



SUCCESS CENTER STRATEGIES FOR STRENGTHENING MATH STUDY SKILLS

I. Studying Math

Previewing Material

Before you attend your next class, use your textbook to preview the material that the instructor will be covering. Even a brief skimming will make your class time more beneficial; a more careful study will enable you to formulate questions and be a more active learner in class.

Attending Class

Always attend class! Be sure to be on time. Be an active participant: think, question, write, interact. It is important to ask questions to make all concepts clear. Make yourself aware of other resources available (study groups, tutors, Success Center, etc.)

Taking Notes in Math Classes

Write down what is on the board. Include an explanation of what is being done. What seems clear now may not be so clear later.

Write clearly and give yourself plenty of space.

Draw pictures, diagrams, charts, etc.

Keep your notes as organized as possible. Use note cards for formulas and key points.

Studying Properly

In most college courses, you are expected to spend between two and four hours studying outside of class for every hour spent in class.

It is especially important that you spend this much time on your math course, since you must both acquire and then perfect various skills.

It is also important to distribute your study time. Do not try to do all your studying in one day. Understanding and acquiring the necessary skills is much easier if you spread your studying out over the entire week, doing a little each day.

If your study sessions are more than one hour long, it is a good idea to take a ten-minute break after each hour.

What to Do First

Before you attempt your math problems, review the relevant portions of your notes. Simply memorizing a bunch of unrelated steps from an example in your notes may seem to work for you initially, but soon your memory will be overburdened and you will begin to confuse examples and/or forget steps. The goal is to understand the concepts underlying the examples.

Reading Directions

One very important but frequently overlooked part of a math problem is the instructions. Sometimes the instructions are given in a single word, such as “simplify” or “solve”; other times, it takes longer to understand the instructions than it does to do the exercise! The instructions tell us what we are expected to do. Different examples may look the same, but have different instructions. Before attempting a problem, read the instructions carefully to determine what you are being asked to do.

Comparing and Contrasting Examples

When learning something for the first time, it is easy to get confused and treat things which are different as though they are the same simply because they look similar. Algebraic notation can be especially confusing in this respect because of the detail involved. Move or change one symbol in an expression and the entire example is different. Change one word in a word problem and the whole problem has a new meaning.

It is important that you learn to notice these subtle differences. The best way to do this is by comparing and contrasting concepts and examples that look almost identical, but really are not. For example, the two expressions $3 + 2 \cdot 4$ and $3 \cdot 2 + 4$ look similar, but are actually very different.

Reviewing Old Material

Constantly review previous material in order to ensure that you have learned it well. New material will build on concepts previously learned. Reviewing previous material aids you in learning new material.

Keep all worksheets, quizzes, and tests. These are excellent sources of review.

Making Study Cards

Study cards are 3” x 5” or 5” x 8” index cards that contain summary information needed for convenient review. The process of making study cards is a learning experience in itself.

Three types of cards are particularly useful.

1. Definition/principle cards: These cards contain a single definition, concept, or rule for a particular topic.
2. Warning cards: Use these cards to alert you to errors that you may be making consistently on homework, quizzes, or exams, or those common errors pointed out by your teacher. The card should contain the word **WARNING** and the warning itself. On the back include an example of how the problem should be done.
3. Quiz cards: Use these cards to practice for tests. Pick out a few odd-numbered exercises from each section of your text. Copy accurately both the instructions and the problem. On the back of the card, write down the exercise number and the section of the book where the problem was found. Also write down the correct answer.

II. Preparing for an Exam

When to Study

“All-nighters” seldom work. Math skills cannot be developed overnight. In addition, without an adequate amount of rest, you will not have the clear head you need to work on a math exam.

Distribute your study sessions over a period of time. Put in a couple of hours each day instead of many hours all in one day. You will find that not only will your studying be less burdensome, but you will also retain more with less effort.

Study Activities

If you are going to learn math well enough to demonstrate high levels of performance on exams, you must concern yourself with both developing your skills and understanding what you are doing.

Many students concentrate only on skills. They often resort to simply memorizing the procedure. This may work for quizzes or for a test covering just a few topics, but for exams covering more material, this can be quite a strain on the memory. Eventually interference occurs and memorized problems and procedures get confused with one another.

Concentrating on understanding what a method is and why it works is important. Neither the instructor nor the textbook can cover every possible way in which a particular concept may present itself in a problem. If you understand the concept, you should be able to recognize it in any problem.

In order to achieve both skill development and conceptual understanding, your studying should include three activities:

1. Practicing problems
2. Reviewing your notes and textbook
3. Drilling with study cards

Drilling With Study Cards

Study cards are convenient to use – you can carry them along with you and use them for review any time you have a few free moments.

Use the Definition/Principle and Warning cards as follows:

1. Look at the heading of each card and cover the rest of the card. See if you can remember what the rest of the card says.
2. Pull out the cards you know well and put them aside. Review these cards occasionally.
3. Study repeatedly the cards you do not yet know. Shuffle the cards occasionally so as to change the order in which you are viewing them.
4. As you go through your cards, ask yourself the following questions:
 - When do I use this rule, method, or principle?
 - What are some examples of the definitions or concepts?

