Physics Curriculum Bundle #1

Title	Suggested Dates
Kinematics in one dimension	08/24-09/10 (13days)

Big Idea/Enduring Understanding	Guiding Questions
The motion of objects can be described qualitatively as well as quantitatively through the use of graphs and mathematical equations.	How can we describe the motion of an object?

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the district curriculum.

Knowledge & Skills with Student Expectations	Specificity & Examples	Suggested Resources (Read the note above)
Phy.4 Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: 4A generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates;	Including use of real-time technology Such as • Motion detectors • Photogates --- given a graph describe motion • Position-time • Velocity-time • Acceleration-time --- given a description of motion, sketch a graph • Position-time • Velocity-time • Acceleration-time	Motion Detector Lab – using motion detector to graphically represent constant and accelerated motion. (phys_1_MotionDetector) Physics Classroom Website – http://www.glenbrook.k12.il.us/gbssci/Phys/Class/BBoard.html Description of Motion – http://hyperphysics.phy-astr.gsu.edu/hbase/mot.html#motcon
Phy.4 Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: 4B describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;	Understand the fundamental concepts of kinematics. *a. State the definitions for displacement, distance, velocity, speed, and acceleration.* *b. Solve problems involving displacement, distance, velocity, speed, and acceleration.* *c. Solve one-dimensional kinematics problems for the case of constant acceleration.* *d. Create and interpret graphs of one dimensional motion (e.g., position vs. time, velocity vs. time).* *e. Describe two-dimensional trajectory motion qualitatively and quantitatively.* *f. Describe the concept of relative motion and define a*	Free Fall Lab – measuring acceleration due to gravity for object in free fall, introducing concepts of absolute & relative error. (phys_1_freefalllab) Suggested Equipment – photogates, carts & ramps, stopwatches, motion detector, meter stick, graphing software, dot timer.

	frame of reference. CCRS Including --- Distinguish between • Displacement and distance • Velocity and speed --- Kinematic Equations • $v_f = v_i + at$ • $\Delta x = v_i t + \frac{1}{2} a t^2$ • $v_f^2 = v_i^2 + 2a\Delta x$ • Vertical motion (free-fall)	
1 The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. **1A** demonstrate safe practices during laboratory and field investigations	Such as • Use of safety glasses in projectile motion experiments	
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2A** know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2C** know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established		

and highly-reliable explanations, but may be subject to change as new areas of science and new technologies are developed;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2D** distinguish between scientific hypotheses and scientific theories		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2E** design and implement investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2F** demonstrate the use of course apparatus, equipment, techniques, and procedures, including, triple beam balances, clamps, dynamics demonstration equipment, slotted and hooked lab masses, power supply, stopwatches, trajectory apparatus, carbon paper, graph paper, protractors, metric rulers, meter sticks, scientific calculators, graphing technology, computers, ballistic carts or equivalent, spools of nylon thread or string.		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2G** use a wide variety of additional course apparatus, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, micrometer, caliper, radiation monitor, computer, ballistic pendulum, electroscope,		

inclined plane, optics bench, optics kit, pulley with table clamp, resonance tube, ring stand screen, four inch ring, stroboscope, graduated cylinders, and ticker timer;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2H** make measurements with accuracy and precision and record data using scientific notation and International System (SI) units;	Demonstrate familiarity with length scales from sub-atomic particles through macroscopic objects. *a. Compare order of magnitude estimates for metric sizes of a variety of objects (e.g., atomic nucleus, atom, molecule, grain of sand, pinhead, fingernail, baseball, city, state, country, planet, star). CCRS*	
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2I** identify and quantify causes and effects of uncertainties in measured data;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2J** organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2K** communicate valid conclusions supported by the data through various methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports;		
2 The student uses a systematic approach to answer scientific laboratory and field investigative questions. **2L** express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations.		
3 The student uses critical thinking, scientific		

reasoning, and problem solving to make informed decisions within and outside the classroom. **3A** in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student		
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3B** communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials		
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3C** draw inferences based on data related to promotional materials for products and services		
3 The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. **3F** express and interpret relationships symbolically in accordance with accepted theories to make predictions and solve problems mathematically, including problems requiring proportional reasoning and graphical vector addition		