Learning Goals
Honors Physics Fall 2016

CVPM/G Const. Velocity Particle Model (Graphical)	Core Skills	1. Draw a position/ time graph given a motion map or written description of the objects' motion, or vise versa. (weight = 2)
		2. Represent chosen directions of positive correctly and consistently with graphs (weight = 1.5)
	Proficiency Indicators	3. Draw a position graph, given the velocity graph (weight = 3)
		4. Draw a velocity graph, given the position graph (weight = 3)

CVPM Const. Velocity Particle Model	Core Skills	1. Identify situations with constant velocity motion from motion maps graphs, equations, and observation (weight = 1)
		2. Draw a diagram modeling the motion (weight = 1)
		3. Differentiate between distance and displacement (weight = 2)
	Proficiency Indicators	4. Use the definition of velocity to solve **simple** problems (weight = 4)
		5. Differentiate algebraically between average and instantaneous velocity and speed (weight = 2)
	Adv. Ind.	6. Solve **complex** (multi-equation system situation) problems that involve more than 2 steps with out guidance from the teacher. (weight = 3.5)

CAPM/G Const. acceleration Particle Model (graphing)	Core Skills	1. Draw or construct an acceleration/time graph given a velocity/ time graph (weight = 2)
		2. Represent chosen direction of positive correctly and consistently with all graphs (weight = 1.5)
	Proficiency Indicators	3. Draw or construct a x/t graph given a v/t graph and or Draw or construct a v/t graph given an a/t graph (weight = 3.5)
		4. Can describe in words the exact motion of the object using terms such as, forward, backward, slowing down, and speeding up (weight = 3.5)
		5. Solve 1-D motion problems given a graph of the object's motion (weight = 4)

CAPM Const. acceleration Particle Model	Core Skills	1. Draw a diagram modeling the motion (weight = 1)
		2. Use the definition of acceleration to determine the direction of the acceleration (weight = 1.5)
	Proficiency Indicators	3. Differentiate algebraically between average and instantaneous velocity and speed. (weight = 2)
		4. **Solve simple problems** using the kinematic equations. (weight = 4)
	Adv. Ind.	5. **Solve complex problems** involving constant acceleration that involve more than 2 steps with out guidance from the teacher. (weight = 3)

PM Projectile Motion	Core Skills	1. Identify situations (and dimensions) with constant acceleration and constant v motion, and understand and apply the independence of dimensions. (weight = 2)
	Proficiency Indicators	3. Draw x/t, v/t, and a/t graphs and use graphical analysis to solve problems (weight = 2)
		4. Solve **simple** projectile motion problems. (weight = 5)
	Adv. Ind.	5. Solve **complex** projectile motion problems that involve more than 2 steps. with out guidance from the teacher. (Such as more than one object or more than unknown in the problem.) (weight = 3)

Forces Unbalanced Force Particle Model	Core Skills	1. Construct a properly labeled free body diagrams (FBD) that show all forces acting on an object, including correct relative lengths of the vectors. I can identify surrounding objects interacting with an object, and the forces they exert on the object. (weight = 5)
		2. Write net force equations describing an object or system; they should indicate that the forces are balanced. (weight = 4)
	Proficiency Indicators	3 When given one force, I can describe its N3L force pair. I can also correctly apply Newton's third law. (weight = 3)
		4. Apply Hooke's Law (weight = 2)
		5. Solve **simple** problems using net force equations and/or FBD, this includes choosing appropriate axis for analysis, as well as Choose and consistently apply workable direction(s) of positive (weight = 5)
	Adv. Ind.	6. Solve **complex** problems that involve more than 2 steps with out guidance from the teacher. These problems may involve more than one object such as inclined planes, Atwood's machines. (weight = 6)

FRICTION	Core Skills	1. Identify situations in which friction forces are present and understand the microscopic model of friction forces, and determine the direction of the friction force (weight = 2)
		2. Differentiate between static and kinetic friction (weight = 4)
	Proficiency Indicators	3. Solve **simple** problems using friction (weight = 2)
	Adv. Ind.	4. Solve **complex** friction problems that involve more than 2 steps with out guidance from the teacher. Such as banked curves, inclined planes, and times that the normal force is not equal to the weight. (weight = 3)

Momentum	Core Skills	1. I can calculate the momentum of a system. (weight = 1)
		2. I can graphically determine the impulse delivered to a system, and determine what this means. (Is the object speeding up, slowing down, staying still?) (weight = 3)
	Proficiency Indicators	3. I can use conservation of momentum to determine properties of a system, and **solve simple conservation of momentum problems**. (weight = 3)
	Adv. Ind.	4. I can solve **complex momentum/impulse problems** that involve 2 or more steps without guidance from the teacher. (weight = 2)

Laboratory and Experimental Situations

Lab 1a Design Experiments

Students can describe the purpose of the experiment or a problem to be investigated. (Weight = 1)

This skill is about showing that you understand the point, purpose and problem to be investigated in the lab through written expression. Is your paragraph clear? Do you clearly state the purpose of the lab or the problem to be investigated?