Use the Quiz cards to practice your skills. Shuffle the cards and do the problems in random order.

Reviewing Your Notes and Text

An important facet of studying for exams is reviewing your notes and text. Your notes are a summary of the information you believed was important at the time you wrote them down. In the process of reviewing your notes and text, you may turn up something you missed. A gap in your understanding may get filled, giving more meaning to some of the definitions, rules, and concepts on your study cards.

Reviewing the explanations and problems in the text and in your notes gives you a better perspective and helps tie the material together. Concepts will begin to make more sense when you review them and think about how they are interrelated. It is also important to practice review problems so you will not forget skills you have already learned. Do not forget to review old homework exercises, quizzes, and exams, focusing especially on those problems that were done incorrectly.

III. Taking an Exam

Just Before the Exam

You will need to concentrate and think clearly during the exam. For this reason it is important that you get plenty of rest the night before the exam and have adequate nourishment.

It is not a good idea to study up until the last possible moment. You may find something that you missed and become anxious because there is not enough time to learn it. Then, rather than simply missing a problem or two on the exam, the anxiety may affect your performance on the entire exam. It is better to stop studying some time before the exam and do something else. You could, however, review formulas you need to remember and your Warning cards just before the exam.

Beginning the Exam

Be on time! At the exam, make sure you listen carefully to the instructions. Read carefully any written instructions.

As soon as you are allowed to begin, jot down the formulas you might need, and write some key words to remind you to avoid common errors or errors you have made previously. Writing down the formulas first will relieve you of worrying about whether you will remember them later, thus allowing you to concentrate more.

What to Do First

Not all exams have the problems arranged from easiest to most difficult. Since time is usually an important factor, you do not want to spend too much time on difficult problems and not have enough time to do the ones that are easier for you. Look over the exam and start with the problems that you know how to solve quickly. Then go back and work on problems that you know how to solve but that take longer. Finally, work on those problems that you find more difficult. If time remains, check your solutions to the problems you have completed.

Dealing with Panic

If you followed carefully the advice given thus far, you should feel fairly confident and less anxious about the exam. But you may still find during the test that you are suddenly stuck or are "drawing a blank". This may lead to panic. Your heart may start to beat faster and your breathing may quicken.

What you need to do is break the panic cycle. Put aside the exam and silently say to yourself **STOP!** Try to relax, clear your mind, and encourage yourself by saying to yourself things such as "This is only one (or a few) problems, not the whole test" or "I've done problems like this before, so I'll get the solution soon."

Now take several slow deep breaths and search for some problems that you know how to do and start with those. Build your concentration and confidence slowly with more problems.

When you are through with the problems you can complete, go back to the ones you were stuck on. Save some time for checking your work on the problems you have been able to complete.

Concluding Comments About Exams

If you are required to show your work (such as for partial credit), make sure that your work is neat. Put your final answers where directed or at least indicate your answers clearly by putting a box or circle around them.

Some students are unnerved when they see others finishing the exam early. They begin to believe that there may be something wrong with them because they are still working on the exam. You should not be concerned that some students can do the work quickly. Some leave the exam early, not because the exam was easy for them, but because they gave up.

IV. Reviewing Your Exam

Diagnosing Your Strengths and Weaknesses

After you get your exam back, you should review it carefully: examine both what you did correctly and where you made mistakes.

Don't gloss over your errors, assuming that they were all "minor" or merely due to "carelessness." Be honest with yourself. Don't delude yourself into thinking that all your errors are simply the result of carelessness when in fact they are a result of not clearly understanding certain concepts or procedures. Ask yourself the following questions about your errors:

- Did I understand and follow the directions?
- Did I understand the topic that the problem is testing?
- Did I misuse a rule or property?
- Did I make an arithmetic error?

Look over the entire exam. If you think you have a problem understanding a concept, topic, or approach to a problem, you should immediately seek help from your notes, your text, your teacher, or the Success Center.

Checking Your Understanding

After you have studied your exam and you believe that you understand the material and what you did wrong, do the following: Copy the problems onto a clean sheet of paper and rework them without any notes. Check to see if your answers are correct. If they are, then try to find problems in the text that are similar and work these new problems on a clean sheet of paper. If some of your answers are incorrect then you may simply have learned how to solve the test problems without really understanding the topic that those problems were testing. In that case, you may need to repeat these steps several times until you are confident you really understand your errors.

Analyze your study and test-taking techniques. If you are not happy with your grade, then you need to make some changes. *Don't keep doing what you've been doing if you don't want to keep getting what you've been getting.*

Keep your exam (with the correct answers) since it is a good source of information for future study. You may want to record on Warning cards the errors that you consistently made on the exam. Also, different exam problems can be used on your Quiz cards.

Adapted from *Understanding Intermediate Algebra*, 3rd ed, By Lewis Hirsch and Arthur Goodman (St Paul, MN: West Publishing Co, 1994)