Test-Taking Strategies for the AP Physics B Examination

Regardless of the helpfulness of test-taking suggestions you will receive in this book and elsewhere, remember that there is absolutely no substitute for studying. Careful review of exam topics and practice with sample questions is the best preparation for the AP Physics B Examination. To learn the vast quantity of material the exam will cover, you will need to pace yourself. A last-minute studying spree cannot prepare you for an exam of this scope and difficulty. The time to set up your study routine is at the beginning of the semester.

Clearly your AP Physics course work will be a significant part of your preparation for the exam in May. However, you must go beyond the class, as well, and spend time outside of class practicing and mastering what you've learned. Outside preparation consists of rereading sections you've covered in class, practicing problems, and reading ahead. Your work outside of class will sharpen your understanding and skill, and you will see the effects of this work in class as well as in your performance on the AP Physics B Examination.

Take a look at the following bulleted list of issues to consider as you proceed through your AP Physics course—and as you begin to prepare for the AP Physics B Examination.

- Aim to learn and understand thoroughly the physical principles that are the basis of physics. By mastering the underlying physical laws, you can solve a great variety of complexly worded or purely theoretical questions. Don't be content to learn physics strictly as a computational process.
- Many concepts in physics are logical consequences of previous concepts. You may find it easier to order and remember the whole range of a topic if you understand how certain principles are theoretical derivations of others. Alternately, you may find that learning the material in order of historical development provides an excellent arrangement for remembering interrelated topics. (After all, scientists develop and advance theories based on the work of their predecessors.) As you study, you will discover other ways to organize your learning. Finding your own links within the material helps you understand and remember concepts.
- Often there is more than one way to solve a problem. If you arrive at the right answer, but this test prep book presents a different approach, it will benefit you to learn *both* methods. The more methods you have at your disposal, the better you will be able to address the many nuances of AP exam questions.
- Familiarize yourself with the physics equations and the tables of information that will be provided with the exam. Through study and practice, you may find that certain formulas that you use frequently are nonetheless not included in the tables. In this case, you will need to commit these formulas to memory.
- Approach each problem or exam question with confidence. Remember that you have been studying over the course of the year, and there is a strong

possibility that you've conquered a similar question before. By sizing up a question (Ask yourself: What is the underlying physical principle? What are the relevant equations? What information is given? What am I being asked to find?), you can often reveal the true form of a question that seemed opaque at first.

- As you try to determine what information is given in a question, remember that numerical values are not always presented explicitly. Rather, they are sometimes implied by the information provided. For example, in a question related to force diagrams, the effects of gravity and normal forces might not be listed. However, your familiarity with Newtonian mechanics and your experience working through these types of problems will help you know that those forces are present and relevant to the solution.
- If you can't recall the equation that corresponds to the governing physical law that applies to a problem (or even the law itself), take a look at the variables involved. Think about which equations relate these quantities to one another. This may be enough to spark your memory about the governing theory.
- Sometimes questions require you to apply more than one concept, step, or equation to reach a solution. If you suspect that this is the case, examine the information presented and consider its implications. Think about what quantity or quantities you can solve for using some or all of the given information. Often those subsequent quantities will point the way to the question's solution. Failing that, focus on what you are trying to find and then work backward. Sometimes thinking about the penultimate step of a similar problem is enough to trigger your memory of what principle is the bridge between what you are given and what you are trying to find.

You should begin to focus your preparations for the AP Physics B Examination between one and two months beforehand. This way, you'll have plenty of time to devote to each of the five main subject areas covered by the test. The more relaxed study time you allow yourself, the more prepared you will be and the better you will do on the exam.

Aim to finish the review sections in Part II of this book a few weeks before the exam. Then take the first practice test in Part III. Treat the practice test exactly like a real AP exam. In other words, find a quiet place where you can work without interruption and give yourself only three hours. This approach helps you become familiar with the actual testing conditions so that you will be less nervous on testing day.

After you have scored your first practice test, take a day to review your answers. Look at the types of questions you got wrong. Do they fall under the same content area or areas? If so, you should focus further study on those particular areas for the next few days. Count the number of questions you skipped. Did they fall near the end of Section I? This could mean that you were running out of time. Did you feel rushed? If so, it might be wise to plan ahead of time which kinds of questions you should skip over. You'll need to make sure that you answer the questions you're more likely to know and that you skip the ones that might slow you down.

