

Incorporating Study Skills into Mathematics Classes
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Here is a group of different activities and assignments designed to help students improve their math study skills. The goal is to improve my students' study skills without sacrificing too much class time.

If you have any questions, or a terrific activity/assignment that you'd like to share, please drop me a line at georgew@cos.edu.

List of Assignments:

- Note Taking – 5 Minute Intro to Cornell Notes & Keeping a Binder
- Note Taking – Building the Perfect Notes
- Doing Homework – Coping Strategies
- Doing Homework – Using Note Cards to Overcome Difficult Problems
- Reading the Textbook – Think/Pair/Share
- Reading the Textbook – Identifying Key Features
- Memorization – Using Note Cards
- Practice Quizzes – How to Create and Use (Test Preparation)
- Practice Quizzes – MyMathLab Style
- Test Taking – Taking a Half Test
- Test Analysis – Assignment to Review Performance on a Test
- Time Management – Weekly Calendar
- Study Groups – A Number of Suggestions to Encourage Students to Form Groups (Including In-Class Assignments, Mathematician in History, Newsletters)
- Math Anxiety – Math Autobiography
- Math Anxiety – Assessment of Strengths and Weaknesses
- Learning Styles – Group Presentations
- Learning Styles – Pass the Pen

Note Taking

I start with note taking because I believe that a high percentage of the learning that occurs takes place inside the classroom. Note taking is the one activity that is essentially included in each day's session.

On the first day of class I tell my students what type of binder they need to have, and how the notebook should be structured.

(A description of how I want the notebook to be structured follows on the next page.)

On the first day that I lecture I explain the Cornell note taking system, and why it's helpful.

(A description of how I want students to set up their page for Cornell notes is listed 2 pages from here. If you want more details, send me an email at georgew@cos.edu.)

I also explain why we take notes in class, and how we use them afterward.

After I cover enough material for roughly one page of notes, I stop and talk to my students about their notes.

Are they neat? Are they easy to follow?

What questions or comments could have been written in the left-hand column?

How would you summarize the first page of notes at the bottom of the page?

This takes a total of 5 minutes of class time on top of the math lecture.

That's it. On day 2, I walk into class and see my students preparing their pages.

I start each class by asking students to read me their summaries from the previous day.

Essentially, this is my "What did we cover yesterday?" moment.

Format of Notebook for My Students

Your Notebook

Many say that organization is one of the keys to success. It is definitely true in a math class. You can take the greatest notes, but if you can't find them it won't help you at all. You should have one notebook that is for your math class only. You should use a three-ring binder, which is easier for creating quality notes than a spiral notebook. A binder that is 1 ½" or 2" thick would be a good choice.

Put your copy of the class syllabus at the very beginning of the binder. The syllabus contains all of the important information for the course, including my office location and the schedule for office hours. After the syllabus, break the binder into several sections using section dividers. Here are the sections I want you to use.

- **Section 1 - Notes:** This section will contain your classroom notes.
- **Section 2 – Homework:** In addition to your homework (odd textbook exercises), you can keep class work in this section.
- **Section 3 - Exams and Quizzes:** Keep your old exams and quizzes in this section. Many students fail to keep their old exams and quizzes handy, but reviewing old quizzes is a great way to prepare for an exam. Reviewing old exams is a great way to prepare for a final cumulative exam.
- **Section 4 – Key Problems:** For each section you will be assigned a set of key problems that you will turn in. Once they are returned to you, store them here.
- **Section 5 – Handouts:** In this section you can keep any handouts that I give you. This should include any handouts I give you throughout the semester.
- **Section 6 – Glossary:** Each section in the textbook has a set of key vocabulary terms. You will keep the definitions of these terms in this section of your notebook

Cornell Notes

Heading

Column 1 ← 2 ½ inches →

Column 2 ← 6 inches →

Comment Section

Note Section

This column is for main ideas, terms being defined, questions you have, reminders for important points, etc.

This column is for taking notes.
This includes definitions, procedures, and example problems.

Summary Row

This row is for summarizing the page's contents while reworking your notes.

← 2 inches →

Note Taking Activity –

“Building the Perfect Notes”

- **Give a carefully scripted 20-minute lecture. Include definitions, examples, and commentary.**
- **After the 20 minutes, pair students together and have them compare their notes for 5 minutes. Give each pair 10 minutes to rewrite their notes based on their discussions.**
- **Combine two pairs together and have each group of 4 compare their notes for 5 minutes. Give each group 10 minutes to rewrite their notes based on their discussions.**
- **For homework, have each student supplement their notes with materials from the textbook.**
- **On the next day of class, go over a list of things that students added to their notes.**

Doing Homework #1 – Coping Strategies

- **Form groups of 2-4 students.**
- **Have each group of students make a list of 5 coping strategies when stuck on a homework exercise. (5 minutes should be plenty of time.)**
- **Collect the strategies on the board, 1 from a group at a time until all strategies are exhausted.**
- **Comment/discuss the effectiveness/practicality of each.**
- **Add any other strategies you can think of.**

Doing Homework #2 - Note Cards

- **Assign homework near the end of the class period. Instruct students to check their answers after completing each of the exercises.**
- **For any problem missed, the student should**
 - Write the problem, and what went wrong, on the front of the card.*
 - Work out the problem correctly on the back.*
- **Collect the note cards at the beginning of the next class to look them over. This will give you a snapshot of where your students are having trouble.**
- **Briefly discuss how to use these note cards as part of an overall test preparation strategy, as well as the potential benefits of using these cards.**

