Name _____ Hour _____

Momentum Lab

Momentum is defined as the mass of an object multiplied times its velocity.

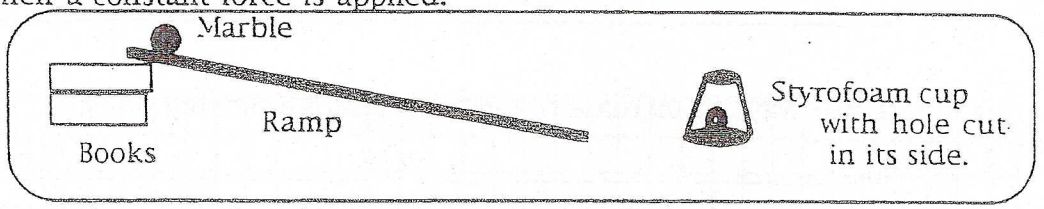
$$\vec{P} = m\vec{V}$$

$\vec{P}$ = momentum
m = mass
$\vec{V}$ = velocity

Momentum is the total motion of an object in a given direction. Momentum has been defined as a property of a moving object that determines the length of time required to bring it to rest when under the action of a constant force.

Momentum is an important quantity to consider during collisions. When two or more objects collide the resulting affect depend on the momentum of each object. Consider when two football players collide during the game. The player with the greater momentum will stop the player of less momentum. When cars collide on the highway momentum differences can cause one car to be stopped and be pushed backward by the other.

In this lab we will investigate the ways to change the momentum of moving objects. The momentum will be measured in terms of how far a moving object will travel when a constant force is applied.



Problem 1: Does the velocity of the marble affect its momentum? Fact: the greater the momentum of the moving marble the farther the styrofoam cup will move.

Velocity (Ramp Position of Marble) (cm)	Momentum (Cup Movement) (cm)

Conclusion: What affect does changing the velocity of the marble have on its momentum?

_____

_____

(over)

Problem 2: Does the mass of the marble affect its momentum? Fact: the greater the momentum of the moving marble the farther the styrofoam cup will move. Increasing the number of marbles rolling down the ramp will increase the mass. Place the upper-most marble at the position on the ramp to maintain constant speed. Complete the data table provided.

Mass	Momentum
(Number of Marbles)	(Cup Movement in cm)

Conclusion: What affect does changing the total mass of the marble have on momentum?

_____

_____

1. State two ways to increase the momentum of a moving object.

   a) _____ b) _____

2. Two object of the same mass have different momentums. State how this could occur. _____

3. Two cars traveling at the same speed collide. Car "A" pushes Car "B" backward from the point of impact. Which car has the greater mass? _____

4. Football problem: A less massive linebacker is able to tackle and push backward a more massive running back. State how the linebacker was able to do this. _____

5. What is the momentum of a 1000 kg car that travels at a velocity of 20 m/s north? (show your work)

Formula Used: _____

Problem calculations:

Solution : _____
(include correct units)