Lab 5 – Warm-Up Activity Worksheet – Comparison of two measured numbers
Reference: Taylor, Sections 2.5

Group: _____

Analyst: _____

Experimenter: _____

Recorder: _____

1. A lab group is investigating the law of conservation of momentum by colliding two carts and measuring the total momentum before and after.
   In the first trial, they measure
   $p_i = (1.49 \pm 0.03)\ \text{kg m / s}$ and
   $p_f = (1.56 \pm 0.06)\ \text{kg m / s}$.
   a. Looking at the numerical results, do the results of Trial 1 agree? Why or why not?

   b. Compare the results of Trial 1 graphically, by showing the data and uncertainties for the initial and final momentum on the graph below. Show the data points as data markers and the uncertainties as *error bars*. Error bars represent the probable range that the data fall within. In this case, they will be vertical lines extending on either side of the data marker. Spread the two points out along the x-axis.

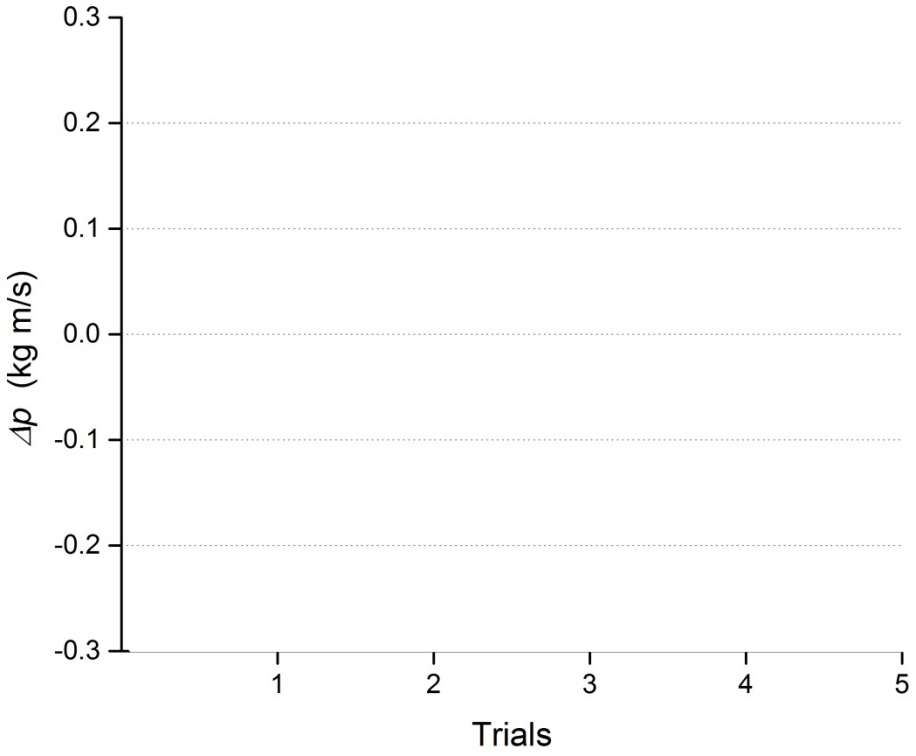
   Using the graph, how would you argue whether or not the results of Trial 1 agree?

2. They make more trials, and report their results in the table below.

Table 1: Measured momenta (kg m /s)

Trial Number	Initial Momentum p_i (all +/- 0.03)	Final Momentum p_f (all +/- 0.06)	Difference $\Delta p = p_f - p_i$
1	1.49	1.56	
2	3.21	3.12	
3	2.16	2.05	
4	0.51	0.70	

a. Calculate the differences and report in the table.
b. Compare the differences graphically, by showing differences and uncertainties (as error bars) on the graph below. Use the provisional rule for calculating the uncertainty in difference measurements:



c. Do the results agree with the law of conservation of momentum? Why or why not?

d. Which method – comparing numerical differences or comparing differences graphically – do you find more effective in demonstrating agreement between the results?