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## Concept-Based Study

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Math courses and most science courses (including physics and chemistry courses) are different from, say, a history course or an English II course. History and English are courses based on information, and math and science courses are based on problems.

In an information-based course:

- Classes are like lectures. The instructor introduces a topic and discusses it, sometimes one-sided and sometimes inviting feedback from students.
- Textbooks contain large amounts of text to read.
- Homework assignments tend to be reading assignments (in preparation for the next day's class) or large writing assignments, such as research papers and essays.
- Your grade is based on how well you can write and convey information. Frankly, agreeing with what your instructor says can help your grade.
- The emphasis in the course is on memorization. You may be given vocabulary, dates, names, biographies, and so on, and your job is to synthesize it all so that you understand it. The more you can remember, the better you'll do.
- Frequently, the bulk of the information you will need for a course is given to you during that course.

If you try to approach your math or science course with these ideas and strategies in mind, you won't do well. Science and math courses benefit from a different approach.

In a problem-based course:

- Classes are like tutorials. The instructor may introduce a new concept and talk about it for a while, but a lot of the time the instructor is at the board writing definitions or theorems, or working through a problem.
- Textbooks contain some paragraphs to read, but there are boxes that have theorems in them, definitions in bold, diagrams, insets, and more examples of worked problems. Textbooks are not meant to be read from start to finish.
- Homework assignments are frequent and small, and consist of problems to solve, and the occasional short-answer question to ensure you understand the concepts you're working with. Preparation for the class means doing problems from the textbook that are not part of the homework assignment.
- Grades are based on accuracy in solving problems. Your instructor's judgment determines what part marks you get for an answer, but if you're right, you're right.
- The emphasis is partly on the core concepts of your course, which will need to be memorized, but mostly on your ability to solve problems, whether you've seen that type of problem before or not.
- Every concept you learn will build on things you've done in previous courses. You'll be expected to know everything covered in the subject up to that point in your academic career.