Reading the Textbook #1 – Think/Pair/Share

- **For homework have students read through several objectives or an entire section in the book. The earlier in the semester the better, while the material is on the “easier” side.**
- **Students should summarize the main ideas and describe the types of examples covered.**
- **At the beginning of class, put students in groups of 2-4 students. The students should compare what they have written with the rest of their group, looking for items or ideas they are missing.**
- **Give the students a brief assignment, allowing them to use what they have written. This will allow the students to determine whether they got enough out of the reading.**

Reading the Textbook #2 – Main Features

- **Have students flip through 1 chapter in the textbook and make a listing of the different features in the book. This can be done individually, or in groups.**
- **For each feature, discuss how it can be used to help the student learn and understand mathematics.**

Memorization - Note Cards

- **Note cards are an effective tool for memorization. Here is a list of possible topics for which note cards would help students to memorize.**
 - **Sign rules for integers**
 - **Rules for arithmetic with fractions**
 - **Formulas for factoring**
 - **Set up for word problems**
 - **First step for solving absolute value equations and inequalities**
 - **Steps for graphing different types of functions/equations**
- **Choose one topic early in the course, and make a set of note cards on the board. For example, in a prealgebra class covering multiplication and division of integers, the following would work.**

Front	Back
Positive \times Positive Positive \div Positive	Positive
Positive \times Negative Positive \div Negative	Negative
Negative \times Positive Negative \div Positive	Negative
Negative \times Negative Negative \div Negative	Positive

- **As the course progresses, you can point out opportunities to create note cards.**

Practice Quizzes

As we all learned in grad school, being able to anticipate what you'll be asked is half the battle to be successful on an exam.

- **Assign your students to create a practice quiz (for a section or an entire chapter) for homework.**
- **Give them an idea about the types of problems, as well as how many, to include.**
- **You can:**
 - **Collect the quizzes and give your feedback.**
 - **Have students swap quizzes and analyze the other student's test. (Too hard, too easy, missing this type of problem, ...)**
 - **Have students swap quizzes and take each other's practice quiz, Ask the student who wrote the practice quiz to grade it.**

Practice Quizzes - MyMathLab Style

- **Print out the online exercise listing for a certain chapter for your text from MyMathLab.**
- **Form groups of 4 students, and instruct them to make a 20 question practice test from this list.**
- **Tell them that the problems should be varied in level of difficulty and represent the entire chapter.**
- **Quickly create their practice tests on MyMathLab, and post them so they can take it.**
- **Sometimes I have students take the practice quiz that another group wrote and analyze how well they did in creating their practice quiz.**

Test Taking - Half Test

- **Write a varied practice test that will take half of a class period.**
- **After the students have finished, give out a sheet with solutions.**
- **Have students determine whether they are working quickly enough.**
- **Have students determine which subjects/problems will require further study and spend the remainder of the time answering questions.**
- **The main idea is to put students in a test-like situation prior to the test. This can be done before the first exam, and students can do this on their own prior to all subsequent exams.**

Test Analysis

- **When you turn back a test, assign your students a “Test Analysis” assignment.**
- **For any problem they lost points on, have them**
 - **Explain the error in their own words**
 - **Rework the problem correctly**
 - **Cite a page number and example number where this type of problem can be found in the book**
 - **Make up a similar problem of their own and solve it.**

Time Management – Weekly Calendar

- **Give a 1-week calendar and have students fill out commitments (classes, work, ...), travel time, sleep, meals, ...**
- **Then have students pencil in time for studying and homework for each class.**
- **Open discussion on whether this is enough time devoted to the course, is the plan realistic, etcetera.**
- **A couple of weeks later have students keep track of the time they spend working on your class. Have them compare their budgeted study time with their actual study time.**

Study Groups

If you want to encourage your students to form groups outside of class, consider incorporating collaborative activities into your class.

For example, reserve the last 5-10 minutes for students to work on problems in groups. If the experience goes well, your students are more likely to work together outside of class.

Specific Assignments You Can Use:

Mathematicians in History – Create a poster documenting the life of a prominent mathematician.

(I have many of these available that I am willing to share.)

Newsletter – Create a newsletter explaining how to solve a certain type of problem.

(I have many of these available that I am willing to share.)

Other group activities to be completed outside of class.

Math Anxiety – Math Autobiography

As a homework assignment, ask students to prepare a brief “Math Autobiography”. This should include items such as

- **Classes taken**
- **Positive experiences**
- **Negative experiences**
- **Overall attitude about math**
- **Strengths and weaknesses**

Just getting these ideas on paper helps students to realize their situation, and gives you a quick snapshot into the mathematical background/baggage of your students.

Commonalities can be discussed in class, showing students that they are not the “only one”.

Math Anxiety – Assessment of Strengths and Weaknesses

- **During the last 5 minutes of class, have students list 3 reasons why they will pass the class, as well as completing the sentence "If I fail the class, it will most likely be because ..."**
- **Collect all of the responses from students on their way out.**
- **Prepare a summary list from both categories before the next class.**
- **Begin the next day with a discussion that will celebrate those strengths, and focus on how to overcome those potential shortcomings. Include your suggestions for overcoming math anxiety.**

Learning Styles #1 – Brief Group Presentations

- **At the end of class, assign a particular problem to one group, based on the material covered that day. This can be selected from the homework exercises, or a problem of your own.**
- **At the beginning of the next class they make a 5-minute presentation of their solution.**
- **The presentation should include auditory/visual components.**
- **Encourage them to use as much of the board as they can to present their work, and to make their explanations as clear and thorough as possible.**

Learning Styles #2 - Pass the Pen

- **Instructor puts a problem on the board. This works best at the end of class, when you have time to sneak in that one extra example to make sure students truly understand before they leave.**
- **A volunteer comes up to do 1 step, then passes the pen to another volunteer who does the next step, and so on.**