Brandon Sadowski

Hayden Harrigan

6th Hour

5/23/17

Physics Lab. Question 2: The Power Tower

Description- The ride goes up and drastically drops causing a free fall feeling.The power tower is powered by air in large cylinders in which a cable, connected to a piston, travels and is connected to the riders cart. The time measurements for the ride were provided on the data sheet, in order to estimate distance we took an average of the 5 given times.

Calculations- For this question had to determine the distance that the ride drops in free fall using time and the equation $h=(½)gt^2$ The "h" represents the height of the roller coaster, g is the gravity constant in m/s (rounded), and t is time. The five given times on the data table were; 2.7s, 3.0s, 2.55s, 2.6s, 2.78s. The average time calculated was 2.726s.

$h=(½)(10m/s^2)(2.726)^2$ h= 37.16m

Analysis- For question two we were trying to find the the distance The Power Tower free falls. The way we calculated this was by taking the average time for the given five, then plugging them into the equation. This was the "t" value, the value of "g" is the gravity constant = $9.8m/s^2$ which was rounded to 10m/s. We plugged each variable into the equation and got the value of h= 37.16m

Physics Lab. Question 4 & 5: The Millennium Force

Description- The Millennium Force is one of the most wicked rides at cedar point. The coaster was the world's first Giga coaster. It uses a cable lift system rather than the traditional. It features lots of steep drops and hard angles. The measurements we needed to calculate for this lab were ride height, speed of the cart, and the valley time (after a drop). Most of the measurements used were given in the data.

Calculations- For the first calculation we had to use the conservation of energy to predict the speed of the roller coaster at the bottom of the first drop. In order to calculate this we used mgh=(½)mv^2, We then solved for v so the equation would be set up v= $\sqrt{2gh}$ Velocity is in m/s, "g" is gravity constant in m/s, and "h" is height.

Derivation- Using equation above (mgh = (½)mv^2) = (gh = (½)mv^2) = (v = $\sqrt{2gh}$

V = $\sqrt{2(10m/s^2 * 91.44m}$ v = 42.76m/s

Analysis- For question 4 we needed to calculate the speed of The Millennium Force at the bottom of the first drop. In order to do this we used the conservation of energy. On the data sheet we were given the height of the roller coaster and the gravity constant of $9.8m/s^2$ we then rounded to 10m/s. We then plugged the variables into the equation v = $\sqrt{2gh}$ after canceling the variable “m” in the equation, the value of v= 42.76m/s

Question 5-

Description- The description of the roller coaster is the same because for both question 4 and 5 we used The Millennium Force. The measurements for this are the length in meter, valley time in seconds. All the measurements needed were on the data sheet provided. In order to find the length in meter we used process provided on the sheet.

Calculations- For the first calculation we had to find the distance in meters. We were given the information that the car is 15 steps long and 12 meter is equal to 20 steps.

12m/20 steps = 0.6m per step

d=rt d = (15 steps)(0.6) = 9m

Valley time = 0.23s

d=rt r=d/tr(9m)(0.23s) r = 39.13m/s

Percent Error-

(|theoretical - experimental|) /theoretical (|39.13 - 42.76|)/ 39.13 = 9.28%

Analysis- For question 5 we had to calculate the speed of the car at the bottom of the first drop. The method we used to find this was d = rt. We then rearranged the equation and solved for r making the equation r = d/t. On the data sheet we were given the length and also the time it took to reach the valley of the roller coaster. First we divided 12m by 20 steps, to convert to meters per step. Next we plugged in 15 steps times 0.6 to get 9m. The valley time was given and finally we plugged both numbers into r = dt. r = 39.13m/s. After solving the speed we found our percent error which was equal to 9.28% Considering we didn't take the observations in person this was an accurate percent.