Tips on How to Study Math

What’s Different About Math Textbooks

1. Math textbooks must be studied very slowly.
2. Unlike many other textbooks, math textbooks have:
   - No repetition
   - No varying of pace
   - Few topic sentences
   - Few concluding sentences
   - No restatement of main idea
3. Math textbooks are written with the expectation that you will not proceed to the next sentence or point without mastery of the previous one.
4. Clarification is achieved by very precise sentences – no extra words.
5. Diagrams and examples are used to illustrate ideas presented in text.

How To Read Math Textbooks

1. Write as you read – key to success.
   - Create tasks to make learning active.
   - After reading an example, cover it up and try to redo from memory.
   - After reading an explanation, immediately look for related examples in the text exercises and try to do.

2. Styles of reading math textbooks vary:
   - Reading Down - Start with an overview of the topic by reading explanations and examples; then go to doing problems.
   - Reading Up - Start with examples, sample problems, and the solutions to problem sets. Ask yourself why each step was done. Go back to text when necessary to seek sentence that clarifies concepts.
Using Text as Reference Only – Start with problems and try to do based on what is already known. Descriptive part of text not read. (Only good for students with previous math experience)

**Marking a Math Textbook**

Record in the text margin or notebook thoughtful comments, questions, clarification, summary of definitions, or words converted to symbolic language.

**Lecture Notes in a Math Class**

<table>
<thead>
<tr>
<th>(Clues to Process)</th>
<th>(Completed problem demonstrated in class)</th>
</tr>
</thead>
</table>
| Divide by common factor | 2x + 2y = 4  
|                     | x + y = 2  |
| Combine like terms | 3x – 8 + 3 = 2x – x + 1  
|                     | 3x – 5 = x + 1  |

**MODIFIED TWO-COLUMN SYSTEM**

<table>
<thead>
<tr>
<th>Key Idea Words</th>
<th>Discussion of Rules/Notes</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Associative Property | Distributive Property  
|                   | Commutative Property | 5 (W+3) + 3 (W+1) = 14  
| Add opposite of 18 | Associative Property | 5W + 15 + 3W + 3 = 14  
|                   | Addition of like terms | 5W + 3W + 15 + 3 = 14  
|                   | Addition property of equality | (5W + 3W) + (15 + 3) = 14  
|                   | Addition + additive inverse | 8W + 18 = 14  
|                   | Multiplication property of equality | 8W + 18 – 18 = 14 – 18  
|                   | Reduce | 8W = –4  
|                   | Answer | 1/8 (8W) = 1/8 (–4)  
|                   | SOLVING EQUATIONS: | W = 4/8  
|                   |       | W = ½  
|                   |       | CHECKING ANSWERS:  
|                   |       | See if it seems right  
|                   |       | Put answer back into |
Some useful tips on taking notes in a math class.

1. Every symbol in a formula has a specific meaning. Special care is needed to be sure to copy accurately.

2. Review class notes daily – as soon after class as possible.
   a. Rewrite the material you cannot read or will not be able to understand in two weeks.
   b. Fill in the gaps where the information is incomplete
   c. Add additional key words and ideas in the left-hand column that will improve your understanding of mathematics.
   d. After going over your notes, spend five minutes reviewing the most important parts of the lecture. Try to summarize these major parts in your mind, as well as putting them together with concepts learned in the past lectures.

3. Use class notes as a supplement to text. Try to find the relationship between them.

4. Periodically, briefly outline what has been studied, in order to highlight progression and relationships from topic to topic.

5. Keep a list or set of index cards of key terms, formulas, important principles, symbols, etc.

5. Know when to take notes in class. Pay attention to cues indicating important material if the instructor is:
   a. presenting contradictory or unrelated facts of ideas
   b. writing on the board
   c. indicating that certain types of problems will be on the test
   d. summarizing
   e. pausing
   f. repeating statements
   g. enumerating items (1, 2, 3, or a, b, c)
   h. working on several examples of the same type
   i. indicating that the problem is tricky
General Tips for Studying Math

1. Math is not a “spectator sport.” Active participation by doing is essential.

2. Daily practice speeds up learning math – regardless of how often the class meets.

3. Keep an organized notebook for a math class – keeping class notes, homework, other problems, and graded quizzes on each topic together.

4. Always redo problems and exercises from homework, quizzes, or exams done incorrectly. It is essential to erase wrong information from your memory.

5. Each day, copy some sample problems from class notes or text and their solutions on index cards – problem on one side and solution on the other side.

