Force and motion essay

? FORCE AND MOTION Ronald Steven DuBois 5th Grade St. Michael’s Catholic School 2009 TABLE OF CONTENTS 1. Abstract 2.

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Results 8. Conclusion 9. Bibliography ABSTRACT I thought it would be fun to fling things like raw eggs and rocks with a catapult. Guess what, it was! By flinging these items I tried to find out if heavier things would travel farther than lighter ones. Basically how force effects motion. With the catapult as the force, I sent items soaring, after weighing them, and then recorded how far the items travelled.

This showed me how Newtons Three Laws of Motion work. Force causes change is Newton’s First Law of Motion which I saw from the catapult flinging the items. My hypothesis that heavier items would go farther was not correct, because Newton’s Second Law of Motion says that the force applied is equal to mass times acceleration. For instance, if you push a skateboard it will roll away, but if you push a car with the same amount of force, it will barely move. So heavier items do not travel farther. Newton’s Third Law of Motion is that for every action there is an equal and opposite eaction. In my experiements this is shown clearly by the graphs in my research paper where I recorded the weight of the items I flung with the catapult, and then recorded the distance the items traveled. So when I sent an item soaring gravity was pulling it down and acting as the equal and opposite reaction.

I really had fun with this project and conducting the experiments. -1- INTRODUCTION I did my Science Fair Project on Force and Motion. I wanted

to find out how far different items would travel when given the same amount of force. Would the size of an item or the eight of an item be more important? Would the shape of an item change anything? If I change the amount of force but keep everything else the same, will I get the same result? It is my hypothesis that heavier items will travel farther than lighter items no matter what size it is.

It is also my prediction that if the same amount of force is given to one group of items and then you compare it with the same group of items, changing the amount of force on the items, the results will be the same, the heavier items will still travel farther. -2- BACKGROUND INFORMATIONWhen I investigated about how to do an experiment that would show how force effects motion I used the internet to Google, " Ways to show Force and Motion. " Many pages came up showing catapults. I showed these to my dad and he helped me build a catapult to represent force. With a catapult I could pull back the arm to different places to show different amounts of force. That way I could see if the amount of force would be the same on a group of items when compared to the same group of items with a different amount of force. When I looked up Force on the internet I learned that it meantWhen I looked up Motion on the internet I learned that it meant When I looked up force and motion I saw the name Sir Issac Newton a lot of times.

So I looked up Sir Issac Newton and found out that there were Three Laws of Motion. They are Newton's First Law of Motion – force causes change Newton's Second Law of Motion – force applied = mass x accelereation WHICH IS THE SAME AS – force applied = weight x speed Newton's Third Law

of Motion – for every action there is an equal and opposite reaction. Sir Issac Newton also discovered gravity. -3- PROCEDURE Materials : . Catapult 2.

Spray Paint 3. Scales 4. Tape measure Items a) pennie b) golf ball c) heavy toy car d) light toy car e) piece of wood f) large green pecan g) small brown pecan h) piece of asphalt i) pinecone j) basketball k) football l) boiled egg m) raw egg n) rock -4- Procedure 1. Collect items around the house. 2. Assign the items letters. 3. Weigh the items on a scale and record the results.

4. Measure out 40 feet in the yard with tape measure 5. Spray paint lines for each foot. 6.

Conduct experiment with catapult pulled back to 180 degrees. All the way back) 7. Record the results in log book. 8. Conduct experiment a second time with catapult pulled back to 90 degrees.

(Half way back) 9. Record results of second experiment in log book. Variables My dependant variables are the amount of force which is shown by how far I pull back the arm on the catapult. My independant variables are the items and their different weights which represent mass/weight..

