Loop de Loop! Challenge

Using your knowledge of Total Mechanical Energy, you will need to determine the height at which your ball will need to start to successfully reach the end of the track. You will need to set the start height of your ball –YOU MAY NOT PRACTICE THIS! You calculate it! **Think** about what information *you need* to find height and what *you have* to start out with.

HINT! Draw the situation using Energy bar charts and assume at the top of the loop KE = 0 J. But remember this is for easy calculating – we don’t actually want Kinetic Energy to be 0J or it won’t make the loop, therefore you may want to add 2-3 cm to your calculation for h to account for this.

Background:

Total Mechanical Energy = PE + KE PE = mgh KE = ½ mv2

 (Vf )2 = 2\*a\*h (where v is velocity, a is acceleration, h is height)

aramp = g \* sinΘ (where **Θ** is the angle of the ramp from horizontal)

**Supplies & Equipment**

* ball, ramp w/a loop, meter stick, protractor

Rule of Play:

1. Once you have calculated the initial height at which the marble must start to complete the loop – get your teacher!!
2. Mark the spot on the track with masking tape but you may NOT roll your marble on the track without my presence for grading.
3. Get Graded!
4. If your marble does not complete the loop and finish the track on the first attempt, you will start it one inch higher or lower incrementally until it does complete the loop. You will be deducted for each increment from your original needed.

Analysis – on separate paper:

1. Discuss what factors had to be taken into account when predicting the initial height of your ball and why. Be sure to put your explanation in terms of Total Mechanical Energy and Work. Show the TME bar charts to explain what happened.
2. If you were to add a second loop in the track after the first loop, what are some of the things you would need to consider to determine the height the loop could be?
3. Draw and label the track & loop with Energy & work labels for the beginning, top of the loop and the end of the track.
4. You didn’t have to account for friction. How would that have affected your challenge?