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			XXXXXXXXXXX
6			XXXXXXXXXXX
7			XXXXXXXXXXX
8			XXXXXXXXXXX
9			XXXXXXXXXXX
10			XXXXXXXXXXX
11			XXXXXXXXXXX
12			XXXXXXXXXXX
13			XXXXXXXXXXX
14			XXXXXXXXXXX
15			XXXXXXXXXXX
16			XXXXXXXXXXX
17			XXXXXXXXXXX
18			XXXXXXXXXXX
19			XXXXXXXXXXX
20			XXXXXXXXXXX
21			XXXXXXXXXXX
22			XXXXXXXXXXX
23			XXXXXXXXXXX
24			XXXXXXXXXXX
25			XXXXXXXXXXX
26			XXXXXXXXXXX
27			XXXXXXXXXXX
28			XXXXXXXXXXX
29			XXXXXXXXXXX
30			XXXXXXXXXXX
31			XXXXXXXXXXX
32			XXXXXXXXXXX
33			XXXXXXXXXXX
34			XXXXXXXXXXX
35			XXXXXXXXXXX
36			XXXXXXXXXXX
37			XXXXXXXXXXX
38			XXXXXXXXXXX
39			XXXXXXXXXXX
40			XXXXXXXXXXX
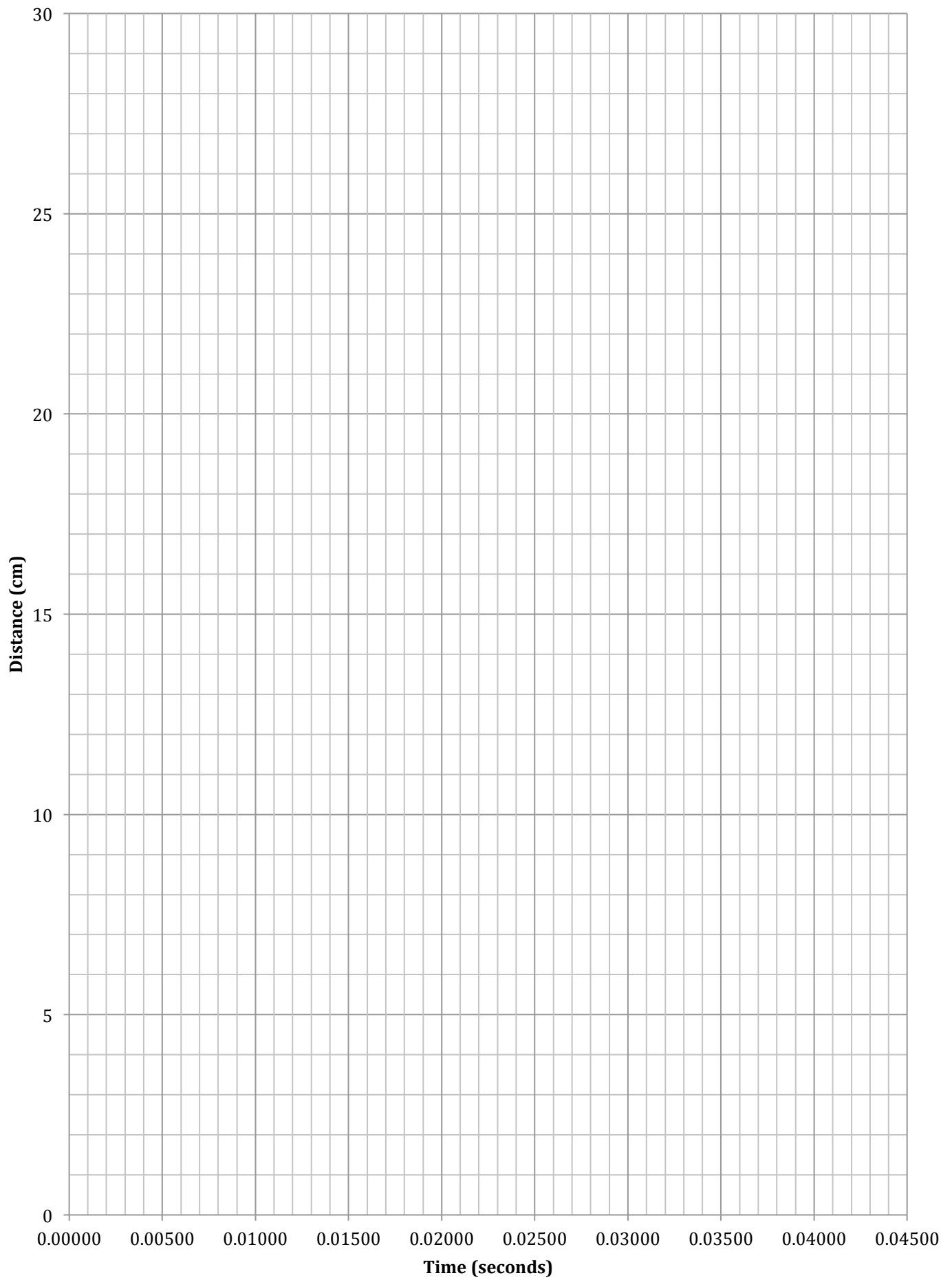
Calculations:

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 collions:

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 collesion?
6. What are the source and size of the errors?