Name _____ Date _____ Period _____

INERTIA CRASH TEST DUMMIES

PROBLEM: Does the mass of a person affect the inertia of the person?

HYPOTHESIS: (Use an if/then statement)

_____

_____

MATERIALS:

1ST EXPERIMENT

- Car that will hold clay "person"
- Ramp
- Books/blocks
- Wooden Wall
- Modeling clay
- Rubber bands of various sizes
- Meter stick

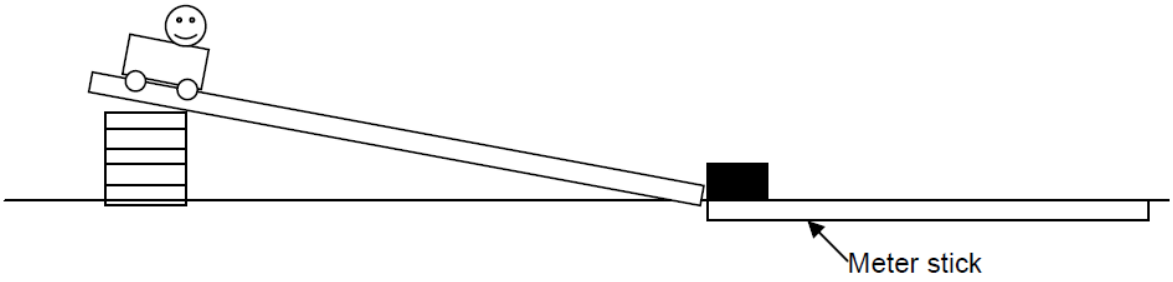
2ND EXPERIMENT

- Rubber Stopper
- Timer
- Plastic Cap
- Ping-Pong Ball
- Car
- Wooden Wall
- Meter stick

PROCEDURE:

EXPERIMENT 1

1. Set up the ramp on the books. Place the wooden wall at the bottom of the ramp on its side to create a short wall the car will crash into.



2. Make three clay people of varying masses. The clay people could represent a parent, a teenager, and a baby.

3. Place one of the people in the car and let it roll down the ramp and crash into the wall. Measure the distance the person flies out of the car toward the wall. If the wall is too tall, a different object might be needed to act as a stopping point. Record the distance in a data table.

Adapted from http://www.coe.uh.edu/texasipc/units/motion/student-crash.pdf
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4. Complete five trials with each person and record your results.
5. After all measurements are taken; secure one of the people in the car using a rubber band as a seat belt. Roll the car down the ramp and observe what happens.
6. Repeat Step 5 with each person. Record your observations.

TRIAL		DISTANCE CLAY FLEW IN CM	OBSERVATIONS WITH RUBBER BAND SEAT BELTS.
Baby	1		
	2		
	3		
	4		
	5		
Average			
Teenager	1		
	2		
	3		
	4		
	5		
Average			
Adult	1		
	2		
	3		
	4		
	5		
Average			

