PHYSICS **NAME: _____**
MOMENTUM LAB
Pledge: I have neither given nor received unauthorized help: **_____**

OBJECTIVE. To investigate elastic and inelastic collisions.

PART II. AIR TRACK SIMULATION. (http://www.physicslessons.com/exp5b.htm)
This simulation models a basic air track with two blocks.

GENERAL DIRECTIONS:
- Drag the **RED Block** to the '**0'** mark on the ruler and drag the **GREEN Bl**ock to the '**3'** mark for all experiments
- Click **GO** to start Simulations
- **STOP** the simulation after the blocks reach the end of ruler.
- Read **FINAL VELOCITIES** by clicking on the **GREEN TAB** of the Momentum Values
- Set ***e*** at '1' for ELASTIC COLLISIONS
- Set ***e*** at '0' for INELASTIC COLLISIONS

Part I. ELASTIC COLLISIONS: QUALITATIVE ANALYSIS

DIRECTIONS: After setting the values click on **GO** and observe what happens **AFTER** the collision, then answer the questions indicating your observations regarding the **velocities** (how fast, how slow) and **direction** of each mass.

Elastic Collision **Case I. $m_1 = m_2$**
Set the values as: $m_1 = 2$ kg $m_2 = 2$ kg
$v_1 = 5$ m/s $v_2 = 0$ m/s

What happens to *Mass 1* (RED)?

_____

What happens to *Mass 2* (GREEN)?

_____

Elastic Collision **Case II. $m_1 > m_2$**
Set the values as: $m_1 = 2$ kg $m_2 = 1$ kg
$v_1 = 5$ m/s $v_2 = 0$ m/s

What happens to *Mass 1* (RED)?

_____

What happens to *Mass 2* (GREEN)?

_____

Elastic Collision **Case III.** $m_1 < m_2$

Set the values as: $m_1 = 1$ kg $m_2 = 2$ kg

$v_1 = 5$ m/s $v_2 = 0$ m/s

What happens to *Mass 1* (RED)?

_____

What happens to *Mass 2* (GREEN)?

_____

Part II. COLLISIONS: QUANTITATIVE ANALYSIS

FOR EACH CASE:

1. Find the values for the **FINAL VELOCITIES (*v_1'* and *v_2'*)**of each block (reading from the Green Tab) and record the values on the tables.
2. Perform your **OWN** calculations for **MOMENTUM** and **KINETIC ENERGY** showing all your work: equations and answers.

ELASTIC COLLISION I. (Set ***e*** at 1)

RED BLOCK	**GREEN BLOCK**
m_1 = 3 kg	***m_2 = 2 kg***
v_1 = 5 m/s	***v_2 = 0 m/s***
Initial momentum =	Initial momentum =
Initial KE =	Initial KE =
v_1' =	***v_2' =***
Final momentum =	Final momentum =
Final KE =	Final KE

Was momentum conserved? _____ Was KE conserved? _____

ELASTIC COLLISION II. (Set ***e*** at 1)

RED BLOCK	**GREEN BLOCK**
$m_1 = 3$ kg	$m_2 = 2$ kg
$v_1 = 5$ m/s	$v_2 = -4$ m/s
Initial momentum =	Initial momentum =
Initial KE =	Initial KE =
$v_1' =$	$v_2' =$
Final momentum =	Final momentum =
Final KE =	Final KE

Was momentum conserved? _____ Was KE conserved? _____

INELASTIC COLLISION I. (Set ***e*** at 0)

RED BLOCK	**GREEN BLOCK**
$m_1 = 3$ kg	$m_2 = 2$ kg
$v_1 = 5$ m/s	$v_2 = 0$ m/s
Initial momentum =	Initial momentum =
Initial KE =	Initial KE =
$v_1' =$	$v_2' =$
Final momentum =	Final momentum =
Final KE =	Final KE

Was momentum conserved? _____ Was KE conserved? _____

If not, find is the loss of KE:

INELASTIC COLLISION II. (Set ***e*** at 0)

RED BLOCK	**GREEN BLOCK**
$m_1 = 3$ kg	$m_2 = 2$ kg
$v_1 = 5$ m/s	$v_2 = -4$ m/s
Initial momentum =	Initial momentum =
Initial KE =	Initial KE =
$v_1' =$	$v_2' =$
Final momentum =	Final momentum =
Final KE =	Final KE

Was momentum conserved? _____ Was KE conserved? _____

If not, find is the loss of KE: