

COMPILATION: AP-C and Modeling Instruction

Date: Fri, 10 Nov 2000
From: Richard Witt <uraniumrich@HOTMAIL.COM>
Subject: AP Physics C & Modeling

We are considering changing our AP Physics curriculum at my high school and I'd like to get some feedback from other modelers on our proposal. Currently, a student wishing to earn AP Physics "C" credit takes physics during their junior year, then takes AP Physics during their senior year. Since our school is on an A/B block schedule, the students in physics meet every other day. However, to meet the requirements of the AP exam, the AP students are enrolled in a 2+1 program. During the first semester I see my students every day and during the second semester we meet every other day. Ultimately, an AP Physics student will need 5 blocks to complete the AP Physics requirements.

We are proposing to eliminate physics as a prerequisite for AP Physics. Under the new program, students wishing to earn AP credit would be able to take AP Physics C - Mechanics during their junior year, then follow-up with AP Physics C - E&M during their senior year. Since both classes would meet every other day, the student would earn their credit in only 4 blocks, instead of 5. Each block meets for 90 minutes.

The plan is to implement a modeling approach supplemented with calculus (as needed) and a healthy dose of AP style problems. My biggest concern is whether or not the students will be successful in the mechanics portion if they are not enrolled in calculus. While some juniors currently take calculus, most students would take AP Calculus BC during their senior year.

The advantages of making this change are numerous. First, the change would reduce the number of blocks from five to four for a student completing AP Physics. Second, more students would earn AP Physics credit because many students would opt out of the physics class and take the AP Physics C - Mechanics course. Third, the students would not be repeating mechanics; currently, they learn mechanics (alg/trig) during their junior year, then learn mechanics with calculus during their senior year. Finally, if a student enrolls in AP Physics, but is unable to grasp the calculus portion, we can bump them down into a regular physics course since the content runs parallel.

My students love the modeling approach. But, I've found many of my juniors want a more challenging level of physics than they are taking. Using calculus to give a more rigorous mathematical treatment of the physics concepts will give them a real challenge.

I see two main risk factors. First, will the students be able to handle the calculus portion of the course without being concurrently enrolled in a calculus course? Second, will students select AP Physics over physics simply to earn the college credit? In other words, since every parent views their own child as a star, will they insist on AP Physics even if their child doesn't possess the intellectual development to be successful?

I'd appreciate some feedback from other modelers, especially anyone else who teaches AP Physics C. While we believe this change would be beneficial, I'd hate to make the change only to see the AP scores not meet our expectations.

Date: Mon, 13 Nov 2000
From: Allen Pickel <pickelc1@TEN-NASH.TEN.K12.TN.US>
Richard,

My experience has been that the vast majority of mechanics in AP-C does not require calculus. A person can not know any calculus and most years can make a 5 with no problem if they know the physics. What I have done (and this works only if the students have strong math skills) is to show them how to take derivatives and how to integrate (without explaining the theory behind it). The techniques are fairly simple and the majority of them grasp them quickly. The worst problem I have with these students is getting them to recognize when to integrate or take a derivative. By mid course this is usually not a major problem. I also make sure I reinforce that they can make a 5 without any calculus at all. (Of course this changes when they get to E & M.)

Date: Tue, 14 Nov 2000

From: stan hutto <fizwiz2@YAHOO.COM>

First I would like to concur with the statement by Alan:

> My experience has been that the vast majority of mechanics in AP C does not require calculus.

What calculus is needed in AP "C" level can be easily taught on a strictly "need to know" basis. The amount of calculus on the AP C level mechanics test what I refer to as "gratuitous calculus" Its just there so that some has to be used. A good physics student can achieve a 5 on the exam without doing any calculus. Over the past 8-10 years a raw score of 50 -53% has been a 5.

The school I'm now at prefers that I do an AP B style course which more closely aligns with the local community college so I can offer the course as dual-credit. We offer AP as a second-year course so much of the modeling groundwork has been laid in the first-year. I still do whiteboard sessions, especially after labs, and we sometimes have whiteboard sessions over various problems assigned. *The key is in the discourse generated and continual re-focusing of students to address what model was used and how that model was applied to the problem-solving, and to the discussion of variation and similarities.*

Note: in 2002 Richard Witt posted that AP-C continues to be a second year physics course, but "the AP physics class meets every other day for one semester and every day for the other semester (1 + 2)."