Design Challenge - Crash Test

Name: _____

Mathematical Analysis Worksheet

1. Velocity:

   a. Length of guided course: _____ meters
   b. Time to complet the courese: _____ seconds
   c. Velocity = Length/Time: _____ m/s

2. Acceleration of your vehicle:
   Use the equation $A=2x/t^2$ where s = distance traveled, and t = time.

a. Acceleration of your vehicle: _____ m/s^2

3. Force of your vehicle:
   Force = Mass x Acceleration

   a. Mass of your car: _____ kg
   b. Acceleration: _____ m/s^2
   c. Force = Mass x Acceleration: _____ kg-m/s^2 (N)

4. Impulse Force of Impact (Without a Crumple Zone):
   (If photo gate sensors are not availabe to measure the force of impact, use .01 sec for the time of deceleration for the following equations.)

   Force = (Mass x Change in Velocity)/Change in Time

   a. Mass of your car: _____ kg
   b. O m/sec – Velocity (found in 1c): _____ m/sec
   c. Reading from Photo gate (or .01 s): _____ s
   d. Impulse force of Impact: _____ Newtons

5. Impulse Force of Impact (With a Crumple Zone):
   (If photo gate sensors are not availabe to measure the force of impact, use .10 sec for the time of deceleration for the following equations.)

   a. Mass of your car: _____ kg
   b. O m/sec – Velocity (found in 1c): _____ m/sec
   c. Reading from Photo gate (or .1 s): _____ s
   d. Impulse force of Impact: _____ Newtons

6. What is the difference in the impuls force at impact with a crumple zone?

_____ Newtons