Toy Cars and Newton's Second Law

Materials:

* Toy Car
* Strips of tape
* 10 pennies
* 1 Earth Science book
* Ruler
* Tape measure
* Blance

Before the Experiment:

Prediction: How will a difference in mass affect the **distance** that the car travels? Cars with greater mass don't travel as far when they are launched. In Newton's Second Law of Motion, if two objects like cars are given the same force, the lighter object will accelerate more, and the more it will travel.

Prediction: How will a difference in mass affect the **speed** that the car travels? If the object is heavier the car will not travel that far if the object is light the car will travel far.

Why is it important to keep the ramp angle, release height, and release speed the same? It is important to keep every the same to get perfect test results and it not being all messy and you get better test results that way.

During the Experiment:

| 0 Pennies and Car: Total mass (grams) \_\_\_\_\_\_ | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | Trial #1 | Trial #2 | Trial #3 | Average | Observations (At least three) |
| Distance traveled in cm | 30 cm | 29cm | 10cm | 69cm | I noticed it traveled a lot of cm, it always went high in centimeter, and low in centimeters. |
| Speed | 2 mph | 1mph | 1mph | 4mph | I noticed when the car did not have any penny on it was one faster, two easier to launch, and three travels farther. |

| 5 Pennies and Car: Total mass (grams) \_\_\_\_\_\_ | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | Trial #1 | Trial #2 | Trial #3 | Average | Observations (At least three) |
| Distance traveled in cm | 22 cm | 13 cm | 17 cm | 53 cm | I noticed when I added tape and penies it became heavier, it became slower, and it went from high to low to high centimeters. |
| Speed | 0.9 mph | 1mph | 1 mph | 2.9 mph | I noticed that it was super slow, it was harder to launch, and traveled less farther. |

| 10 Pennies and Car: Total mass (grams) \_\_\_\_\_\_ | | | | | |
| --- | --- | --- | --- | --- | --- |
|  | Trial #1 | Trial #2 | Trial #3 | Average | Observations (At least three) |
| Distance traveled in cm | 8 cm | 19 cm | 24 cm | 51 cm | I noticed it traveled less in cm, I noticed it went from low to high cm, and it was hard for its wheels to move. |
| Speed | 0.6 mph | 0.8 mph | 1 mph | 2.4 mph | It moved as slow as a snail, it was super hard to launch it, and traveled less than the first two times. |

After the Experiment:

What did your data show about how increasing mass (adding weight) impacts the speed of the object? If you add weight on the car the more the weight the less faster it goes unless it doesn’t have any weight on the car.

What did your data show about how increasing mass (adding weight) impacts the distance of the object? If weight is added to the car the less distance but if there is no weight the car can go farther distance.

Explain your results in terms of Newton's Second Law (Acceleration= Force/Mass). Newton's second law shows that there is a direct relationship between force and acceleration. The greater the mass of an object, the less it will accelerate when a given force is applied.