Physics Curriculum Bundle #3

Title	Suggested Dates
Forces	10/04-10/22 (14days)

Big Idea/Enduring Understanding	Guiding Questions
Unbalanced forces acting on an object result in changes in the motion of the object.	How do forces affect 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: **4D** calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects;	Including • Identify mass as a measure of inertia • Solve problems involving force, mass and acceleration • Interpret real life situations using Newton's 3rd Law • Including • Action and reaction forces • Such as • Pairs of forces • Weight and normal force • Weight and tension Pre-AP: • Calculate μs and μk Understand the concepts of mass and inertia. *a. Describe the concept of mass as a measurement of inertia.* *b. Compare order of magnitude estimates for masses of a variety of objects (e.g., electron, grain of sand, pebble, baseball, person, car, planet, star). CCRS* Understand the concepts of gravitational force and weight. *a. Qualitatively and quantitatively describe Newton's Law of Gravitation and the factors that affect the gravitational force between two objects.*	Inertia Balance – frequency of oscillation dependence on mass. (phys_3_inertiabalance)

	b. Describe weight as a force of attraction to a large body and make computations of weight (using W = mg). *c. Give examples to differentiate between mass and weight. CCRS* Understand forces and Newton's Laws. *a. State Newton's Laws of Motion and demonstrate understanding of their application through lab activities.* *b. Solve for an unknown quantity using Newton's Second Law and the concept of equilibrium.* *c. Distinguish qualitatively between static and kinetic friction, and describe their effects on the motion of objects. CCRS*	
Phy.4 Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: **4E** develop and interpret free-body force diagrams; and	Including • Represent interactions between objects through free-body diagrams Apply the concept of static equilibrium. CCRS *a. Describe the two conditions for which an object is in static equilibrium.* *b. Construct an equation using the concept of static equilibrium and solve for an unknown quantity. CCRS* Pre-AP: • Resolve vectors on FBD	Force Table Lab – equilibrium of 3 forces. (phys_3_Forcetablevectorlab) Free-body Diagram website – http://www.glenbrook.k12.il.us/gbssci/phys/Class/newtlaws/u2l2c.html
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		
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, graph paper, protractors, friction blocks, metric rulers, spring scales, meter sticks, scientific calculators, graphing technology, computers,		

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;		
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		