FRANKLIN-SIMPSON HIGH SCHOOL

Course Name: Physics **Unit Name:** **Speed, Velocity and Acceleration**

Quality Core Objectives:

	Unit 1 Speed, Velocity and Acceleration
A.1. Scientific Inquiry	a. Identify and clarify research questions and design experiments
	b. Design experiments with controlled variables and appropriate numbers of trials
	c. Collect, organize, and analyze data accurately and use appropriate techniques and devices
	d. Interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations
	e. Write and speak effectively to present and explain scientific results, using appropriate terminology and graphics
	f. Safely use laboratory equipment and techniques when conducting scientific investigations
	g. Routinely make predictions and estimations
A.2. Mathematics and Measurement in Science	a. Distinguish between precision and accuracy with respect to experimental data
	b. Use appropriate SI units for length, mass, time, temperature, area, volume, and density; describe the relationships among SI unit prefixes (e.g., centi-, milli-, kilo-) and how to convert between English units and SI units
	c. Calculate slope and explain its physical significance (e.g., velocity is slope on a displacement-time graph)
	d. Calculate/estimate, using significant figures, the uncertainty in experimental results, and use the uncertainty to evaluate and interpret results
	e. Express numbers in scientific notation when appropriate
	f. Solve for unknown quantities by manipulating variables
	g. Use graphical, mathematical, and/or statistical models to express patterns and relationships inferred from sets of scientific data
A.3. Science in Practice	a. Understand the fundamental assumptions of science (e.g., the physical world is measurable and can be modeled)

	b. Explain and apply criteria that scientists use to evaluate the validity of scientific claims and theories
	c. Explain why experimental replication and peer review are essential to eliminate as much error and bias as possible in scientific claims
	d. Explain the criteria that explanations must meet to be considered scientific (e.g., be consistent with experimental/observational evidence about nature, be open to critique and modification, use ethical reporting methods and procedures)
B.1. Speed, Velocity, and Acceleration	a. Write equations for the displacement and velocity of an object over time; based on these equations, recognize and/or draw graphs of the object's displacement and velocity versus time
	b. Solve problems in kinematics using the equations $v = v_o + at$, $s = s_o + v_o t + (1/2)at^2$, and $v_{avg} = (s - s_o)/t$
	c. Construct the two graphs *not* given, when given a linear motion graph of displacement, velocity, or acceleration versus time

Purpose of the Unit:

The purpose of this unit is for students to understand that motion can be defined and calculated using the basic understanding of physics. Students will be able to also diagram and interpret graphs that show motion.

Prerequisites:

1. Understand appropriate SI units for length, time and mass.
2. Understand relationships among SI units (centi-, kilo-, etc) and able to convert between them.
3. Able to convert between standard and SI units.
4. Able to diagram basic graphs.

Daily Lesson Guide

Day	Lesson Content and Objectives	Focus Questions	Critical Thinking (High Yield / Literacy /LTF/etc.)	Engagement	Assessment and/or Accommodations
1	Introduction to SI Units for Physics -Definitions -Examples -Relationships to standard (US) units	Which system is mathematically easier? Why is the US still using standard units?			
2	Converting units - w/in SI system - btwn SI & standard - Practice (Metric Mania)				Student use of "staircase" diagram
3	Converting practice (continued) Accuracy vs precision	Why Is it important of being accurate?			
4	Quiz (SI & Conversion) Dimensional Analysis -Practice worksheet	Where do you see the greatest use of dimensional analysis in the world?			Quiz (SI Units & Conversion)

5	**Define speed & velocity (formula)** **Types of speed/velocity:** **-Instantaneous, average, constant**	**What is the difference btwn speed & velocity?**			
6	**Speed Activity (Physics 500)** **Graph Results (d vs t)** **(Graphing Practice)**	**How fast can you run? walk? skip?**		**Activity (Physics 500)**	
7	**Speed/Velocity Practice Problems** **Acceleration** **-Define, formula** **-gravity (CONSTANT VALUE!)** **Worksheet (practice)**				
8	**Quiz (Speed)** **Acceleration due to gravity (How far? & How fast?)** **Graphing (v vs. t)**	**Can a penny break concrete if tossed from a building? (Mythbusters clip)**			**Quiz (Speed/Velocity)**
9	**Acceleration Worksheets (practice & Word Problems)**				

10	**Summary of Speed, Velocity & Acceleration (REVIEW)**				
11	**Unit Test**				
12	**Additional Day for demos/activity/curriculum carry over (if needed)**				**Use of Vernier tracks and motion sensors.**
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