



**Department of Mathematics
TA Training Manual
Fall 2011**

Contents

Welcome	5
Guiding Principles	6
Training Goals	6
Lesson Planning.....	7
Essential Elements of Any Teaching Activity.....	8
Creating Objectives	9
Student Engagement	11
Giving Directions.....	12
Measuring Student Engagement in your Lesson Planning	12
Assessment: Checking for Understanding	13
Questions – Your and Theirs	14
Using Open-Ended Questions and Probing Statements to respond to Direct Questions	14
Examples of Probing Statements and Open-Ended Questions that Re-Direct Students.....	15
Getting to the Heart of Understanding – “Do Language” vs. “Think Language”	16
Establishing and Maintaining an Appropriate Classroom Culture	17
The First Day of Class	17
Setting Expectations	18
Professionalism	20
When Things Go Wrong – Practice Progressive Intervention.....	21
Grading.....	23
Mechanics	25
Boardwork.....	25
Communication Skills.....	25
Organization.....	26
Record Keeping	27
Homework Policies	28
Writing a Homework Policy	28
Sample Homework Policies.....	32

Welcome

Welcome to the University of Arizona Department of Mathematics. Teaching is an important part of the mission of our department, and you are now an important part of that teaching mission. Your role as an instructor in this department is to do your best to help students succeed in math.

This manual and training, in conjunction with the Department of Mathematics Instructor Resource Manual, are intended to help prepare you for the critical first few weeks in your job as a first-time instructor in our department. We hope that you will find this material practical and helpful.

Enjoy your first semester of teaching at the U of A!

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Guiding Principles

This manual and the accompanying training were built upon a few guiding principles:

1. Our goal as teachers should be for 100 percent - 100 percent participation, 100 percent engagement, 100 percent effort, 100 percent on-task, 100 percent success. We must have this expectation if we hope to have students working to their full potential.
2. Most of the cognitive work in a class should rest on the students' shoulders.
3. The success of any teaching activity is measured only by how well students are able to meet the objective(s) of that activity. We should establish and use observable and measurable criteria to assess our students' progress.

Training Goals

Our goal is that by the end of this training, you will be able to:

1. Create clear objectives for student learning and behavior.
2. Structure class time and create a lesson plan with clear learning objectives that includes an outline of instructor and student activities and a realistic timeline.
3. Identify various forms of student engagement, and identify the advantages and challenges of each.
4. Identify ways to incorporate and increase student engagement in lesson planning.
5. Identify ways to incorporate ongoing assessment of student understanding in lesson planning.
6. Establish a plan for creating and maintaining an appropriate classroom culture.
7. Understand appropriate standards for professional conduct and demeanor.
8. Present a lesson in front of a group.
9. Be familiar with the resources available to instructors in this department, and know how to find university and department policies and procedures that relate to teaching.
10. Use various strategies for grading student work.
11. Examine your pre-conceived notions about teaching, and begin the process of thinking about who you are as a teacher.
12. Identify various teaching activities that go beyond traditional lecture.

Lesson Planning

Preparation is critical in the success of any class. Preparation means more than just “knowing the material” or “picking examples” – it involves thinking about what you want to happen in class, and specifically planning to make that happen.

A good lesson plan includes not only an outline of activities for the instructor, but also for expected student behaviors. One possible structure for lesson planning is to utilize a 2-column plan, which includes information about what the instructor will do and what the students will do. This type of planning keeps the emphasis where it should be – on the student.

