Science
Physics: Honors
Unit 1: Conceptual Tools

Essential Understandings	▪ Conceptual: o The reoccurring fundamental principles elaborated in physics have uses and implications in every dimension of modern life. o Physics seeks to analyze and understand every system as a demonstration of the cause-effect relationship. ▪ Computational: o Physics quantifies each variable of a system in order to describe, analyze and understand it. o A variety of problem solving techniques make use of a system's quantities to investigate the conceptual relationships evidenced within the system. o Numerical problem solving is an essential component in developing a clear understanding of the conceptual relationships identified within any system.
Essential Questions	▪ Why do we study physics? ▪ How does dimensional analysis help solve mathematical problems? ▪ Why are significant figures important and how are they determined? ▪ How can units be converted? ▪ What are some useful problem solving strategies?
Essential Knowledge	▪ Physics is based on a small number of fundamental laws and principals that reoccur throughout the study of physics. ▪ Length, Mass and Time are defined within the SI system. ▪ Successful problem solving requires one to read, sketch, visualize, strategize, identify equation, solve, check, and explore limits.
Vocabulary	▪ Terms: o dimensional analysis, significant figures, SI units, round-off error, Scientific Notation
Essential Skills	▪ Conduct dimensional analysis. ▪ Solve problems in a deliberate and organized manner. ▪ Determine the proper number of significant figures in a problem.

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Related Maine Learning Results	Science and Technology A. Unifying Themes A1. Systems Students apply an understanding of systems to explain and analyze man-made and natural phenomena. a. Analyze a system using the principles of boundaries, subsystems, inputs, outputs, feedback, or the system's relation to other systems and design solutions to a system problem. B. The Skills and Traits of Scientific Inquiry and Technological Design B2. Skills and Traits of Technological Design Students use a systematic process, tools and techniques, and a variety of materials to design and produce a solution or product that meets new needs or improves existing designs. a. Identify new problems or a current design in need of improvement b. Generate alternative design solutions. c. Select the design that best meets established criteria. d. Use models and simulations as prototypes in the design planning process. e. Implement the proposed design solution. f. Evaluate the solution to a design problem and the consequences of that solution. g. Present the problem, design, process, and solution to a design problem including models, diagrams, and demonstrations. C. The Scientific and Technological Enterprise C4. History and Nature of Science Students describe the human dimensions and traditions of science, the nature of scientific knowledge, and historical episodes in science that impacted science and society. a. Describe the ethical traditions in science including peer review, truthful reporting, and making results public. b. Select and describe one of the major episodes in the history of science including how the scientific knowledge changed over time and any important effects on science and society. c. Give examples that show how societal, cultural, and personal beliefs and ways of viewing the world can bias scientists. d. Provide example of criteria that distinguish scientific explanations from pseudoscientific ones.

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Sample Lessons And Activities	▪ Read the text book and complete the examples presented. ▪ Individually answer conceptual questions and solve problems. ▪ Collectively discuss the answers and solutions in class. ▪ Discuss real world examples of concepts presented in the textbook and encountered in the real world. ▪ Pasco Data Studio introductory laboratory.
Sample Classroom Assessment Methods	▪ Homework assignments. ▪ Assess understanding in classroom discussions. ▪ Written formative and summative assessments with real world conceptual questions and numerical problems.
Sample Resources	▪ Publications: ○ Physics, second edition - James S. Walker ▪ Videos: ○ Mechanical Universe Video Series ▪ Other Resource: ○ Companion Website: http://physics.prenhall.com/walker ○ Physics Demonstrations in Mechanics