Unit Lesson Plan – <Title>			
Teacher:	**<Teacher>**	**Time Frame:**	**<Time Frame>**
Grade:	**9**	**School:**	**<School>**
Subject:	**PSI Algebra Based Physics**		

NGSS DCI:	• This unit provides necessary background and skills for the following units.
AP Standards:	• Science Practice 1: The student can use representations and models to communicate scientific phenomena and solve scientific problems. • Science Practice 2: The student can use mathematics appropriately. • Science Practice 3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course. • Science Practice 4: The student can plan and implement data collection strategies in relation to a particular scientific question.

Essential Questions
(What questions will the student be able to answer as a result of the instruction?)
1. How vectors are used to analyze motion? 2. What is the difference between speed and velocity? 3. What are the relationships between position, velocity, and acceleration?

Knowledge & Skills	
(What skills are needed to achieve the desired results?)	
By the end of this unit, students will: • understand the general relationships among position, velocity, and acceleration for the motion of a particle along a straight line. • understand the special case of motion with constant acceleration. • understand the relationship among words, equations and graphs for motion in on dimension.	By the end of this unit, students will be able to: • solve problems specifically by first writing out all variables present, determining the appropriate equation to use, solving the equation for the variable needed, inserting numbers into the equation, and finally performing calculations with a scientific calculator. • apply the qualitative definition of acceleration (speeding up, or slowing down, and/or changing direction) to determine if an object is accelerating. • Students will be able to determine velocity by taking the slope of a position-time graph, and determine acceleration from the slope of a velocity-time graph, as well as the displacement by calculating the area under the curve. • Students will correlate negative and positive slopes with positive and negative velocities and accelerations.

Note that this **exact** Smart Notebook presentation has not been used in the classroom, although all of the material has. The pacing below is approximate based on a 40-45 minute class period. Feel free to adjust as necessary and please provide your feedback!

Assessment

(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Average Speed Quiz
Equation 1 Quiz
Equation 2 Quiz
Equation 3 Quiz
Mixed Equations Quiz
Kinematics Test

Other assessments on the NJCTL website are optional and can be used as needed.

(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?

Day	Topic	Classwork	Homework**
1	Speed, Distance and Time $s = \frac{d}{t}$	Slides 1-21 Problems 1-8	Problems 9-16
2	Average Speed $S_{ave} = \frac{d_1 + d_2 + d_3 + \cdots}{t_1 + t_2 + t_3 + \cdots}$	Slides 22-45	Problems 17-19 MC 1-6
3	Average Speed continued	Problems 20-22	Problems 23-28
4	Average Speed Quiz + Reference Frames, Position, Displacement and Velocity	Average Speed Quiz Slides 46-71	MC 16-21
5	Position, Displacement and Velocity $v = \frac{\Delta x}{\Delta t}$	Slides 72-100 Problems 29-30	Problems 31-34
6	Motion with a constant acceleration/first kinematics equation $v = v_o + at$	Slides 101-123 Problems 35-41	Problems 42-49

7	Motion with a constant acceleration/first kinematics equation continued + Graphing	Review HW problems Slides 124-131	MC 7-15 & 22-30
8	Bowling Ball Lab*	Lab	Lab questions/write up
9	Free Fall	Slides 132-147 Problems 50-54	Problems 55-59
10	Extra time if needed		
11	First Kinematics Equation Quiz + Second kinematics equation: Position vs. time $x = x_0 + v_0 t + \frac{1}{2} a t^2$	First Quiz Slides 148-158	Problems 70-73 MC 31-34
12	Second kinematics equation: Position vs. time continued	Problems 60-69	Problems 74-76 MC 35-39
13	Stomp Rocket Lab*	Lab	Lab questions/write up
14	Second Equation Quiz + Third kinematics equation $v^2 = {v_0}^2 + 2a(x - x_0)$	Second Quiz Slides 159-167	Problems 83-85 MC 40-44
15	Third kinematics equation continued	Problems 77-82	Problems 86-88 MC 45-50
16	Extra time if needed		
17	Third Equation Quiz + Three kinematics equations problem solving	Third Quiz Slides 168-171 Problems 89-94	Problems 104-110
18	Three kinematics equations problem solving continued	Problems 95-103	Problems 111-117
19	Three Equations Quiz + Graphing Practice	Slides 172-192 Problems 118-121	Problems 122-124
20	Graphing Practice	Problems 125-128	Problems 129-130

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21	Hopper Lab*	Lab	Lab questions/write up
22	Review MC	Review MC	Study for test
23	Kinematics Test		

* It may not be possible to complete labs in the order stated due to lab schedules. Other labs on the NJCTL website are option and can be used as needed.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.