Momentum Activity ELASTIC

Names: _____

Purpose:

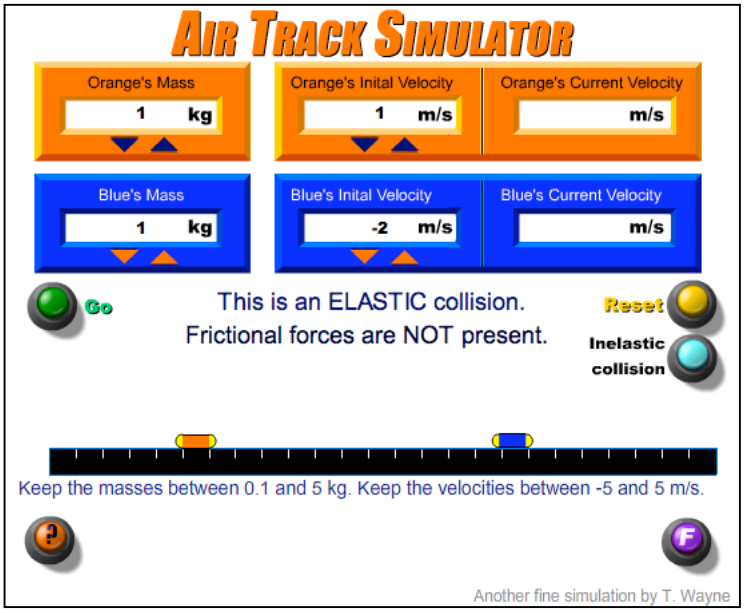
In this activity you are going to investigate momentum. (Time: 40 minutes)

Procedure:

Open up the web browser and go to the URL below It is case sensitive.

http://www.mrwaynesclass.com/teacher/Impulse/SimFriction

If the link will not open, then reload the page again by pressing ⌘-R. Sometimes this happens because everyone is trying to read the same file at the same time.



This Flash applet simulates the collision between two carts on a track. There is no friction on the track unless the "Friction" button I pressed. Change the masses and velocities then press the "Go" button. Pay attention to the current velocity numbers in the boxes.

- Press the "GO" button and watch what happens.
- Press the "Reset" button. This time make the necessary observations to fill out the chart below. Lower case "p" stands for momentum.

Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Momentum Before the Collision $p=(mass)(v_{INITIAL})$ Calculate this value	Cart's Momentum After the Collision $p=(mass)(v_{FINAL})$ Calculate this value	Add p's of orange & blue before the collision	Add p's of orange & blue after the collision
Orange	1	1					
Blue	2.0	0					

What relationship do you observe between p_O and p_B (In the last two columns?)

_____

_____

_____

Have the teacher initial your statement above before continuing. _____

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Create three experiments. **In each experiment change ONLY one variable.** To change the variables like mass or initial velocity, click on the "Reset" button and then enter the numbers. The TAB key can be use instead of the mouse to jump around the variable boxes. Try it. It will save you time entering numbers. Note that every time you press the "Reset" button the number are cleared. The purpose of your experiments is to see if your statement is true under each of the following conditions. **Empty cells in the data table are to be filled in and chosen by you.** Choose velocities such that none of the carts impact the end's of the track before hitting the other cart.

Experiment 1: Effect of Mass

The mass of one of the carts is increased while the rest of the variables are left unchanged from the original conditions

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Momentum Before the Collision $p=(mass)(v_{INITIAL})$ Calculate this value	Cart's Momentum After the Collision $p=(mass)(v_{FINAL})$ Calculate this value	Add p's of orange & blue before the collision	Add p's of orange & blue after the collision
1	Orange	1	1					
	Blue	1	0					
2	Orange	1	1					
	Blue		0					
3	Orange	1	1					
	Blue		0					
4	Orange	1	1					
	Blue		0					
5	Orange	1	1					
	Blue		0					