My experiment shows how my independant variables are effected by my depentant variables as to force and motion. -5- DATA AND OBSERVATIONS

FEET TRAVELED _____

M_____ __35 _____

M_____ __34 _____

M_____ __33 _____ M

N_____ __ 32 _____ M

N_____ 31 __ B _____ L_M

N____ _____ 30 __ B_ _____ G_____ L M

N_____ _____ _ 29 __ B_____G_____ L M

N_____ 28 __ B_____G_____ L_M

N_____ _ _27 __ B_____G_____ L_M

N_____ _ _26 B_____G_____ L_M

N_____ _ _25 __ B_____G_____ L_M

N_____ _ _24 B__ G_____ L_M

N_____ _ _23 __ B___D____ G_____ L_M

N_____ __ 22 __ B__ D____ G_____ J__ L M

N_____ 21 __ B___D___F G_H___ J_ _L M

N_____ 20 __ B___D___F G_H___ J___L M

N_____ 19 _ _B __D___F G_H___ J___L M

N_____ _ 18 B_D _ F G_H___ J L M

N_____ 17 __ B__ D_E_F G_H_I_ J__ L M N_

_ _____ B C_____ G_____ _____ 16 __ B__ D E_F G_H_I_ J_ _ L M N

_____ B_C_____ G__ _ J_ _____ 15 A B C_D_E F_G_H I_ J_K_L M N_

_____ B_C_____ G_ I_ J_____M_N_ 14 A B C_D_E F_G_H_I_ J_K_L M N_

_____ B_C_____ G__ I_ J_____M_N__ 13 A_B C_D_E_F_G_H_I_ J_K_L M N

_____ B_C_D____ G_ _ I_ J_____M_N_ _12 A_B C_D_E_F_G_H_I_ J_K_L M N _

_____ B_C_D____ G__ I_ J_____M_N_ _11 A_B C D_E_F_G H I _J K L M N _

_____B_C_D___ G_ I _J ____ M N_ 10 A_B C_D_E_F_G_H_I_ J_K_L_M

N_____ B_C D F G__ I J_____M_N__ 9 A B C_D_E_F_G_H_I_ J_K_L_M

N_____ B_C_D E_F_G__ I_ J_____M_N__ 8 A B C_D_E_F_G_H_I_ J_K_L_M

N_____ B_C_D E_F_G___I_ J_____M_N__ 7 A B C_D_E_F_G_H_I_ J_K_L_M

N_____ B C_D E_F G H I_ J_____M_N__ 6 A_B C_D_E_F_G_H_I_ J_K_L_M

N_____A B_C_D E_F G_H I_ J K L_M_N__ 5 A B C D E F G H I J K L M N A B C D E F G H I J K L M N 180 Degrees90 Degrees Weight in Grams Items: a) pennie 3 b) golf ball48 c) heavy toy car68 d) light toy car30 e) piece of wood26 f) large green pecan23 g) small brown pecan 8 h) piece of asphalt 215 i) pinecone58 j) basketball 572 k) football 358 l) boiled egg64-6- m) raw egg66 n) rock 218 RESULTS My experiment showed that a heavier item may not go as far as a lighter item, even if the force is the same. If you push a skateboard and it rolls away and then you push a car with the same amount of force it will barely move. So even though the amount of force is the same, the car being weighing more does not matter. I now know that the mass of the item must be considered. The weight of an item does not effect how far it goes. I believe the shape and size of the item must be considered because of air resistance and gravity.

My hypothesis was that the heavier item would travel farther than the lighter item. My experiment showed me that this was not true and that I should have used the size and shape of the items. In Newton’s Laws of Motion, his third law is about how every action has an equal but opposite reaction. So I think that if the catapult is the force, which represents the action causing he motion, then the effects of gravity and air resistance are the equal and opposite reaction. If I did this experiment again I would use the mass of the items instead of the weight of the items. Mass is the size and shape of the items. The weight of a man on earth would be different than his weight on the moon.

But his size and shape, or his mass would be the same both places -7- CONCLUSION I really learned a lot doing this experiment. Even though my

hypothesis was not right. I learned about Sir Issac Newton and his Three Laws of Motion. I also learned about gravity and its effect on all things.

I really thought that a heavier item would go farther but learning why it doesn’t was fun. -8- BIBLIOGRAPHY -9-