

6. HOW TO EXCEL IN MATHEMATICS

Experience of the successful mathematicians leads to the following principles and cautions, which if strictly observed, will convert Mathematics from a cold unsociable stranger with knit brows and frown into a warmhearted, cheerful and loving friend. Study the entire second chapter and design the Critical Chain Project Management for your course. The following points help in mastering mathematics. These ideas are also helpful in other subjects.

1. Never wait until the eleventh hour to do your assignment. Go through the entire assignment, even if you cannot solve all problems in one sitting. Solve the easy problems and think about the problems that are difficult. Mathematics has a way of working in your subconscious mind once you think about a problem a while. A solution might pop up in your mind as you are doing something else totally unrelated to mathematics. In order to give time for your mind to think do not wait until the last minute to start the math assignment. Many students hurt their confidence and learning by waiting until the last minute to do their assignments. It also causes too much stress. When you complete any assignment, you feel relieved, satisfied, elated and confident.

DO: Start working on your assignment the day it is given.

2. Never approach mathematics just after taking heavy meals. Let the food be well digested, and then apply yourself to the subject. Otherwise you will feel sleepy, find mathematics very dry and repulsive to study and most uninteresting.

DO: Eat lightly and wait one half hour before solving problems.

3. Don't attack mathematical problems when you are sleepy or about to go to bed. They will only lull you to sleep very quickly. At this time you can review some mathematics which you have already studied or solve simple problems which require little mental exertion. In order to excel in mathematics, you should give sleep its due. We cannot have a clear brain if we do not have enough sleep.

DO: Attack when you are alert.

4. If your circumstances are such that you have to solve difficult mathematical problems just after taking meals or when you feel sleepy, then you have to do that either standing up or walking up and down while you think. Otherwise, your efficiency will be reduced and sleep will conquer you.

DO: Never let circumstances prevent you from doing work.

Never forget to take physical exercise. Remember, it is not labor that kills a student but it is laziness, procrastination or neglect of exercise that does so.

DO: Activate your body to revitalize your mind.

5. When you begin a new topic, go through it completely solving simple problems, leaving hard problems for the second reading. Go through the topic again without omitting a single problem, regardless of whether the instructor has assigned it for homework or not. This way you will save a great deal of time and labor and your work will be efficient.

DO: Don't get stuck. Master the minor to solve the major.

6. As far as possible, try to do everything with your unaided efforts. Not only should you try to solve the examples by your own exertions, but try to do the book work also without the aid of the author. Try to rediscover everything. Read the heading or statement, assumptions discussed in the topic and try to see whether you can come up with the conclusion with the shut book. If you think your efforts are fruitless, then read one or two lines from the top and then try to complete the remaining steps yourself. Thus, at least a part of the problem must be drawn out from your brain to acquire a sound knowledge of mathematics. You might read only very little this way, but whatever is not learned this way forms a very weak part of education. Verbalize the definition, the concept, the problem in your own words. That deepens your understanding. As you practice, you will notice your power increasing and the process will not be slow. Your progress will be rapid and thorough, and you will find yourself quick to perceive and slow to forget.

DO: Test your skills without any aid. Verbalize.

7. Never cram mathematics. The why and wherefore of each step must be grasped. Do not remain content until you know what is to be shown, what is given, and the method to be applied. Otherwise, memory gets unfairly taxed and the work degenerates into drudgery and the knowledge will not be available when it is needed.

The solution to easy problems depends entirely on a thorough knowledge of fundamental principles and methods, and those who skip the steps can only guess the answer and most often it is wrong. On the other hand those who take the trouble to recognize fully the methods and framework of facts on which a particular problem is based will possess a powerful machinery to attack any reasonable problem that is given.

All that will be needed is "readiness" in applying the knowledge this can be brought about by frequent practice in working examples.

DO: Never cram mathematics. Do not rush. Take control of time to take control of the complex.

8. Don't just pass over a problem knowing how to do it, but actually work it out. By this you will acquire practice which will make you perfect. You know the greater part of your exam will consist of easy problems. If you are practiced in the work, you will finish your whole examination in a very short time except for those problems which require thinking. Out of the total time allotted, you will have plenty of it at your disposal for thinking only. Simple problems are a great recreation to students of mathematics.

Most students when asked to work a problem after making a feeble effort, or frequently, before making any, give up in despair saying, "It is very difficult." But the same students after looking at the solution say, "Oh, it was so easy!" "Yes! It was so easy but you could not get it, because you did not enter into it or you panicked before you even got started. You should have more courage, more patience and more strong will." You should try to bring it out of you. Once you do that you will have immense satisfaction and confidence.

DO: Do the homework problems completely. Persevere and be confident.

9. Frequently review the topics you have studied; otherwise your progress will be very slow. Chrystal, a famous author of an old textbook in algebra says, "Every Mathematical book that is worth anything must be read backwards. Go on but often return to strengthen your faith. When you come on a hard or dreary passage pass it over; and come back to it after you have seen its importance or found the need for it further on."

DO: Review the old to tackle the new.

10. In order to attain dexterity in analysis and calculation and become expert in giving ready solutions to problems, it is desirable to acquire the habit of performing mathematical investigations mentally. For example, factoring can many times be done mentally. Calculus formulas can be applied mentally. No other discipline is so effective in strengthening the faculty of attention; it gives a facility of comprehension, an accuracy and steadiness to the conceptions, and what is still more valuable, it makes the mind get into the habit of reasonings and reflections.

DO: Practice with just the mind, leave the paper behind.

11. Mathematics requires of us a great deal of time and energy; we should be continually working at it. It requires our body to be active but mind still. There should not be any worry or anxiety in the mind, when we are studying mathematics. We should only be thinking of the work at hand and should allow nothing to disturb our peace and calm of mind. The labor will bear little fruit unless we are able to keep the mind in perfect solitude, which requires our bodies also to be alone. But to reinforce the ideas, study groups help. After working alone try to find classmates to work together and discuss.

DO: Study in solitude, reinforce it in a group.

12. A student of mathematics should always have a humble heart and a "docile" spirit. Carefully store every piece of knowledge, even if you don't see its immediate use. These directions can be summed up in one line - Love the subject, and try, by every means possible, to keep yourself in a state in which you may be able to concentrate and pay close and undivided attention to the subject. This faculty is the great constituent of inventing power. It is that complete retirement of the mind within itself, that intense meditation on which no thought can intrude; that

firm, straight forward progress of thought, where the mind becomes one with the subject.

DO: A docile mind with focused concentration gets results and fulfills expectations.