PhET Simulation: Collision Lab.

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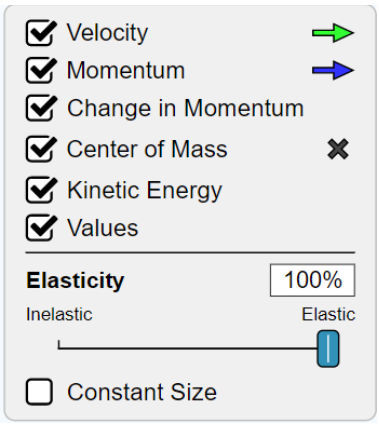
Intro



Momentum = m x v **Kinetic energy = ½ m x v^2**

Along the x axis: Choose the positive and negative directions.

1) **Before Collision:**

a) Calculate the momentum of ball A: Make sure to use the + or – sign for the velocity.

Compare your value to the value on the screen in the simulation.

b) Calculate the momentum of ball B: Make sure to use the + or – sign for the velocity.

Compare your value to the value on the screen in the simulation.

c) Calculate the total momentum before collision = momentum of ball 1 + momentum of ball 2
d) Calculate the total momentum after collision = momentum ball 1 + momentum of ball 2.
e) Use the calculations of c and d to prove that the total momentum before collision = total momentum after collision

Note: If you check more data box, you will see the values there.

☑ More Data

	Mass (kg)	Position (m) x	Velocity (m/s) v_x	Momentum (kg m/s) p_x
1	0.50	-1.00	1.00	0.50
2	1.50	1.00	-0.50	-0.75

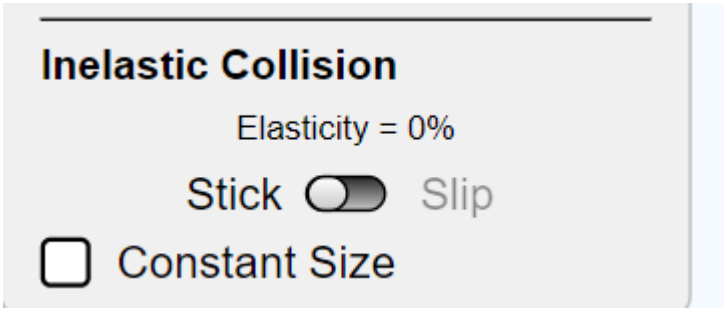
f) Use the kinematic equations and the value for time to calculate X for each ball. Compare you calculated value to the value on the screen for PhET.

Kinematic Equations for Motion with Constant Acceleration
$v = v_o + at$
$x = \frac{1}{2}(v_o + v)t$
$v^2 = v_o^2 + 2ax$
$x = v_o t + \frac{1}{2}at^2$

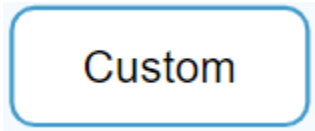
x Displacement (km, m)	a acceleration (m/s ²)	t time (s, h)	Vo =Vi initial velocity (m/s, km/h)	V = Vf Final velocity (m/s , km/h)

Part 2: Inelastic Collision

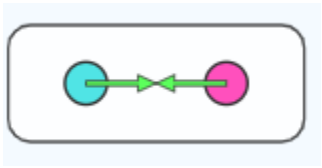
a)



b) For Custom:



Choose



c) Have one ball bigger than the other. Repeat these steps

Momentum = m x v **Kinetic energy = ½ m x v^2**

Along the x axis: Choose the positive and negative directions.

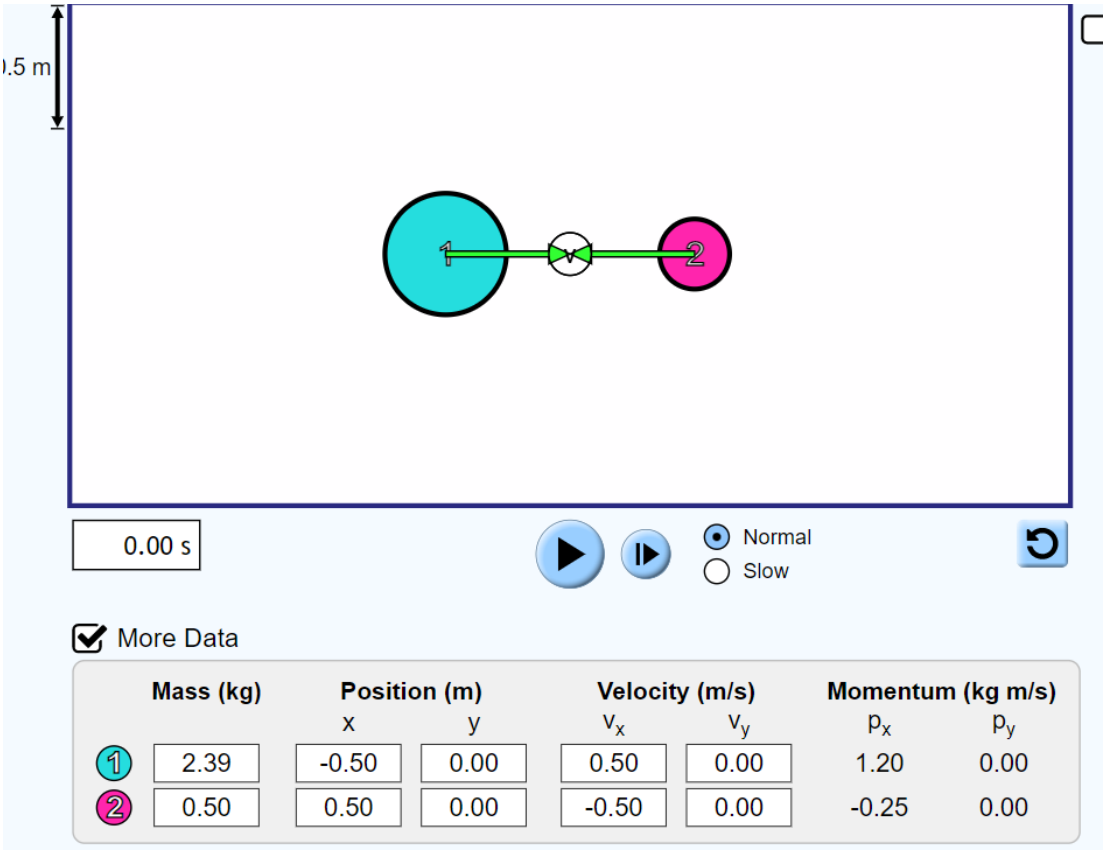
2) Before Collision:

g) Calculate the momentum of ball A: Make sure to use the + or – sign for the velocity. Compare your value to the value on the screen in the simulation.

h) Calculate the momentum of ball B: Make sure to use the + or – sign for the velocity. Compare your value to the value on the screen in the simulation.

i) Calculate the total momentum before collision = momentum of ball 1 + momentum of ball 2
j) Calculate the total momentum after collision = momentum ball 1 + momentum of ball 2.
k) Use the calculations of c and d to prove that the total momentum before collision = total momentum after collision

Note: If you check more data box, you will see the values there.



	Mass (kg)	Position (m) x	Position (m) y	Velocity (m/s) v_x	Velocity (m/s) v_y	Momentum (kg m/s) p_x	Momentum (kg m/s) p_y
1	2.39	-0.50	0.00	0.50	0.00	1.20	0.00
2	0.50	0.50	0.00	-0.50	0.00	-0.25	0.00