

Physics for Dummies

Excellent teaching transformed this hopeless physics student into a prodigy.

By Bruce Roseman, MD

Physics had been the bane of my existence in high school. After a few classes, it was apparent to me and to my teacher that I would *never* pass. I dropped physics twice in high school and avoided it in college — until the fateful day that I decided to become a doctor. Physics was essential for medical school.

One of the physics professors had set up his course such that there were 30 tests sprinkled throughout the term. If you passed all of the tests, you got an A, 25 passes for a B, 20 passes for a C, 15 passes for a D and, with anything less than 15, you failed. If you failed, you could take the test again and again until you passed.

I signed up for this course and was assigned to a teaching assistant who was to mark my tests and explain to me the information that I got wrong on the test. I arranged to take my first test with him in two days.

From the outset, physics was very difficult for me. I had studied for about a week and struggled through it, hoping I knew enough to get by. I was totally wrong.

In fact, when I took the test the teaching assistant told me that I had absolutely no understanding of what I had just studied. He recommended that I drop the course because he thought it unlikely that I could ever pass. I told the teacher I would think about it and let him know the next day.

I decided that if I really studied hard I could get it, and so I returned the following week to retake the test. The teacher was surprised to see me but was impressed that I had returned. Unfortunately, I failed the test again.

This time, I decided to make the most of the advantage of this type of course. I asked the teaching assistant if he would explain my mistakes. He had no other students and seemed happy to spend two hours explaining the material to me.

I went home to study what he had taught me. I had a far better understanding of the material, but I was still confused by some things. I went back the next day and he explained some more, and he continued to do so each day I returned. I was now spending hours every day with him in what amounted to one-on-one tutoring.

After three weeks, I finally passed the first of 25 tests. I was very proud of myself and it was clear that my teacher was too. He told me that I understood the physics for that first test better than any student he had ever given the test to. That was the good news.

The bad news was that even though he was very impressed with how I had mastered the material, it was only the first chapter of the book. I would need to pass 14 more tests in order to get a D, and there was simply not enough time in the semester for that. Once again, he suggested that I drop the course.

I decided that since things were going so well, I would just keep doing what I was doing. He told me that in order to survive the course, I needed to learn more math. It was obvious that I was very poor at multiplication and division, and I needed to learn trigonometry.

Learning to multiply and divide was relatively simple. Although I had never learned the multiplication and division tables before, I committed them to memory now.

Trigonometry was another story; I had flunked in both high school and college. I decided to start at the beginning and bought a high school review text on trigonometry and set to reading it that very night. It was a revelation.

I found that doing it in my own way and in my own time and repeating a sentence or page or chapter as many as five or six times made all the difference in the world to my understanding of the material.

Over the next 36 hours, I read and studied that trigonometry book, taking time to nap and eat only when absolutely necessary. As I approached the end of the book, I realized something that astonished me. I had mastered in hours what I could not learn in a full year of high school and in a full semester of college trigonometry.

How could that be? I realized that the key to my success was that I could move at my own speed and in my own way without being judged every step of the way.

Armed with my newly-acquired math smarts, I found the physics much easier to comprehend. It took me only one week to pass my next test, and in the following week I passed three tests.

The teacher had never seen anyone pass three tests in one week; he was amazed even though I had taken about 20 hours per week of private tutoring.

By the time I got to the 20th test, the dynamics of our relationship had changed dramatically. He told me that I was the best physics student he had ever seen, and that I should go on and complete a physics major and then go to graduate school for a PhD in physics.

My teacher's patience in explaining the material from all different angles so that I could understand it, never moving on until I understood everything in totality, made me realize that I was never "bad at physics."

It turns out that I had never had a learning problem at all; rather, all the teachers who had come before had had a teaching problem.

(Adapted with permission from A Kid Just Like Me: A Father and Son Overcome the Challenges of ADD and Learning Disabilities. Dr. Roseman is a doctor in New York City who overcame his own learning difficulties, and is now working on those of his hard-to-teach son.)