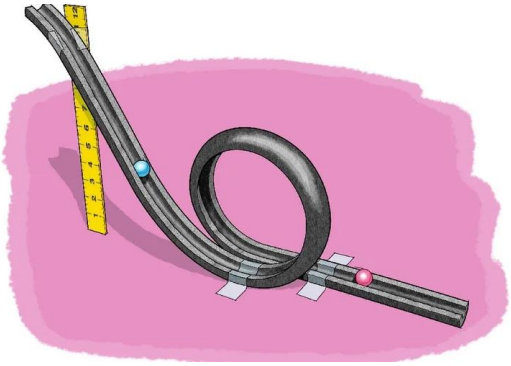
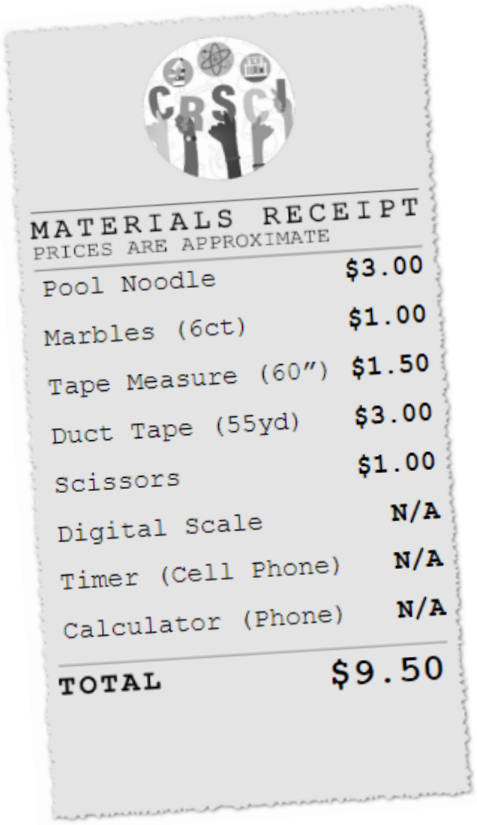
Twisted Noodles *Testing Law Of Conservation Of Energy*

INTRODUCTION: Energy is the ability to do work. When you get on a roller coaster, it takes a lot of force to get the cars to the top of the hill. However, once it's there, a chain is no longer needed to do work on the coaster. This is because it has all of the stored energy (Potential Energy) needed from that one hill to make it MOVE (Kinetic Energy) all the way to the end. The image below shows the differences between potential and kinetic energy:





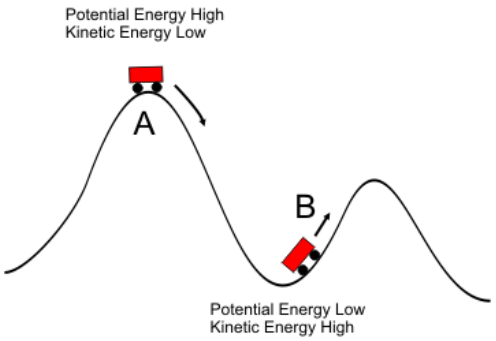
MATERIALS RECEIPT
PRICES ARE APPROXIMATE

Pool Noodle	$3.00
Marbles (6ct)	$1.00
Tape Measure (60")	$1.50
Duct Tape (55yd)	$3.00
Scissors	$1.00
Digital Scale	N/A
Timer (Cell Phone)	N/A
Calculator (Phone)	N/A
TOTAL	$9.50

Like matter, energy can neither be created nor destroyed. This is known as The Law of Conservation Of Energy. This law states that the total amount of energy (Mechanical Energy) the coaster has in the beginning is equal to the total that it has at the end. In other words, mechanical energy consists of potential energy plus kinetic energy, and potential energy should equal kinetic energy. Below are the equations for mechanical, potential and kinetic energy. In this lab, you'll test the law of conservation of energy by building a homemade roller coaster.

$ME = GPE + KE$ $KE = \frac{1}{2}mv^2$ $GPE = mgh$

ME = mechanical energy
GPE = gravitational potential energy
KE = kinetic energy
m = mass
v = velocity
g = earth's grav accel
h = height



PROCEDURE:

1.Use the scale to record the mass of the marble.
2.Slice the foam pool noodle in half (the long way) to make two U-shaped channels.
3.Tape the foam U-channels together, end-to-end. The joint between the two pieces should be as smooth as possible.
4.Measure the entire length of the joined tubes and record in your table as displacement.
5.Arrange your joined tubes into a path with an initial drop hill and a roundabout loop in the middle.
6.Ensure that the coaster path ends at the lowest point of your system
7.Measure the height of your first hill
8.Time how long it takes the marble to reach the end
9.Repeat step 5 four additional times.
10.Calculate and record the average time AND average velocity.

DATA

Trial	Mass (g)	Height (m)	Displacement (m)	Time (s)	Velocity (m/s)
1					
2					
3					
4					
5					
				AVG=	AVG=

LET'S APPLY

1. At the beginning of your coaster, did the marble have any GPE? Explain.

2. Did the marble have any KE at the beginning? Explain.

3. Calculate the amount of GPE at the beginning of the coaster? Why is this also the amount of ME? (Remember, gravity = -9.8 m/s^2)

4. Using your average time, calculate the amount of KE at the end of the coaster? Why is this also the amount of ME?

5. Were your values of ME the same or different at the end vs the beginning? Why do you think this occurred?