Now that you know what adjustments to make to your test-taking strategy, give yourself a few days of extra practice with your problem areas and then take

the second practice test about a week before the real exam (don't overwhelm yourself before the real thing!). Again, analyze your performance. Did your adjustments pay off? Is there anything you should do differently? Then use your last few days to do any fine-tuning and to relax before the exam. Below is a brief list of basic tips to think about during the days just preceding the exam.

- Try to plan your schedule so that you get *two* very good nights of sleep before exam day. On the day of the test, make sure that you eat good, nutritious meals. Your body must be in peak condition in order for your brain to perform well.
- By arriving at the exam site thirty minutes before the start time, you will save additional worry about arriving late.
- Be ready to present a photo I.D. when you arrive at the exam site. (It is essential to have a photo I.D. if you are taking the exam at a school other than your own.) Carrying a driver's license or a student I.D. card will allow you to prove your identity, should anyone ask for such proof.
- Bring several sharpened #2 pencils with good erasers. The machine that scores Section I of the exam cannot recognize marks made by other types of pencils. Also, it cannot read a correct answer if a previous answer has not been erased completely.
- It will be helpful to have a watch with you as you take the exam. Most testing rooms will have clocks, and most test administrators will give you periodic reminders of how much time you have remaining. However, having your own watch makes it easy to keep close track of your own pace. Be careful to avoid watches that have a calculator or an alarm, however, as these are not permitted in the exam room.
- Do not bring books of any kind, laptop computers, wireless instant-messaging devices, cameras, or portable radios. If you must bring a cellular phone with you, turn it off and give it to the test proctor until you are finished with your exam.
- You may wish to purchase and install a new calculator battery a few days before the exam.

The test administrators are very clear and very serious about what is *not* allowed during the examination. Below is a list of actions to avoid at all costs, since each is grounds for your immediate dismissal from the exam room.

- Do not consult any outside materials during the exam period. Remember, the short break between sections is technically part of the exam—you are not free to review any materials at that time either.
- Do not speak during the exam, unless you have a question for the test proctor. Raise your hand to get the proctor's attention.
- When you are told to stop working on a section of the exam, you must stop *immediately.*
- Do not open your exam booklet before the test begins.
- Never tear a page out of your test booklet or try to remove the exam from the test room.
- Do not behave disruptively—even if you are distressed about a difficult test question or because you have run out of time. Stay calm and make no

unnecessary noise. Remember, too, the worst-case scenario: If you are displeased with your performance on test day, you can cancel your exam scores.

Section I: Strategies for Multiple-Choice Questions

Obviously, having a firm grasp of physics is the key to doing well on the AP Physics B Examination. In addition, being well-informed about the exam itself increases your chances of achieving a high score. Below is a list of strategies that you can use to increase your comfort, your confidence, and your chances of excelling on the multiple-choice section of the exam.

- Always read the entire question carefully, and underline key words or ideas.
- Read each and every one of the answer choices carefully before you make your final selection.
- Pace yourself and keep track of the remaining time as you complete Section I. Remember, you have ninety minutes to answer all seventy questions (that is about one minute and fifteen seconds per question). It's important that you don't get stuck on one question for too long. In fact, you may not be able to answer all seventy questions. As you approach each question, assess quickly whether it is the type of problem at which you are skilled or whether it is a type that either takes a long time or tends to trip you up. Making this assessment will help insure that you don't get stuck on any one question for too long.
- Since all multiple-choice questions are equally weighted, it makes sense to leave the most difficult questions until the end. In other words, plan to skip questions and return to them if you have time. Remember, also, that no points are taken away for an unanswered question. Make a light mark in your test booklet next to any questions you can't answer. Return to them after you reach the end of Section I.
- If you do skip a question, however, it is very important to remember to skip the appropriate space on the answer sheet, as well. It's a good idea to make yourself follow a simple rule: Always check the question number before filling in the oval on your answer sheet.
- Given the time limitations, you may be tempted to speed through the test, looking at key words and numerical values and glancing at answer choices in hopes that one will jump out at you as the right one. A better strategy is to slow down and maintain your focus, especially in cases where a quick glance has revealed what seems to be an easy question. The fact is that it might *not* be easy on closer inspection.
- Work all the way through a problem, and then check to see whether your answer is one of the five available choices. Obviously, if it's not there, you need to try again. Sometimes you can use the units of your answer to identify where you made an error.
- If you find that several answer choices differ dramatically, try to home in on the right answer by working through rough mental calculations. You may be able to estimate, for instance, generally how large or small the answer should be, and this knowledge may allow you to eliminate some choices immediately. The more familiar you are with the laws of physics, the more you will be able to employ this method.

