Newton’s 2nd law lab

Science, Mathematics

Newton’s 2nd Law Lab Introduction: The purpose of this lab was to prove Newton’s 2nd Law; which states accelerate equals force divided by mass (a= F/m). During this lab we were trying to find out the relationship between acceleration, force, and mass by using a air track, glider with picket fence, and photogates. Before I did the lab, I had already knew that acceleration, force, and mass were related. I just didn’t know how they were related. When recording the results of this lab we had to record the applied force in Newton’s. Newtons’s is a unit of measurement represented in m(meters) divided by s2(seconds squared). I think that F/m= a because in Newton’s second law, he tells us that force is equal to mass times acceleration (f= ma), so if you take the mass and divided by both sides to cancel it out on the right, you would end up with a= f/m. Procedure: First we weighed the glider and fence with the string attached, in kg(kilograms). Then we recorded in the table. Next we weighed the mass of the hanging weight in kg and recorded it in the table. Then we found the total mass being accelerated in kg by adding the mass of the hanging glider to the mass of the hanging weight. Fourth we found the applied force by taking the mass of the hanging weight and multiplying it by 9. 8(gravity). Then we found the theoretical acceleration by using the formula a= F/m and plugged in the total mass for m and the applied force for F. By taking F and dividing it by m we can up with the theoretical acceleration. We then looked on the time graph and found the experimental acceleration by looking at the slope of the velocity time graph and recorded it on the table. Lastly we found the percent difference by taking experimental acceleration, subtracting it from the theoretical acceleration, and then dividing that answer by the theoretical acceleration.

We then took that answer and multiplied it by 100 to give us a percent. We then reweighed the glider each time and increased the mass of the hanging weight. Then we repeated steps three through seven, 15 more times so we had enough data. Results/Observations: Result are on the attacked sheet. Durning the lab, I observed that the more mass that was on the hanging weight the less accretion. Also the more mass, the faster the glider went. I also noticed the more weighted you taped onto the glider the faster the glider went. Analysis/Conclusion I think a= f/m because in Newton’s second law, he tells us that force is equal to mass times acceleration (f= ma), so if you take the mass and divided by both sides to cancel it out on the right, you would end up with a= f/m. After this lab, we proved that this theory is right because when you look at the theoretical and experimental acceleration data and you look at the percent difference, they vary from 2. 6% to 18%, which is really good. The numbers are not perfect because of errors in the lab. Some of the possible errors could be from, software calculation and the way we rounded our numbers, the air track had a little bit of friction and the weight of our hanging weight could have hit the ground and fell off before the picket fence went threw the the photogate. In conclusion, our lab proved that acceleration does equal force divided mass because when we took the applied force and divided it by the total mass and come up with the theoretical acceleration, our data result came back with an average percent difference is 5. 04; which is less then 10%!