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Name: ___________________________

Partner: ___________________________

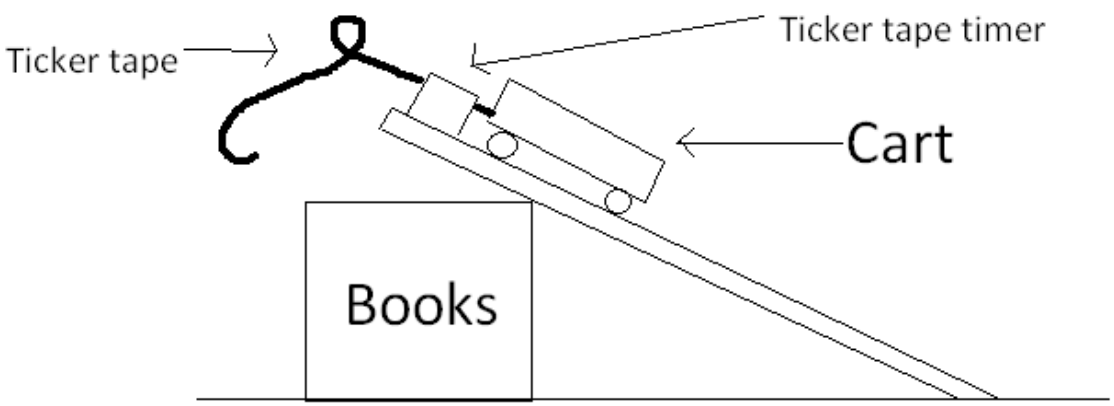
Grade 11 Physics – Uniform and Non-uniform Velocity

Objective: to compare the way a cart moves with uniform velocity and accelerated velocity

Apparatus:

- Ticker-tape Timer
- Ticker Paper
- Ruler
- Clamp
- Incline
- Tape
- Dynamics Cart
- Uniform Speed Car

Procedure:



Part A: Accelerated Motion

1. Set up the incline with a small angle
2. Clamp the ticker-tape timer to the end of the board
3. Briefly test the timer by plugging it in and turning it on. It should have a loud, steady buzzing sound. If it is working properly, it will make 60 "ticks" per second.
4. Tape the ticker paper to the end of the cart
5. With the dynamics cart at the top of the incline, thread 2 meters of ticker paper through the timer. Make sure the ink side of the carbon paper is touching the ticker paper.
6. Turn on the timer and release the cart. Turn off the timer once the cart has reached the bottom.
7. Bring your ticker paper to your teacher to confirm the results will be acceptable for the calculations

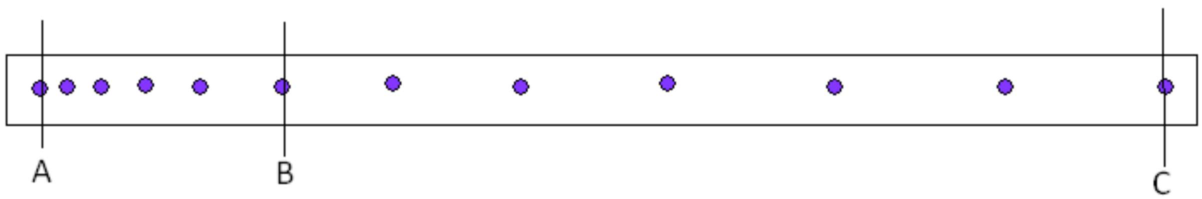
Part B: Uniform Motion

1. Attach 0.5 meters of ticker paper to the uniform speed car
2. Thread the ticker paper though the timer
3. Turn on the timer and then turn on the car and release it
4. Once the car has driven 0.5 meters away from the timer, turn off the timer
5. Bring your ticker paper to your teacher to confirm the results will be acceptable for the calculations

Analysis:

Perform the following steps on both pieces of ticker paper.

1. Count off groups of 6 spaces and mark the tape at (not between) every 6th dot.
   Note: 6 dots = 0.10s



2. Complete the data table
3. Create a position-time graph with the first two columns of the data table. Put time on the x-axis and position on the y-axis.
4. Create a velocity-time graph with the last two columns of the data table. Put time on the x-axis and velocity on the y-axis.
5. Draw a line of best fit for each graph. Do NOT connect all the dots. The line of best fit may be straight or curved, depending on what would fit your data best. It does not have to begin at zero. – This will be worth one mark for each graph.

Discussion:

1. Compare the position-time graphs for Part A and B. What is similar or different and why?

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2. Compare the velocity-time graphs for Part A and B. What is similar or different and why?

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3. Perform the following calculations for Part B:
   a. Calculate the slope of the position-time graph.

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   b. Calculate the velocity of the car by using the total distance it travelled and the total time.

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   c. How do your answers for the previous two questions compare?

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Data: Part A – Accelerated Motion

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Time, t (s)	Position, $\vec{d}$ (m) measured from the start	□t (s)	Displacement $\Delta\vec{d} = \vec{d}_2 - \vec{d}_1$ (m)	Average Velocity $\vec{v}_{avg} = \frac{\Delta\vec{d}}{\Delta t}$ (m/s)	Time, t (s) Use for the velocity-time graph
0	0				
		0.10			0.05
0.10					
					0.15
0.20					
					0.25
0.30					
					0.35
0.40					
					0.45
0.50					
					0.55
0.60					
					0.65
0.70					
					0.75
0.80					
					0.85
0.90					
					0.95
1.00					
					1.05
1.10					

Data: Part B – Uniform Motion

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Time, t (s)	Position, $\vec{d}$ (m) measured from the start	□t (s)	Displacement $\Delta\vec{d} = \vec{d}_2 - \vec{d}_1$ (m)	Average Velocity $\vec{v}_{avg} = \frac{\Delta\vec{d}}{\Delta t}$ (m/s)	Time, t (s) Use for the velocity-time graph
0	0				
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0.10					
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0.30					
					0.35
0.40					
					0.45
0.50					
					0.55
0.60					
					0.65
0.70					
					0.75
0.80					
					0.85
0.90					
					0.95
1.00					
					1.05
1.10					