Exercise: Creating a Lesson Plan

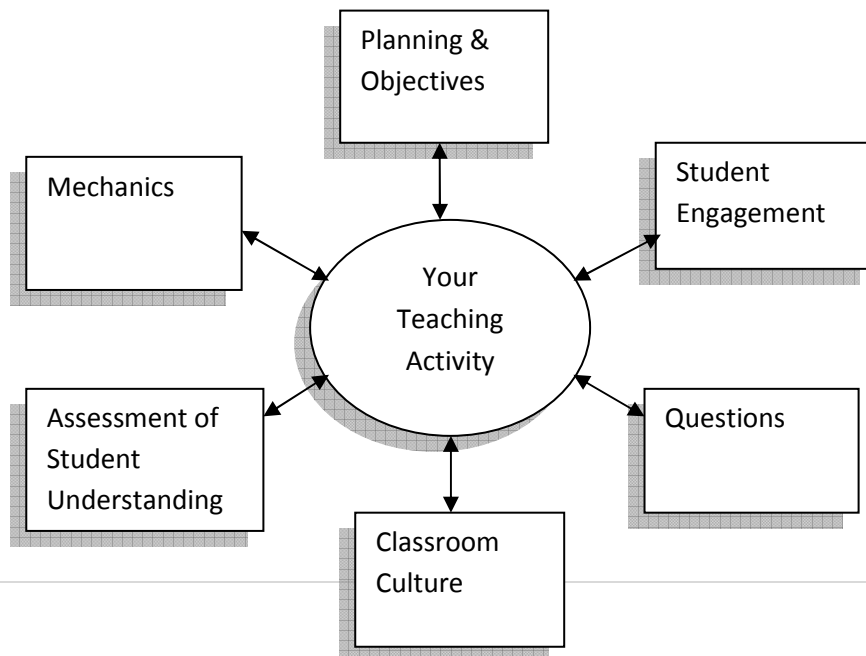
During this activity, you will be planning a lesson for the first day of regular class. Along with one other person at your table, plan a lesson for one class day. Be sure to indicate an amount of time for each activity, for a total of 50 minutes.

Directions:

1. Read relevant material in textbook.
2. Review the homework in the section, to determine type and level of questions the students should be able to answer by the end of the class period.
3. Look at syllabus to approximate timing.
4. Write a list of things you want students to be able to do by the end of the class period.
5. Include specific examples, definitions, terminology, drawings, graphs, and amount of time spent on each part

Essential Elements of Any Teaching Activity

- **Planning/objectives**
All good lessons start with good plans, and good plans start with well-constructed objectives. In addition to a clear plan for what you want students to be able to accomplish by the end of the class period, you need to have a detailed outline of all of your teaching activities that will support those outcomes.
- **Student engagement**
Engagement refers to all forms of student participation – listening, thinking, discussing, taking notes, problem-solving, answering questions, asking questions, etc. The goal of 100% engagement means all students, all the time.
- **Questions**
Asking and answering questions is a critical component of teaching. Open-ended and probing questions are effective tools in assessing student understanding. Finding out what students already know and understand will be of the utmost value in answering questions, by helping students get from where they are to where they need to be.
- **Ongoing assessment of student understanding**
Assessments come in many forms. By “ongoing assessment”, we are referring to the daily activities that assist us in determining how well students understand concepts and how well they are able to meet the daily objectives. Assessment tools include observation of problem-solving, questioning, and quizzing.
- **Classroom culture**
Classroom culture refers to the atmosphere of the class, based on the observable behavior and attitudes of the students and instructor.
- **Mechanics**
The mechanics, or technical aspects of teaching include such things as organization, board work, clear and understandable speaking voice, and communication skills.



Creating Objectives

Objectives should describe skills or knowledge that a student should achieve as a result of educational activities. A clear learning objective should describe WHAT a student should be able to do, HOW (or under what conditions) the student should be able to do it, and specify the degree of accuracy required.

Objectives should:

- Be student-centered; i.e. address what students should be able to do after the given activity
- Be specific
- Be observable
- Be measurable
- Include conditions (the “givens”) when appropriate
- Include criteria for assessment when appropriate

You will need *action* verbs in order to create learning objectives. Below is a list of the six levels of intellectual behavior important in the learning process, as described by Bloom’s Taxonomy, with a corresponding list of action verbs that might correspond to each.

