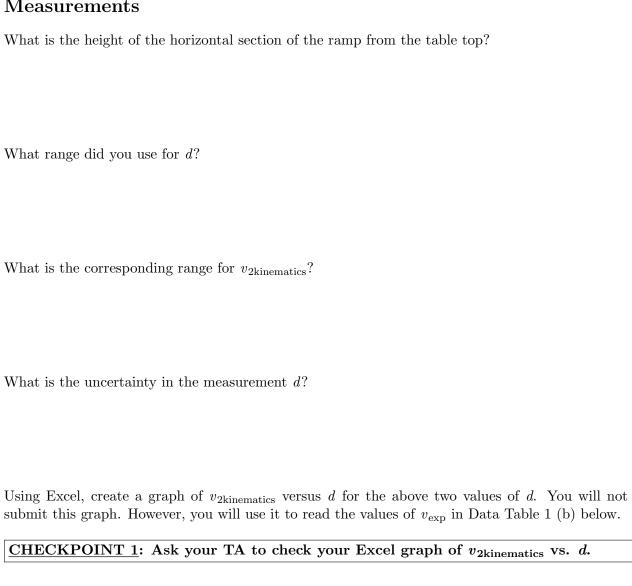# Conservation of Mechanical Energy

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Measurements

What is the height of the horizontal section of the ramp from the table top?

What range did you use for d?

What is the corresponding range for $v_{2\text{kinematics}}$?

What is the uncertainty in the measurement d?

Using Excel, create a graph of $v_{2\text{kinematics}}$ versus d for the above two values of d. You will not submit this graph. However, you will use it to read the values of v_{exp} in Data Table 1 (b) below.

CHECKPOINT 1: Ask your TA to check your Excel graph of $v_{2\text{kinematics}}$ vs. d.

Calculating v_2 using kinematics

Complete the data table below. h_1 is the height through which the sphere falls.

Data Table 1 (a)

Position	h_1 (cm)	Horizontal Distance d (cm)			
		Trial 1	**Trial 2**	**Trial 3**	**Average (cm)**
1					
2					
3					
4					
5					

Data Table 1 (b)

Position	σ_{davg} (cm)	v_{exp} (cm/s)	σ_{vexp} cm/s	% uncertainty
1				
2				
3				
4				
5				

CHECKPOINT 2: **Ask your TA to check your calculations before proceeding.**

Calculating v_2 using conservation of mechanical energy

What is the uncertainty in the measurement of h_1?

Complete the data table below using the same values of h_1 as in Data Table 1 (a).

Data Table 2

Position	h_1 (cm)	$v_{2\text{CME}}$ (cm/s)	$\sigma_{v_{2\text{CME}}}$ (cm/s)	% uncertainty
1				
2				
3				
4				
5				

Comparison

Which results agree within the range of uncertainties? (For each position, compare the values of $v_{\exp}$, $v_{2\text{CME}}$, and their uncertainties exactly as you have entered them.)

Data Table 3

Position	Agree?
1	
2	
3	
4	
5	

CHECKPOINT 3: Ask your TA to check your calculations.

What are some of the sources of uncertainty in this lab that could have contributed to a discrepancy in the two data sets?

Write a brief paragraph about what you learned from this lab.