Inquiry Question

Why do some ©*Hotwheels* move faster than others? Can you create the ideal ramp to send a ©*Hotwheel* down fast? What conditions are necessary to send the car far? Test your powers of observation. Design an experiment and play.

Name: ________________________ Date: __________

Newton's Laws of motion can be easily examined using a simple *Hotwheels* track and car. Many great scientific studies begin with simply "playing" with the equipment and observing "cause and effect"

Test your powers of observation and create a series of experiments to try to determine what factors affect how your *Hotwheel* performs.

General Instructions

Students are to design an experiment to test the conditions necessary to send a *Hotwheel* car down a ramp the fastest and the furthest. Students should then attempt to relate the results to Newton's Laws.

Materials you'll need:

- Your course notes
- The internet
- tape measure or metre stick
- a ©*Hotwheel* that runs true (in a straight line)
- ©*Hotwheels* track (a 1 metre long board can substitute)
- some books stacked to create a 1 metre long ramp that is 20-30 cm high.

Procedure:

- Students construct a 1 metre long ramp (using books holding up a board for example). They are to send down a ©*Hotwheel* toy car from the same location and height every time. They are to measure how far the hot wheel coasts along the floor when it leaves the ramp. Then they repeat the experiment by adding a small mass to the back of the ©*Hotwheel* with tape (a quarter works well for this). Finally, they are to summarize their results and explain them according to Newton's Laws.

- Be sure to time how long each *Hotwheel* takes to get to the bottom of the ramp. What do you notice here?
- You may use a table such as the one shown below to help organize your results:

Number of quarters	Distance				Time to Bottom of Ramp (s)			
	Trial 1	Trial 2	Trial 3	Average Distance	Trial 1	Trial 2	Trial 3	Average Time
0								
5								
10								
15								

- As a secondary experiment, they could repeat the above experiment on a carpeted floor and comment of the results.

Ideas and Hints

- If using the actual ©*Hotwheels* track, make sure that one 1 metre only is used to create a ramp. The rest of the track may be used as the level "floor".
- Lino or hardwood floors will work well for the first part of the lab.
- You may have to run each newly weighted ©*Hotwheel* down the ramp a few times to find an average distance for consistency.

Project submission:

- If you can drop-in to the school, you can present it to your teacher in-person. Otherwise, scan or take a photo and upload it to the project submission folder at the end of the unit.

Project Timing:

- In its most basic form, this project will take the average student 2 hours. Locating and collecting all of the necessary materials will vary.

Inquiry Questions and Experimental Design:

1. Create a set of instructions (your procedure or method) that will help somebody else repeat your experiment. Make the instructions step-by-step like a recipe. Include diagrams to explain your set-up

2. Summarize your results. Submit a diagram or photo of your experimental setup and be sure to label or list all of the materials used. Include a table showing all of your data (see above).

3. How did mass affect the time it took your your *Hotwheel* to get to the bottom of the ramp? Can you explain this?

4. How did mass affect the distance traveled along the floor? Can you explain this with Newton's Laws?

5. How did the results change when the floor was no longer smooth (carpet instead of wood for example)?

6. What is the ideal car/ramp combination to create a situation where the car goes the fastest? The furthest?