

M&M Can Collision

Procedure:

1) Find the video:

- a) On a school science computer open the Physics 9 folder on the desktop, open Videos, open Unit 4, open the mampm.mov file.
- b) Go to the website http://serc.carleton.edu/student_videos/index.html#impulse_momentum and download the file "M&M colliding with pop can."
- c) View the video on YouTube https://www.youtube.com/watch?v=1_oN37CzO3A. This option will not allow you to step through the video one frame at a time like what is possible if you download it and use Quicktime.

If you don't have Apple Quicktime on your computer you can download it from <https://www.apple.com/quicktime/download/> It is available on Windows as well as Macs.

2) View the video:

Watch it through at least once. Then use the video to collect data on both the M&M and the Pop Can.

3) Calculate the velocity of the M&M and the Pop Can after the collision.

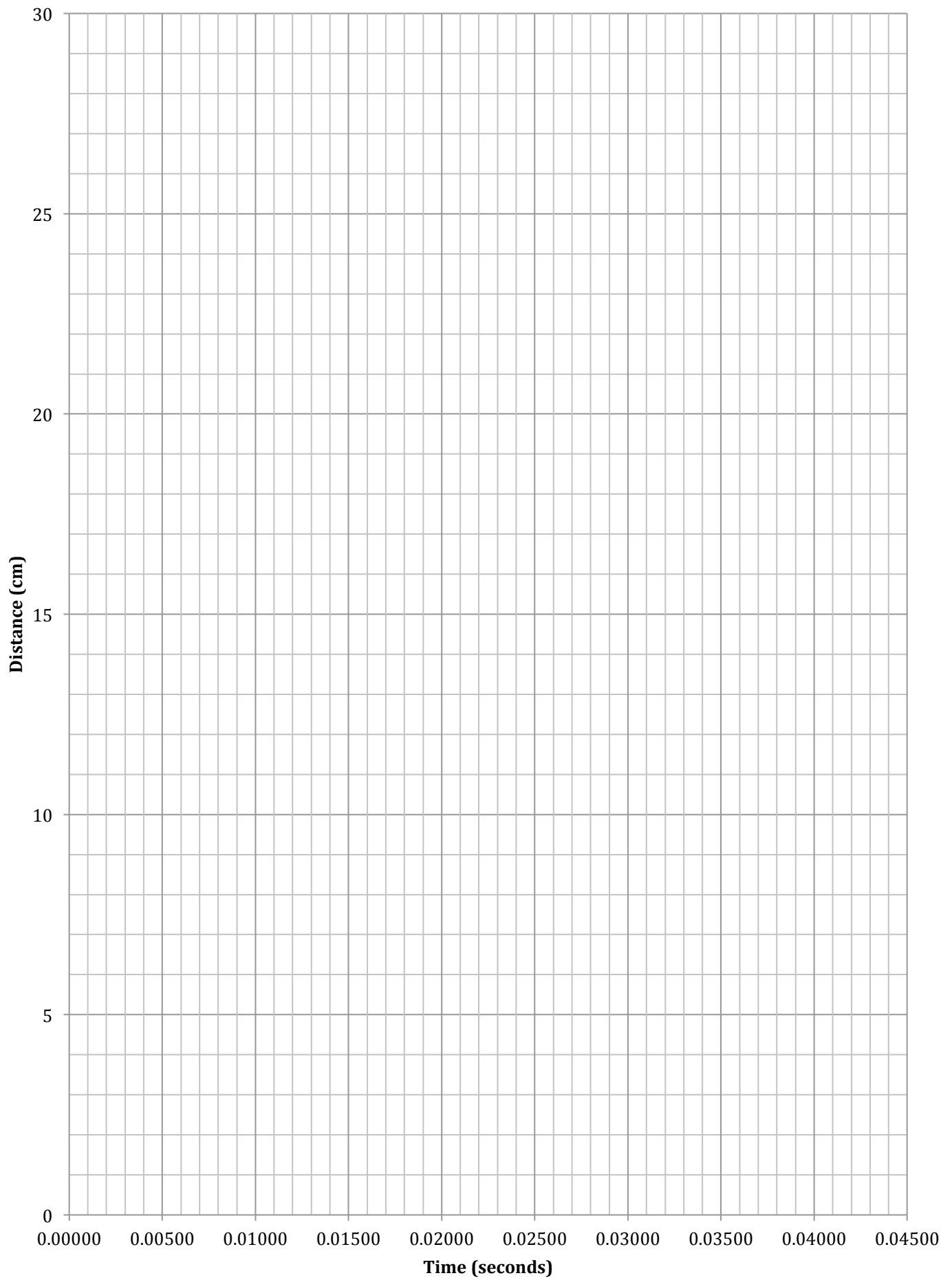
- a) Calculate the time for each frame.
- b) Graph your data and use the definition of velocity (velocity = slope of velocity vs time) to calculate the velocity of both the M&M and the Pop Can on the same graph. **Make sure you do a best fit line and identify the points you are using to calculate the slope.**

4) Calculate the momentum of the of the M&M before the collision.

- a) Use the mass of the M&M to calculate the momentum of the M&M after the collision.
- b) Use the mass of the Pop Can to calculate the momentum of the Pop Can after the collision.
- c) Use the velocity of the Pop Can before the collision (zero) to calculate the momentum before the collision.
- d) Use the law of conservation of momentum to calculate the momentum of the M&M before the collision.
- e) Calculate the velocity of the M&M before the collision from the momentum.

Data:

Frame Number	Time	Pop Can Distance	M&M Distance
0			
1			
2			
3			
4			
5			XXXXXXXXXXXXXX
6			XXXXXXXXXXXXXX
7			XXXXXXXXXXXXXX
8			XXXXXXXXXXXXXX
9			XXXXXXXXXXXXXX
10			XXXXXXXXXXXXXX
11			XXXXXXXXXXXXXX
12			XXXXXXXXXXXXXX
13			XXXXXXXXXXXXXX
14			XXXXXXXXXXXXXX
15			XXXXXXXXXXXXXX
16			XXXXXXXXXXXXXX
17			XXXXXXXXXXXXXX
18			XXXXXXXXXXXXXX
19			XXXXXXXXXXXXXX
20			XXXXXXXXXXXXXX
21			XXXXXXXXXXXXXX
22			XXXXXXXXXXXXXX
23			XXXXXXXXXXXXXX
24			XXXXXXXXXXXXXX
25			XXXXXXXXXXXXXX
26			XXXXXXXXXXXXXX
27			XXXXXXXXXXXXXX
28			XXXXXXXXXXXXXX
29			XXXXXXXXXXXXXX
30			XXXXXXXXXXXXXX
31			XXXXXXXXXXXXXX
32			XXXXXXXXXXXXXX
33			XXXXXXXXXXXXXX
34			XXXXXXXXXXXXXX
35			XXXXXXXXXXXXXX
36			XXXXXXXXXXXXXX
37			XXXXXXXXXXXXXX
38			XXXXXXXXXXXXXX
39			XXXXXXXXXXXXXX
40			XXXXXXXXXXXXXX



Calculations:

Time:

M&M Velocity after the collision:

Pop Can Velocity after the collision:

Momentum of the M&M after the collision:

Momentum of the Pop Can after the collision:

Momentum of the Pop Can before the collision:

Momentum of the M&M before the collision:

Velocity of the M&M before the collisions:

Summary:

1. What is the law of conservation of momentum?
2. How is momentum calculated?
3. How did you calculate the velocity to calculate the momentum?
4. How did you calculate the momentum of the M&M before the collision?
5. How did you calculate the velocity of the M&M before the collision?
6. What are the source and size of the errors?