Storm Runner

For safety reasons, please do not take data collection devices on this ride. All the questions below can be answered through observation and utilization of the concepts of kinematics, work, power and special relativity.

1. Stand and watch the Storm Runner launch. How many g's of acceleration do you think a rider will feel?

2. Record the time it takes for the car to reach its top speed (from the time it launches to the time that it reaches the start of the first hill). (See Appendix B.)

   a. t_{launch} = _____ s

   b. Considering that that portion of the track is 45 long, what is the average acceleration of the train?

   c. What is it in g's?

3. A certain Ferrari[1] can go from 0-60mph in 3.1s. What is the average acceleration of the car? Keep in mind that 1 m/s = 2.237 mph. Compare this with the Storm Runner.

[1]http://www.carspecsdirectory.com/Eagle_Ferrari.htm

4. Calculate the force on an average rider with a mass of 68 kg.

    a. Due to the acceleration of the coaster.

    b. And due to the acceleration of the Ferrari.

5. Calculate the work done on the coaster during its launch period. The mass of the full train is 10,660 kg.

6. How much power was used to launch the train?

7. According to Einstein's theory of Special Relativity, when an object is moving at close to the speed of light, it experiences a length contraction ΔL according to an observer at rest in another frame. Suppose the Storm Runner was launched a speed of 0.7c. What would be the length contraction ΔL? The original length of the train $L_0 = 11.98$ m.