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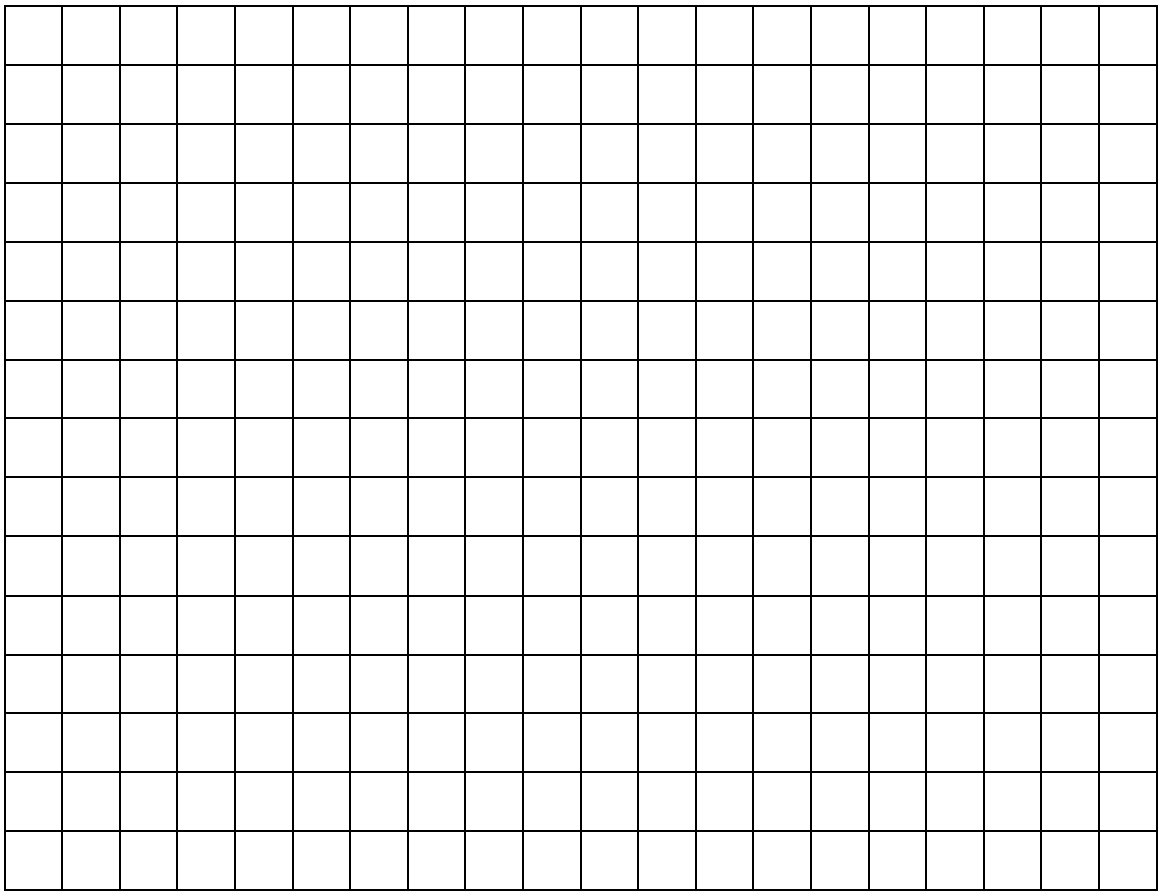
Make a graph of the using the AVERAGES!



PROBLEM 2: Does the speed of the vehicle affect how far the dummy is thrown?

HYPOTHESIS: (Use an if/then statement)

_____

_____

PROCEDURE:

1. Put your clay dummies away. We will use different dummies for this experiment.
2. Measure a distance of 1 meter in front of the wall side of the barrier. Mark the floor with a small piece of masking tape. This is the starting line from which you will roll your car.

3. Insert the pointy end of the dummy (cap, rubber stopper, ping-pong ball) into the hole on the top of the car. If necessary, adjust the position of the dummy so it is tilted slightly backwards.
4. Decide who will be the recorder, measurer, time keeper, and car operator for the first trial. Do a few practice runs of Steps 5 & 6 with each person doing their respective job. Do this until every person in the group has a chance to practice all four jobs. (DO NOT RECORD DATA FOR YOUR PRACTICE RUNS.)
5. The car operator should hold the car, cock back his or her arm, and then with a forward motion, release the car at the starting line so that it travels at a medium speed towards the barrier. The second the operator lets go of the car at the starting line, the timer should start the stopwatch. When the car hits the barrier, stop the timer.
6. The measurer should measure the distance from the barrier that the dummy is thrown in centimeters. Record the distance the dummy is thrown along with the time it took the car to reach the barrier in the data table.
7. Switch jobs. Place the dummy back in the car & repeat steps 5 & 6 four more times. (After every switch race the car at a slightly faster speed.)
8. Use the formula provided to calculate the car's speed.