   Front Side | Reverse Side
   -----------------  ------------
   Find 6% of $8.750 | Solution:

   6% = .06
   $8.750
   \( \times .06 \)
   $525.00

   An excellent, handy supply of practice exercises for reviewing for exams will result. By shuffling the index cards, problems appear in random order to provide a true test of how well material is known, since there will be no hints of chapter, section titles, etc. to remind you of solution methods.

   At least twice a week, shuffle the deck of index cards and deal yourself the number of problems you can complete in one hour. Work the problems and grade yourself by comparing your solutions with the ones found on the reverse side of the index cards.

   For each problem you cannot work without looking at the solution, find at least two similar problems in your index cards, notes, or book. Work those problems also until you understand and remember the procedure.

6. Math requires cumulative learning – what you learn today, you use tomorrow to learning something else. Therefore never skip topics and try to never miss
a class since there will be a “missing link” in your development of the concepts.

7. Remembering to work math problems in an orderly manner speeds up the learning process. Even when working on scrap paper, label problems and work with problems or equations aligned in columns or other appropriate formats. Using lined paper helps.

8. Use a calculator for speed and to check accuracy only after you understand the particular procedure, method, or function. Be sure to study the manual for your model.

How to Review Math Quizzes or Exams

1. Spread review out over more than one study session. Short, repeated study sessions are recommended.

2. Prepare a list of specific objectives you expect to be on the test.

3. Locate and work examples and problems related to each of the objectives you have listed.

4. Learn definitions of new words. Being able to repeat these definitions orally is a good check to see if you really can recall the appropriate definition. When learning a definition, note any specific limitations.

5. Look for and try to recall general patterns in the problems. Study previous quizzes, and in particular, problems you worked incorrectly.

6. Reword problems from past homework assignments. Compare your answers with your original results.

7. Never just look over homework or previous tests; instead, rework the problems completely.

8. Two nights before a test, work the sample tests at the end of each chapter which the test will cover.

9. Be sure to ask the instructor about anything you don’t understand.

10. If the instructor offers a review session, pay especially close attention as he or she may have just have finished writing the test and may be creating review problems that are similar to those that will be on the test.

Suggestions for Taking a Math Test
1. For at least the first 75% of the time allotted for the exam, work at a comfortable but steady pace. For the last 25% of the time, speed up if over 25% of the questions remain unanswered.

2. For problems remaining unanswered near the end of the testing period, if the test is short-answer, T/F, or multiple choice, spend the last few minutes making educated guesses. Don’t lose points on a test because you didn’t take advantage of free guesses!

3. If the instructor offers partial credit (with problems requiring that you show your work), keep in mind that many instructors give more credit for incorrect attempts than for incomplete attempts.
   a. Construct drawings that will help with the presentation of the solution. Also, record any formulas or theorems that apply to the problem.
   b. Give careful thought to the first steps of the solution. Mistakes made in the first few steps are usually penalized more heavily since they may indicate a lack of knowledge on how to begin the problem.
   c. After completing the first few steps in the solution, determine if you can complete the problem at a faster pace if your time is limited.
   d. If there is not enough time remaining to complete the problem, outline the steps required to complete the problem so the instructor can see that you at least have the knowledge necessary to work it.

4. Two-part questions are those that require an answer from the first part in order to solve the second part. If you know how to work the second part, but not the first, write a note on your test paper stating that you are making up an answer to the unsolved first part so you can continue with the second. To avoid confusion, however, always write an explanation to the instructor so he will know what the numbers represent.

5. Ask yourself if your answer is reasonable. If it is not, try the following:
   a. If the answer is much too large or small, check the positions of any decimal points.
   b. If the answer is negative when it should be positive, check the steps in the solution where negative and positive numbers are being added, subtracted, multiplied, or divided.
   c. If a formula with substitutions is being used, check that the proper substitutions were made.
Resources:

Hawes, Gene R. and Lynne S. Hawes, “HAWES GUIDE TO SUCCESSFUL STUDY SKILLS.”
Kepner, Henry S. Jr. and David R. Johnson, “GUIDELINES FOR THE TUTOR OF MATHEMATICS.”
Margenau, James and Michael Sentiowitz, “HOW TO STUDY MATHEMATICS.”
Nolting, Paul D., “WINNING AT MATH – YOUR GUIDE TO LEARNING MATHEMATICS THE QUICK AND EASY WAY.”
Oxrieder, C. Ann and Jane P. Ray, “YOUR NUMBERS’S UP!”
Tobias, Sheila, “SUCCEED WITH MATH.”