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AP Physics C - Practice Workbook - Book 1 Mechanics The following (© is applicable to this entire document - copies for student distribution for exam preparation explicitly allowed.

Know the difference between a scalar and a vector quantity: In physics both scalar and vector quantities are common. A scalar only has a magnitude and a vector has a magnitude and a direction. A vector description is considered incomplete if it does not have a direction specified. Also, realize that equations employing vector quantities contain unit vectors. These unit vectors have a magnitude of one and are pointed in the same direction as the resultant vector. Understand individual concepts in all of the categories: Become very familiar with all of the individual concepts of the topics listed in Tip 1. Pay attention to the units of measure for each variable and know how the variables are interrelated to each other and to the force in which they describe. Prepare a table of the basic forces and the units that are used to express those forces as a study guide. Alongside this table, create another table with the variables and their respective units for each force or property. This study guide is for your sole personal use when preparing for the AP Physics exam, but you will not be able to use it when taking the exam. The multiple-choice section contains 50 multiple-choice questions and contains discrete items, items in sets and multi-select items where two options are correct. The multi-select questions are arguably the most difficult of all the multiple-choice questions so make sure to allocate more time on these. Beginning in May, each multiple-choice question only contains four answer options rather than five. The document contains many essential knowledge concepts that will significantly enhance your ability to solve problems and bolster your overall understanding of physics. Practice common problems involving the force of friction: Suppose we have a box that has a mass of 25kg and it takes a force of 75N to move it, what is its static coefficient of friction? For inclined plane problems you must draw a detailed diagram showing the x and y components of the weight of the box as shown below: Study the following table which gives some of the most common units used in physics in both metric systems: Make sure that you are consistent with the units of either system when doing problems. If the problem starts out in MKS units make sure you solve the problem in those units. If you need to convert from one system to another, make sure you are doing it properly. Make diagrams for certain problems: Many problems on AP Physics are best tackled drawing a small diagram. This is especially important if you are asked to calculate a force in a particular direction. Draw a coordinate axis and any vectors or component vectors on the diagram. Mark each vector with a symbol having a defining subscript. For example, the component force of acceleration in the x direction should be denoted as a_x . There will only be five multi-select questions on this part of the exam. Get a firm grasp of the question and then find the best two answers. Gather your thoughts and the crucial concepts of the question and read each answer carefully. Use the process of elimination to the best of your ability. Draw a diagram or write down an equation that may be relevant to the question. With the equation written down it will be much easier for you to determine whether one variable is decreasing or increasing and what affect that will have on the variable pertaining to the question. Review important conservation relationships: All quantities in dynamic physics are conserved. For example, in a collision between two objects, linear momentum is conserved. However, if the collision is inelastic, the kinetic energy and also the momentum before and after the collision are not the same although the total energy of the system is always conserved. In the inelastic case, some of the energy of the collision is taken away by internal friction and is dissipated as heat energy. The conservation of momentum relation applies to angular momentum as well both on the macro and subatomic quantum levels. The conservation of momentum and energy are fundamental laws of physics. You will need to use them frequently when solving many problems in physics. Know and understand the relationship between work, energy and power: Work refers to an activity involving a force in the same direction of the force e . In other words, you need a certain amount of energy to perform a certain amount of work. Using the previous example, we needed 2, Joules 2kJ of energy to perform the task of pushing the object. In our example above, if it took us 2 seconds to move the object, the amount of power that was output was 1, Watts or 1kW. Practice drawing vector diagrams and know how to add and subtract them: Vector diagrams and vector algebra are at

the very heart of physics. It is crucial to know how to add and subtract vectors graphically using the head-to-tail approach starting at the origin of a Cartesian coordinate axis and to draw the correct resultant vector. For vector addition it does not matter which vector you draw first since addition is commutative. For subtraction, however, make sure that the vector you draw first is the one you are subtracting from. The next steps are the same as addition. Place the tail of the second vector at the head of the first one. Continue doing this until you have all the vectors in place. Then simply draw a line from the origin to the head of the final vector. This line will be the resultant vector of the subtraction. See the example below: Below is another figure illustrating the subtraction of two vectors. The AP Physics 1 exam introduces simple electrical circuits employing only resistors whereas the AP Physics 2 exam includes circuits containing RC components. There is one based on experimental design, another related to quantitative and qualitative translation and another three that are short answers. The AP Physics 2 exam follows the same format except that there are only two short answer type questions. In scoring the FRQs, credit for the answers depends on the quality of the solutions and the explanations given. Partial solutions may receive partial credit so it is important to show all your work. A table of information and equations needed for the exam are available for students at least one year before the exam. You will be given the exact same information values of physical constants, etc. You cannot bring your own copy to the exam. See the Appendix on page Use paragraph length responses: Some FRQs on the AP Physics exam will require you to provide a coherent, organized and sequential description of the situation presented. If so, provide an accurate, concise and factually based response to the question in the form of a paragraph utilizing prose. Make sure that you do not add any erroneous information or subject matter. Read the question carefully and focus on answering all parts of the question in the order that they appear. Cite physical principles and equations: Also, only use the appropriate equations and principles needed to answer the question. Focus only on answering the question and avoid any digressions. You will lose credit if you only write down a bunch of equations without any written explanation. Use diagrams, equations, graphs and calculations to support your line of reasoning. Keep your paragraphs short to moderate in length and make sure that they make sense on the first reading. Describe and explain questions: Utilize your skills in writing and in depth knowledge of physical principles to answer these types of questions. Justify your answers by using an argument which is supported by key evidence. The evidence should include the fundamental laws of physics, diagrams, graphs, equations, calculations and data. Draw a free-body diagram for mechanics and motion problems: Draw a free-body diagram for questions involving inclined plane problems, motion problems, pulley problems and any other problems having a number of vector components. In this manner, you will be able to better visualize all of the forces at a glance. Clearly indicate all the forces and their components. Use appropriate units for the numerical values of any physical quantities. Leaving out units, and directions in the case of vectors, will cost you points! Skim all the problems prior to solving: Take a minute or two to quickly skim the FRQs to get an assessment or indication of which question looks easier to answer. You will likely see one or two that you feel more comfortable with so you should start on those problems first. Gauge your time to about 15 minutes for each problem. Practice as many previous FRQs as possible: The College Board website will have some examples you can study. Here is an excellent website containing dozens of sample exams from previous years in addition to the chapter problems for the Giancoli physics textbook and the course work from the Massachusetts Institute of Technology. Form a study group of your peers: Schedule a time and place where you can get together with classmates to discuss and solve physics problems.

2: ap-physics-c-practice-workbook

This book is a compilation of all the problems published by College Board in AP Physics B and AP Physics C that are appropriate for the AP B level as well as problems from AAPT's Physics Bowl and U.S. Physics Team Qualifying Exams.

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a variety of physics courses, including algebra-based introductory physics, and was an early and enthusiastic adopter of Knight's Physics for Scientists and Engineers. Stuart maintains an active research program in the area of superconductivity.

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