Experiment 2: Effect of impact velocity

The speed of one of the carts is always the same positive value while the other cart is varied and all the masses are held constant. (You choose the variable's values.) The blue cart's velocity needs to be a lot less than the orange cart.
Do not make any masses greater than 5 or less than -5

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Momentum Before the Collision $p=(mass)(v_{INITIAL})$ Calculate this value	Cart's Momentum After the Collision $p=(mass)(v_{FINAL})$ Calculate this value	Add p's of orange & blue before the collision	Add p's of orange & blue after the collision
1	Orange		5					
	Blue		0					
2	Orange		5					
	Blue		1					
3	Orange		5					
	Blue		2					

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Experiment 3: Effect of negative velocity

The speed of BLUE cart is always the same negative value while the other cart is varied and all the masses are held constant. **Do not make any masses greater than 5** **Empty cells in the data table are to be filled in and chosen by you.** Choose velocities such that none of the carts impact the end's of the track before hitting the other cart.

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Momentum Before the Collision $p=(mass)(v_{INITIAL})$ Calculate this value	Cart's Momentum After the Collision $p=(mass)(v_{FINAL})$ Calculate this value	Add p's of orange & blue before the collision	Add p's of orange & blue after the collision
1	Orange							
	Blue		-1					
2	Orange							
	Blue		-1					
3	Orange							
	Blue		-1					
4	Orange							
	Blue		-1					
5	Orange							
	Blue		-1					

Is you statement from the first page still true? YES or NO (Circle your answer)

If the statement it is not still true, rewrite it below.

_____

_____

_____

_____

Do you think you statement above will remain true if the two carts stick together? YES or NO

Get the teacher's initials before continuing. _____

Momentum Activity Homework

Names: _____

Click on the inelastic button. Run the simulation. Describe how this is different from the previous experiment result.

Create an experiment to test if your statement is still true if the two carts stick together. **Do not make any masses greater than 5** Choose velocities such that none of the carts impact the end's of the track before hitting the other cart.

Experiment 4: Inelastic

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Momentum Before the Collision $p=(mass)(v_{INITIAL})$ Calculate this value	Cart's Momentum After the Collision $p=(mass)(v_{FINAL})$ Calculate this value	Add p's of orange & blue before the collision	Add p's of orange & blue after the collision
1	Orange							
	Blue							
2	Orange							
	Blue							
3	Orange							
	Blue							
4	Orange							
	Blue							
5	Orange							
	Blue							

Is you statement from the first page still true? YES or NO (Circle your answer)
If it is not still true rewrite it below.

_____

_____

_____

Get the teacher's initials and turn in your paper._____

Momentum Activity Homework

Names: _____

Finish collecting the data.

Fill out the data table's below using data from experiments 1 and 4.

Experiment 1

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Kinetic Energy Before the Collision $KE = \frac{1}{2}m\upsilon^2$ Calculate this value	Cart's Kinetic Energy After the Collision $KE = \frac{1}{2}m\upsilon^2$ Calculate this value	Add all the KE's of orange & blue before the collision	Add all the KE's of orange & blue after the collision
1	Orange	1	1					
	Blue	1	0					
2	Orange	1	1					
	Blue		0					
3	Orange	1	1					
	Blue		0					
4	Orange	1	1					
	Blue		0					
5	Orange	1	1					
	Blue		0					

Experiment 4

Trial	Cart	Mass	Initial velocity before the collision	Final velocity after the collision	Cart's Kinetic Energy Before the Collision $KE = \frac{1}{2}m\upsilon^2$ Calculate this value	Cart's Kinetic Energy After the Collision $KE = \frac{1}{2}m\upsilon^2$ Calculate this value	Add all the KE's of orange & blue before the collision	Add all the KE's of orange & blue after the collision
1	Orange							
	Blue							
2	Orange							
	Blue							
3	Orange							
	Blue							
4	Orange							
	Blue							
5	Orange							
	Blue							

To conserve a quantity means the total before the collision equals the total after the collision. Are momentum and kinetic energy conserved? How do you know?