felt faster to start the climb standing. My plan was to remain standing as long as possible and then dump into my triple ring and spin like a madman once I couldn't stand anymore. It wasn't a bad plan except that once I did dump into my triple about $\frac{3}{4}$ of the way through the climb I spun less like a madman and more like a sloth.

My heart rate shot to a personal record of 175 bpm about ½ way through the climb and then stayed above 170 bpm for the remainder of the ascent. By the top of the hill I was breathing so hard that I could taste blood in my throat from the effort.

I didn't look at my elapsed time until I passed the stop sign at the top of the climb. I had hoped to complete the climb in less than five minutes; instead I completed the climb in 5:02.4. I'm confident that without the excuses named above (temperature, wind, price of Oryza Sativa in Guandong) I could have easily shaved off 0.0001 seconds from my time.

With my fight against gravity complete, I rode around in circles at the top of the hill until the overwhelming sense of nausea subsided. I rode back down Beatty and on to my home about four miles away at a crawling pace. Once home I downed an ice cold Redhook as soon as I hit my garage.

My Polar s725x recorded the effort as follows:

Date: 31 August 2007

Temperature: 106 Deg F

Distance: 0.78 miles

Time: 5:02.4

Ascent: 350 ft

Average Speed 9.2 mph

Max Speed: 17.9 mph

Average Grade 9.8%

Average Cadence: 72 rpm

Average Heart Rate: 167 bpm

Maximum Heart Rate: 175 bpm

My battle against gravity was complete for that day. I knew there would be future battles, but for that day I could only sum up my effort as follows (with apologies to Sonny Curtis & the Crickets):

I rode my bike in the hot dry sun, and I fought the law and the law won