	SPEED OF CAR			DUMMY DISTANCE
Trial #	**Distance (cm)**	**Time (s)**	**Speed (cm/s)** *To Calculate speed = distance /time*	**Distance Thrown in cm**
1				
2				
3				
4				
5				

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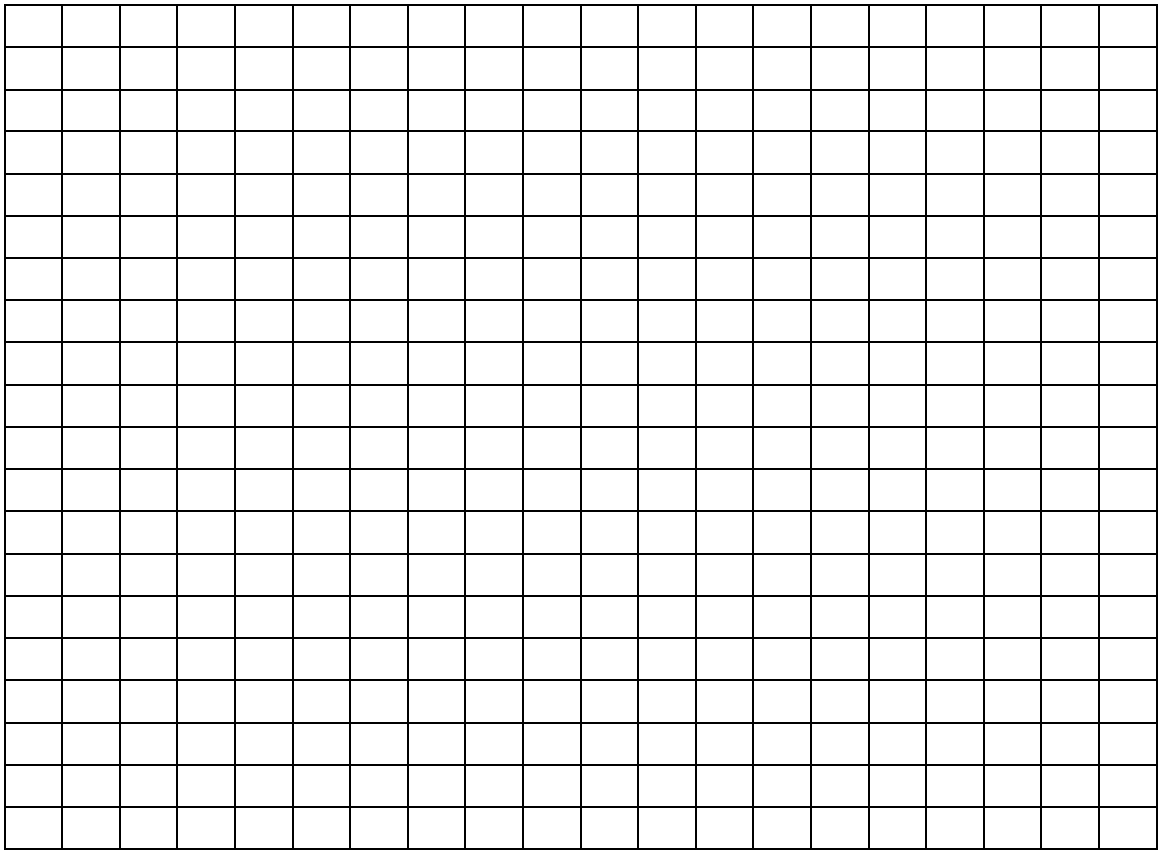
Graph your data.



ANALYSIS/CONCLUSIONS:

1. Describe Newton's first law of motion?

   _____

2. Which person flew out of the car the farthest? _____

3. What is inertia? _____

4. Why did the people fly out of the car? _____

5. What could be done to the car to make the people fly out farther?

   _____

6. What is the relationship between mass and inertia?

   _____

7. When the seat belts were put on, what happened to the people?

   _____

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8. How can you relate this investigation of Newton's first law of motion to daily life when you wear seat belts in a car?

_____

9. A friend does not wear a seat belt when in the car. From your experience during this laboratory exercise, how could you convince your friend the importance of wearing a seatbelt?

_____

_____

_____

10. What is the relationship between the car's speed and the distance thrown?

_____

11. Explain how this activity illustrates the Law of Inertia.

_____

_____

IDENTIFY VARIABLES

	PROBLEM 1	PROBLEM 2
Independent Variable		
Dependent Variable		
Controls		
Possible Sources Of Error		

Write a **CONCLUSION**. Answer your original question. Restate your hypothesis. Accept or reject your hypothesis. Use actual data [real numbers] to provide evidence for what you say. What relationships exist between the variables? Identify any sources of error. In this experiment you tested 2 variables. What other variables could be tested? Wrap it up.

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