- After you have answered the questions you found least demanding, it will be helpful for you to separate remaining questions into two groups—those that you can do but that are time-consuming, and those that you are not sure how to manage. Naturally, you will want to work through the former batch of questions first.
- You may have time to tackle questions you're not certain how to solve. Remember, if you can confidently eliminate two or more answer choices, statistically it is in your best interest to make a guess. Below is an example that demonstrates one approach to eliminating answer choices.

8. If a wave moves along a string toward an end that is free (not fixed), which of the following statements accurately describes the reflected pulse?

I. The reflected pulse will be on the same side of the string as the incident pulse.
II. The wavelength of the reflected pulse depends on the length of the rope.
III. The reflected pulse will have an increased velocity.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

This question falls under the category of wave motion. Let's say that you remember a few facts from diagrams of wave motion. You recall that if an incident pulse travels along a string toward an end that is not fixed, its reflection is on the same side. Unfortunately, you cannot recall anything about change in velocity or wavelength for reflected pulses. However, just one piece of the puzzle can be used to eliminate several choices. That is, if statement I is true, then answers B, C, and E cannot be the correct answer. Using one fact, you have increased the odds of getting the correct answer from 1 in 5 to 1 in 2. The correct answer, by the way, is A.

- Become familiar with the format of Section I and with the types of questions you will encounter there. (Remember, Part II and Part III of this book provide you with invaluable practice with all relevant types of multiple-choice questions.) Once again, all questions in Section I will fall into one of the following six categories.
  - Computation
  - Multi-step computation
  - Variable-manipulation
  - Graphical analysis
  - Diagram-based
  - "Reverse" multiple-choice
- Familiarize yourself also with the instructions for the multiple-choice questions *before* you take the exam. You will find the instructions in this book. By knowing the instructions cold, you will save yourself the time of reading them carefully on exam day.

Section II: Strategies for Free-Response Questions

Initially, you can approach the free-response questions as you did questions in Section I. That is, take a look at each question to assess its difficulty and your level of comfort with the material; then proceed to answer first the questions about which you feel the most confident. Below are additional strategies that will help you succeed in Section II.

- Since you have just ninety minutes to answer as many as eight questions in Section II, you must manage your time carefully. In the test booklet (and with the sample free-response questions in Part III of this book), you will find suggestions for how much time to spend on each free-response question.
- Be as comprehensive as possible in your explanations. For instance, it is vital to describe all applicable physical laws and their relevant equations. In a numerical example, label the variables that are given and identify those for which you wish to solve. Organize your work logically to maximize your score, and include any relevant sketches, charts, or graphs that support your explanation.
- In Section II, partial credit is sometimes awarded to students who answer part of a question correctly. If time is an issue, it is better to present an unsimplified numerical expression carried through and correctly applied to another part of the question than it is to present a fully simplified expression in one part while leaving the rest of the question unsolved. For each step, list the units of any numerical expression. Doing this makes your answer more complete and improves your score; moreover, it can alert you to the fact that you've made a mistake.
- All of your work must be presented legibly and in an order that is easy to follow. Since often it takes more than one attempt to arrive at a correct answer (as is the case in scientific research), be careful to erase or cross out completely any incorrect attempts. Points can be deducted from your score for incorrect attempts that are not properly crossed out or erased.
- Remember your audience—a stranger rather than your AP Physics teacher—when writing your explanations. Show each step clearly and explain why you are using it. If you make a mistake in the course of your answer, your presentation of these steps is crucial to your being awarded partial credit.
- If you run out of space in your answer book directly beneath a question, indicate clearly where you will continue your answer. If the reader is unable to tell which question an answer refers to, he or she will give no credit for that work. Note, also, that the free-response questions are printed on the removable insert in the exam booklet. Though you may use this sheet for reference, there are no answer spaces provided, and nothing you write on this insert will be graded.
- Finally, try every part of every question—and no matter what, never leave a blank space beneath a question. If you are unsure how to solve a question, begin by listing what you *do* know about the topic and work with that information. You may find that this process jumpstarts your memory or suggests an approach. At the very least, it makes you a candidate for partial credit. AP Physics B Examination readers are more interested in your methodology, critical thought, and insight than they are in your demonstration of numerical manipulation.