Lab 1b Design Experiments

Students can identify equipment needed and describe how it is to be used also describe the procedures to be used, including controls and measurements to be taken. (Weight = 2)

This skill is about showing that you have a plan and that you know what materials and steps are necessary for that plan to take place. This is connected to the "Lab 1a" skill in that you must know the goal of the lab in order to have a plan. Your goal here is to articulate and express your plan through written expression and clearly communicate the how behind the lab. With the goal in mind, answer these questions: What do you have to do in order to accomplish the goal or to solve the problem? What detailed steps are required in order to do this? What materials will you need? What variables are you working with and what are you measuring? How and what will you control in the experiment to avoid error or skewed data?

Lab 1c Design Experiments

Students can draw a diagram or provide a description of an experimental setup. (Weight = 1)

This skill is about showing your experimental plan and design through a drawing. This helps the reader to visualize your plan. In order to be complete, you need to make sure your drawing is thorough and labeled, as well as having a detailed description above or below your drawing to assist the reader in interpreting the drawing and the plan. (Think of a newspaper, journal, or magazine image...there is always a description below to help the reader out.)

Lab 2 Observe and Measure real Phenomena

Students should be able to make relevant observations, and be able to take measurements with a variety of instruments. (Cannot be assessed via paper and pencil examinations.) (Weight = 4)

This skill is all about being in the moment with your lab partners and helping to accomplish the goal of the experiment by taking quality measurements. This skill is graded through teacher observations and as long as you are being an active member in the group (active in the sense that you are helping to take measurements and acquire quality data, and are actively recording the data), you will succeed at this skill.

Lab 3a Analyze Data

Students can display data in graphical or tabular form, and draw a best fit line and curves to data points. (Weight = 4)

This skill is all about representing your data/findings via tables and graphing. This is an organizational and important skill to master. Answer these questions as you create your graph. Do your tables and graphs have a detailed and quality titles (the title should clearly and briefly express what the graph is representing)? Do you have labels on your x and y axis? Do you have an appropriate scale on your x and y axis (the graphical shape should take up the entire graph, not be squeezed into a corner)? Did you plot all your points? (You need to be honest with yourselves and your audience and plot all your data, not just what you think are the best data points.") Do you have a best fit line or curves (if appropriate) and do they represent the average of your trials? Do you have labels or a legend for multiple lines/curves? (The reader should be able to look at your tables and graphs and clearly and easily understand what the data is representing without having to re-read the purpose section or search

around for understanding)

Lab 3b Analyze Data

Students can perform calculations with the data. (Weight = 2)

Graphs are not only for math class...in fact, in physics, graphs can reveal some really cool details and quantities! This skill is about using the data you have collected in order to perform a calculation. (For example, using the slope of the line to discover an important quantity, or finding the area under a line to find a quantity)

Make sure that you know what you are looking for, and how a graph can be useful in finding unknown quantities.

Lab 3c Analyze Data

Students can make extrapolations and interpolations from the data (Weight = 2)

This skill is all about interpreting and expressing information about the data. The point of collecting data is so that you can interpret it and find out something new or to confirm ideas, predictions, and theories. Asking yourself these questions can help you to thoroughly analyze and express your findings: Going back to the goal, what was I trying to accomplish/discover? What does the data suggest about my goal or the question I was asking (what can I say confidently now that I have this data)? What patterns or trends did I find in the data, with respect to my initial goal?

Lab 4a Analyze errors

Students can identify sources of error and how they propagate. (Weight = 1)

This skill is all about taking an honest look at and reflecting on your experimental procedure and your findings (post-experiment) to see if there were any areas where the data could be skewed or show bias. This skill is also about suggesting ways to minimize error in future experiments. This skill will be discussed in class.

Lab 4b Analyze errors

Students can estimate magnitude and direction of errors. (Weight = 1)

Lab 4c Analyze errors

Students can determine significant digits. (Weight = 0.5)

Lab 4d Analyze errors

Students can identify ways to reduce error. (Weight = 1)

How does friction play a roll? How can you minimize human error?

Lab 5a Communicate Results

Students can draw inferences and conclusions from experimental data. (Weight = 2)

This skill is about summarizing your results in a, “big picture” way, and then suggesting ways to improve the lab for future trials. Consider these questions: What general or specific conclusions can I make about the topic at hand after a thorough examination of my data and findings?

Lab 5a Communicate Results

Students can suggest ways to improve experiment and propose questions to improve experiment. (Weight = 2)

If you were to do the experiment again, or if you were to guide someone else through the experiment again, what improvements could you make to the process?

Rubric:

8 - You have totally mastered the skill, meaning you have demonstrated a full understanding of the concepts involved, have clearly showed all steps of your reasoning, have used all notation correctly, wrote exemplary and clear prose and have made no algebraic errors.

7 **–** You have totally mastered the skill, but you might have made a small notational error, or a very small (non-fatal) algebraic error.

6 – You have a firm grasp of the skill, meaning you have demonstrated a full or almost understanding of the concepts involved, but you possibly didn't show steps in your reasoning, didn't use notation totally consistently, you could have written clearer prose, and/or made more than one (non-fatal) algebraic errors.

5 – You have demonstrated some conceptual understanding of the skill. You possibly have some confused reasoning, did not completely answer the question, did not use consistent notation, wrote muddled prose, and/or made more than one (non-fatal) algebraic errors.

4 **–** You have demonstrated a weak or no conceptual understanding. You possibly have confused reasoning, poor prose, and/or made one or more serious (fatal) algebraic errors.

0 – You left the problem blank. This is more of a placeholder till you are able to reassess.