📖 Mathematics Tips 📖

When studying math you know that:

- Solving problems is the most important aspect of mathematics.
- You must learn how to solve problems to do well in math so most of your study time should be spent working or studying problems.

Reading

1. Pre-skim; get an idea of the concepts covered; look at the questions at the end of the chapter.

2. Read Actively –

   a. 15 minutes per page is about right for new material.
   b. Know what every word and symbol means.
   c. Check to see how the new material relates to previous material.
   d. Read to thoroughly <u>understand</u> - do not memorize.
   e. Study the examples in your book and ask:
      - How are the rules, definitions, and concepts applied?
      - What methods are used to solve the problem?
      - What is the first step?
      - How can these examples help me do my homework or problems at the end of the chapter?
      - What differences or similarities are there between the examples and homework problems?

      Also,
      - Explain each step using your own words to see if you really understand what was done in each step. Write these explanations on paper.
      - Draw your own diagrams to explain problems.
      - For practice, write down example problems from your book, close your book and try to work the problem. Cross check your work with the example to find out what rules, definitions, concepts, or methods you are having trouble with.

3. Recall actively – new concepts, rules, definitions, etc.

4. Constantly review previous readings. Material that you did not understand the first time will seem clearer on the second and third reading on the same material

Problem Solving
A. Analysis
1. You must understand what is being asked before you start working or you might answer a different question. You must understand all the words that are used. Try to picture exactly what is happening in the problem and relate it to something concrete. Ask yourself the following questions:
   - What is given?
   - What is being asked?
   - What is the concept behind the problem?
   - What is the form of the answer?
2. Graph the functions; try to identify points of singularity and graph values close to those points. When appropriate make a sketch, identifying all known and unknown qualities.

B. Working problems
1. Devise a plan to solve the problem. This is a difficult step but is one that can lead to a solution. Try the following ideas:
   - Identify each type of problem. For example, get to a point where you can look at a problem and determine for yourself the procedure or set of directions you will use to solve it in advance. Decide which problems in the set correspond to a similar example from your textbook or notes. Separate them into groups classified by type of problem.
   - Work one problem of each type rather than just starting at the beginning of the set and trying to work straight through
   - Select *one* problem from the set that embodies *all* the steps of the procedure for solving a certain type of problem. Use these examples to learn general procedures of solving each type of problem.
   - Break the problem into smaller parts (possibly to generate more information).
   - Think of formulas or definitions related to the givens in the problem.
   - Work backward, ask yourself "What do I need to know in order to write down the solution easily?" Then try to generate the information.
   - Guess an answer and then try to check it to see if it is correct. The method you use to check your answer may suggest a possible plan.

2. Once you have a plan, carry out the plan. Be sure to check each step.

3. Be sure to always check the solution. To do this you can:
   - Check to see if the answer is in the proper form that you thought it should be in.
   - Insert the answer back into the problem.
   - Ask yourself if your answer is reasonable (for example, the distance from Los Angeles to New York is 2800 miles, not 28 or 280 miles).

4. If you can't solve a problem when you are attempting it, don't spend hours on it. Set it aside. A few hours later or the next day try it again. Often you will succeed.

Problem

1. Analyze problems after you have solved them.

2. Ask yourself:
   - How did I begin?
   - What concept or definitions did I use?
   - What methods did I use?
   - How does the solution compare with worked problems from the textbook?
   - How can I use this problem to solve other problems?
   - Can I do this problem another way? Can I simplify what I did?

Note Taking

Before class: Preview material to be covered. Note new vocabulary, new examples, and problems at the end of the section.
During class:
   - Listen actively.
   - Ask questions if concept or computational procedure is unclear.
   - Note starting points, assumptions, conditions. Take notes on key steps and fill in later.
   - Anticipate consequences of theorems and definitions.

- During proofs, keep the conclusion in mind.

<u>After class</u>: Immediately summarize and review.

Test Preparation

- Summarize – make a list of all new concepts, definitions, etc.
- Analyze problems – both examples and your own solved problems. Usually one learns how to solve 6-10 different kinds of problems for any one test. Learn the general set of problem for solving all the different types of problems that you expect to find on the exam. Often, all the problems of a given type are worked the same way and the same set of directions can be applied to their solutions.
- Review and rework problems cyclically – suppose the exam will cover more than one chapter. When reviewing problems, analyze another from each chapter, and so on.
- Pretend you are allowed to take a sheet of notes with you to the test. Make such a sheet and study it until you know it so well you don't need it anymore.

Test Taking
- Scan test and work the problems you can work immediately.
- Allot appropriate time for each problem.
- Maximize partial credit possibilities by showing all your work.
- Think of test taking as one more way to practice skills.

Test Analysis
- Analyze returned tests to find areas of difficulty. Possible areas of difficulty are content, problem solving, test anxiety, understanding lectures or understanding the textbook.
- Adjust study patterns appropriately.

Important: Math is <u>cumulative</u>. Many math concepts build on previous concepts and a lack of understanding of current concepts will impede your understanding of future concepts. If you encounter difficulty, seek help early.