Remembering	define, list, reproduce, state, acquire, label, list, match, name, outline, state
Understanding	classify, describe, explain, identify, recognize, select, discuss, convert, defend, distinguish, estimate, explain, extend, generalize, give examples, give in own words, illustrate, interpret, infer, paraphrase, predict, rewrite, summarize, restate, reorder, rearrange, represent, translate, transform
Applying	choose, demonstrate, illustrate, interpret, solve, use, apply, change, classify, compute, develop, discover, employ, manipulate, modify, operate, organize, predict, prepare, produce, relate, restructure, show, transfer
Analyzing	compare, contrast, differentiate, distinguish, experiment, analyze, break down, detect, deduce, illustrate, discriminate, infer, relate, separate
Evaluating	argue, defend, support, evaluate, appraise, assess, compare, conclude, contrast, criticize, describe, discriminate, explain, interpret, judge, relate, summarize, validate
Creating	assemble, construct, create, design, develop, write, formulate, categorize, combine, compile, compose, devise, explain, generate, modify, organize, plan, rearrange, reconstruct, relate, reorganize, revise, rewrite, summarize

Group Exercise: Rewriting a Learning Objective

“Understand domain of a function.” What’s wrong with this learning objective? How can we rewrite it to make it better meet the criteria stated above?

Exercise: Rewriting Learning Objectives

Rewrite each of the following learning objectives so that it satisfies the criteria stated above. Note that you may need to narrow the focus of the objective in order to do this; you may do this in whatever fashion you choose, or write multiple objectives to cover different skills. How will this objective be observed and measured?

1. Understand the definition of a function.
2. Find the equation of a line.
3. Give the formula for a parabola.
4. Introduce the idea of a logarithm.

Exercise: Creating Learning Objectives for the First Section of the Text

In your table groups, write a set of learning objectives for the first section of the text. Be sure that each learning objective satisfies the criteria stated above.

Student Engagement

The goal is 100 percent engagement from students at all times. We define student engagement as having one's attention, mind, or energy occupied with cognitive work relating to the class.

Some types of engagement

- Thinking
- Listening
- Asking questions
- Answering questions
- Taking notes
- Think-Pair-Share
- Cold-calling
- Working problems individually
- Working on problems in pairs/groups
- Presenting to other students
- Quizzing
- Full-class discussion
- Polling

Exercise: The When, What, How, and How Much of Student Engagement

For each type of student engagement, answer the following questions:

1. When (under what circumstances) might you use this activity?
2. What do you do and say to make sure this engagement happens?
3. How do you let students know your expectations (directions, course policy, class rules/norms of behavior, etc.)?
4. What percentage of students might be engaged during this activity?

Giving Directions

Some types of engagement may well be monitored by stated course policies or norms. For example, you may have established a protocol for students answering questions, or have pre-established groups. In most cases, however, you will need to give appropriate and clear directions in order to get full cooperation. Here are some essential elements that you will want to include in directions:

1. The assigned group of people.
2. The specific task. Use action words like “decide,” “list,” “solve,” “choose,” etc.
3. The expected product. For example, the students may be expected to report back to the class, hand in a sheet of paper, etc.
4. The time allotment. Err on the side of too little rather than too much. You can always give more time. You should shorten the time if most students are finished early.
5. The method of reporting out or sharing results with the class, if this is part of the activity.
6. Directions should be reiterated or clarified during the activity. You will want to give a time warning (like a 1-minute warning) to let them know it is time to wrap up.
7. A mechanism for bringing groups back to the full-class discussion.

Measuring Student Engagement in your Lesson Planning

We will use an “I/We/You” format for measuring the amount of student engagement:

- “I” refers to activities in which the instructor is doing most of the cognitive work. These include lecturing, demonstrating examples, providing directions, and summarizing.
- “We” refers to activities in which the cognitive work is largely shared by instructor and students. These include activities like guided discussion or having students talk you through an example.
- “You” refers to activities in which the student is doing all or almost all of the cognitive work. Activities such as “seatwork”, problem-solving in groups, “think-pair-share”, and student board work are examples of this.

