COL Worksheet

Your Name: _____ **Signature:** _____

Lab partner(s): _____

Course & Section: _____ **Station #**_____ **Date:** _____

Section D. Procedure

1. What are the masses of your two carts, gratings, and mass bars?

m_{cart1} = _____ ± _____ _____ (units)

m_{cart2} = _____ ± _____ _____ (units)

$m_{grating1}$ = _____ ± _____ _____ (units)

$m_{grating2}$ = _____ ± _____ _____ (units)

m_{bar1} = _____ ± _____ _____ (units)

m_{bar2} = _____ ± _____ _____ (units)

2. What is the average velocity for each photogate? Remember that if the two don't agree, you will have to find their ratios and adjust the velocities of all subsequent velocity measurements.

$v_{photogate1}$ = _____ ± _____ _____ (units)

$v_{photogate2}$ = _____ ± _____ _____ (units)

Section E Analysis

3. Record your data in the tables below. Do not forget to include the directions for the vector quantities.

Collision 1

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____±_____	_____±_____	_____±_____	_____±_____
Velocity (m/s)	_____±_____	_____±_____	_____±_____	_____±_____
Momentum (kg m/s)				
Kinetic energy (J)				

ε_p =_____

$\varepsilon_{k=}$ _____

Collision 2

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Velocity (m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Momentum (kg m/s)				
Kinetic energy (J)				

$\varepsilon_p =$ _____

$\varepsilon_{k =}$ _____

Collision 3*

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Velocity (m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Momentum (kg m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Kinetic energy (J)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____

$\varepsilon_p =$ _____

$\varepsilon_{k =}$ _____

Collision 4

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Velocity (m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Momentum (kg m/s)				
Kinetic energy (J)				

$\varepsilon_p =$ _____

$\varepsilon_{k =}$ _____

Collision 5

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Velocity (m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Momentum (kg m/s)				
Kinetic energy (J)				

$\Delta p =$ _____ Kg.m/s

$\Delta K =$ _____ J

Collision 6

	Cart 1 before collision	Cart 1 after collision	Cart 2 before collision	Cart 2 after collision
Mass (kg)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Velocity (m/s)	_____ ± _____	_____ ± _____	_____ ± _____	_____ ± _____
Momentum (kg m/s)				
Kinetic energy (J)				

$\Delta p =$ _____ Kg.m/s.

$\Delta K =$ _____ J.

4*. Write out the error analysis for collision 3 to find the uncertainties in momentum and kinetic energy, and the uncertainties in ε_p and ε_k.

5. For the elastic collisions, did your data fit the conservation of energy and momentum model? Explain.

6. For the inelastic collisions, did your data fit the conservation of momentum model? Explain. What was the relative energy loss? Where did the energy go?

7. For the "explosion," did your data fit the conservation of momentum model? Explain. What was the energy gained?

GRADE:_____   **GRADED BY _____**
       (out of 30 points)   (TA's initials)