Name ____ Hour ____________

The Physics of Toys Lab

_____ cm = 1 m, _______ g = 1 kg

Your work must be complete, accurate and neat. **Units on every answer please!**

12 pts, due ________ **(SHOW YOUR WORK OR I WILL TAKE OFF POINTS)**

Play with the following toys and answer the questions, making sure to use the GUE!

Toy #1- SUPER BALLS! ☺ Drop a super ball straight down from a height of your choice. Measure the height of its rebound. What is the **change in potential energy**? (How much is missing?) Make sure to show all of your work.

Given: mass = **__22.8__ g = __________ kg**

starting height = **__1.0__ m**

rebound height= **__0.8__ m**

Starting PE= ____________

Rebound PE= ____________

Change in PE= ____________

Toy #2: CAR DOWN RAMP ☺ Pick a car and let it go down the ramp.

1. Use conservation of energy to calculate its **velocity at the bottom of the ramp**. *(We are not accounting for friction, so your answer will be a little higher than the actual.)*
2. Once you know the velocity (Vx), use it to calculate **how far from the edge of the table** the car should land (Δx) using horizontal projectile equations.
3. Once you have calculated Δx, run car down ramp, measure it and calculate a % error for your equations.

% error= (acc – expt) / acc x 100%

Given: h_i=___0.22____ Δy of table = __0.91___

h_f=__0____

Calculated: Δx= ____________ (accepted)

Measured Δx= ___0.75 m___ (experimental)

% error= ____________

Toy #3: THE DART GUN DO NOT SHOOT IT AT YOUR FRIENDS. Fire a dart horizontally from 2 m away. Make sure you shoot it straight. Use its change in height (Δy) and how far away you are from the wall (Δx) to calculate the **speed** (v_x) with which the dart left the gun and then find it's **kinetic energy.**

Given:

Mass of dart= __10___ g = _______ kg Δx = __2.0 m___ Δy= ___0.12___ m

The dart will fall a little from the original height that it was shot. That's your Δy

U.: Vx

E:

U: KE

E.:

Vx= ____________ m/sec

KE = ____________

Name ____ Hour _____________

<u>Toy #4 PULL BACK CAR</u> Make or find a 2-meter track on the tile. Pull the car back until it clicks and let it go at the starting line. Record the time and the mass. Knowing Δt and Δx, find the **acceleration of your car**. Once you know the acceleration, find the **force**, **work** and **horsepower** of the pull-back car. The horsepower should be a little number! It's a little car! ☺

<u>Given</u>: Δx = ___2.0 m____
mass = **_125____ g = _____________ kg**
Δt =**__2.77_____ sec**

W = _____________

a = ___________

P =_________watts

F= ____________

P= _____________ hp

<u>Toy #5: ZOOM-O</u> ☺ Place the Zoom-O on the ground and angle it how you like. Shoot the disk a couple of times until it flies straight without hitting the ceiling. Measure the time (Δt) of the disc's flight. Use the Δt to find Viy, Δy, and finally the potential energy of the disc at its maximum height.

<u>Given</u>: mass of disc= ___12__ g = _________ kg   Δt= _3.16____ sec   ½ Δt= __________sec

**Remember, you need to use Δt at the ½ way point to use the ay =Vfy – Viy /Δ t equation*

Viy = ___________

Δy = ___________

PE = ___________

<u>Toy #6: CAR DOWN RAMP PART 2:</u> ☺ Pick a car and let it go down the ramp. Measure Δx. Use horz. projectile equations to find Δt and then Vx. Finally use conservation of energy to find hi with your Vx=Vf.

<u>Given</u>: Δy where car leaves table (also hf) = ___0.91___   Δx = __2.5___ m

Vx= ____________

Calculated hi = _______