NAME_____ DATE_____

Physics: Graphing Motion Lab (Do as group)

FOR EACH GRAPH THAT YOU DRAW OR PRINT (yes, they can be printed!!)..... Make a conclusion underneath describing what you or your subject was doing in each section and how the graph shows (or doesn't!) those results!! So in summary:

Part I: at least 5 distance time graps with conclusions (4 of your own, one as a challenge).

Part II at least 5 velocity time graphs (same motions as Part I) with conclusions, then areas.

2 challenge velocity time graphs.

PartIII: Comparisons of 2 D-t,V-t,A-t graphs

Part IV: at least four distance time and speed time graphs of a falling object. Equations and cruve fits for the distance time graph. Conclusions on the experiment.

ParIV 2 people distance time graphs with conclusions, 2 people velocity time graphs and areas of the same motions.

Part VI: Two car trips with distance time and speed time graphs, with average speeds, slopes on distance time graph as speeds, areas on speed time graph as distances, slope on speed time graphs as acceleration. Oh, yes, conclusions on this part. as well.

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1) DISTANCE TIME GRAPH MATCHING

With a partner (or two). Use the PHYSICS program with a graphing calculator and CBL unit . Set up probes by selecting the sonic motion detector, then use the distance match option. These programs will draw a distance time graph of motion for you to match.

(Go to APPS: Physics.... 1) Set Up Probes, 1 Probe, Motion.. 2) Collect Data, Graph match, Distance Graph)

Procedure:

Let the program pick a graph for you to match. Holding a book or other object, walk in front of the motion detector and try and match the graph. (Note, having a person hold the motion detector, while you hold the calculator works the best, or put them all together and walk against a wall) ** Sketch the graph, including tick marks, and your results in your lab notes. Have each person in your group try to match the SAME graph at least once.

Using the same program, each person in the group must try and match at least FOUR DIFFERENT distance time graphs. ** Each time, sketch the graph and your results in your notes.(each tick mark is a meter) Later, under each one describe what you were doing.

** Try at least ONE extra challenge: Have one person in your group sketch out a distance time graph of their choosing on a piece of paper. Use the same program and try and replicate the same distance time graph...WITHOUT looking at the real distance-time graph. Record your results.....

Part I: at least 5 distance time graphs with conclusions (4 of your own, one as a challenge). Conclusions include what you or your subject was doing in each section and how the graph shows (or doesn't!) those results!! Also indicate who did the best, and how you did or didn't improve.

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2)VELOCITY TIME GRAPHS

Use the Physics Program to try and match 4 velocity time graphs. Note that holding the motion detector near a wall or table works for this as well. Sketch the graph, including tick marks, and your results in your lab notes. Have each person in your group try to match the SAME graph at least once. Note that simply being on the right side (positive or negative) is usually good enough for these!

Using the same program, each person in the group must try and match at least FOUR DIFFERENT velocity time graphs. ** Each time, sketch the graph and your results in your notes.(each tick mark is a meter) Later, under each one describe what you were doing.

Part II: at least 5 velocity time graphs with conclusions (4 of your own, one as a challenge). Conclusions include what you or your subject was doing in each section and how the graph shows (or doesn't!) those results!! Also indicate who did the best, and how you did or didn't improve.

3) Comparison of Distance-Time and Velocity Time graphs.
At least 2 graphs. Set up the motion detector (Go to APPS: Physics.... 1) Set Up Probes, 1 Probe, Motion.. 2) Collect Data, Time Graph, SampleTime .1, Samples 99) so that you have a 10 second graph. Pick Live display, ymin0,ymax 10, scale =1... Walk against a wall (more than .5 meters away and less than 8 meters away). Sketch both the distance time, velocity time, and acceleration time graphs, with tick marks. (Use the main menu, 3) analyze, view graphs options).

(Honors only: Calculate the slope on each straight or semi-straight section of your distance time graph and compare to your speed-time graph.
Calculate the area on your speed-time graph and compare it to your total distance. Calculate the AREA underneath your final velocity time graphs to show that the area equals the total distance traveled. This can be done by hand by counting the squares, or using a calculator. (Use Analayze part of the program on calculators, uses data in L1,L5
Calculate your average speed in total.
Calculate your accelerations on your speed-time graph.)

Your conclusions should describe what you were doing in each section of each graph, and how the distance, velocity, and acceleration graphs show the same information.

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CHECK TO SEE IF WE HAVE TIME TO DO THIS!

4) Making measurements with the CBL motion detector.
Follow the directions from the HOLT physics lab. Record data (at least 3-4 trials) of a dropping object. For each one sketch the distance time graph, as well as the speed time graph. Use the PHYSICS program ANALYZE option to find the best curve fit, checking linear, quadratic and power. Write the equation and correlation coefficient for each one... sketch the best curve fit line. Also write a paragraph conclusion explaining your results, and what could have been improved upon.

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5) PEOPLE GRAPHS:

Using a timing device (watch, stopwatch, etc...) and a measuring device (meter stick, tape measure, etc...) make at least two distance time graphs for a person walking or running inside/around/outside the school. This can be someone in your group, or you can find a student or teacher to follow around! Try to take at least 20 data point readings (so, every minute for walking... every 15-40 seconds for running). From your results, make a velocity-time graph as well... EXAMPLE:

TIME	DISTANCE (From start)	VELOCITY (change in distance/change in time)
0	0	0
1	5	5
2	6	1
4.5	9.5	1
5	9	-1

Try to draw your two graphs underneath each other, so you can write a conclusion explaining each section by describing what the person is doing and how that is showed by the graph.

*(Honors only ***Calculate the slope on each straight or semi-straight section of your distance time graph and compare to your speed-time graph.*
Calculate the area on your speed-time graph and compare it to your total distance.
Calculate your average speed in total.
Calculate your accelerations on your speed-time graph)

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6.CAR GRAPHS:

Over the next 4 days, make at least two safe trips in a car, preferably with a physics partner. Use your odometer, your speedometer, and car clock to make distance-time AND speed time graphs of the trips (at least 15 min in length)... You can read time and speed every mile, or time and distance every minute, but try and accurately measure your travels.

Draw the distance-time and speed-time graphs for both.

ALL MUST DO: Calculate the slope on each straight or semi-straight section of your distance time graph and compare to your speed-time graph.

Calculate the area on your speed-time graph and compare it to your total distance.

Calculate your average speed in total.

Calculate your accelerations on your speed-time graph)

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