Exercise: Measuring Student Engagement in Your Lesson Plan

Refine your lesson plan using the 2-column lesson planning tool. Classify each activity as an “I”, a “We”, or a “You”. Calculate the percentage of I/We/You. Work to revise your plan to include a higher percentage of We/You.

Assessment: Checking for Understanding

The question you must ask yourself is “what evidence do I have that they understand?” A true check for understanding must incorporate two elements. It must be both:

- Observable
- Measureable

Since we do not yet have the technology to read minds, we must have the student demonstrate in an observable way that they understand the problem. Only through this observation can we measure their progress.

Some Examples of Assessment Techniques

- Students paraphrase general understanding
- Polling/Voting
- Math Journals
- Check a few students have them check others
- Instructional Games
- Presentations
- Students come to board to work a problem
- Ask a question to the class
- Students hold up paper/whiteboards in the air while you walk around and check
- 5 index cards labeled a,b,c,d,e and students hold up cards to show their answer to the problem
- Students write down their understanding of vocabulary or concepts before and after instruction
- Students complete a few problems at the end of instruction and the instructor checks them
- Interview a random sample of students as they solve problem
- In-class quiz
- Concept maps

Questions – Your and Theirs

Asking Open-Ended Questions and Probing Statements

Wording questions in such a way that students are required to give more than a 'yes' or 'no' answer can be effective in teaching from many reasons. Asking a question that requires thought establishes the expectation that an instructor has for a student. If the student is immediately required to provide information from the start, they will understand that they will be expected to participate actively in the course. Using open-ended questions throughout the lesson not only allows the student to do most of the cognitive work, but also helps the instructor to check for the student's understanding along the way.

Exercise: Open-Ended Questions

Below you will find a series of statements and questions that instructors commonly make that allow the student to answer 'yes' or 'no.' Rewrite each as an open-ended question or statement. For example, "Do you have a question?" can be rewritten as "What is your question?"

1. Instructor: "Do you know how to start this problem?"
2. The student has just reached the correct answer and the instructor says, "Do you understand?"
3. Instructor: "Do you know what formula you are supposed to use?"
4. Instructor: "Is this correct?"

Using Open-Ended Questions and Probing Statements to respond to Direct Questions

Often students ask instructors direct questions and it can be easy for an instructor to quickly answer the question the student has asked. The challenge is to respond to the student in a way that helps them come to their own conclusion about the answer to their question.

Exercise: Responding to Student Questions

Below are direct questions that students have asked an instructor. Write a response that you might use to direct the question back to the student. For example, if a student says "Did I get the right answer?", you could respond "How did you come to that solution?"

1. Student: "What is the formula for...?"
2. Student: "What do they want me to do?"
3. Student: "How do I input this into the computer?"
4. Student: "How do I solve this problem?"

Examples of Probing Statements and Open-Ended Questions that Re-Direct Students

Examples:

- What are your thoughts on (specific topic)?
- What is your experience with that? What does this look like?
- Let's look that up and come back to this (specific time).
- What do *you* think about that? (when asked a specific question)
- What do you mean by...?
- Tell me more...
- Be more specific.
- In what way?
- What are we assuming?
- Why would that be so?
- How can that be?
- Give me an example of that concept.
- What do we need to know in order to.... ?
- How is that related to...?
- Summarize the discussion up to this point.
- How does your response tie into...?
- If that is true, what would happen if...?
- What would ___ say about that?
- How could we say that in a different way?
- What are we/you trying to find out?
- What do you need to do next?
- How would you do that?

Adapted from 'Directing Discussion Back to the Group,' The Curators of the University of Missouri, 1997

Getting to the Heart of Understanding – “Do Language” vs. “Think Language”

Often, new teachers focus on the steps involved in solving a problem. For example, “To solve this equation, first we move all the terms to one side of the equals sign, then we factor and set each factor to equal to zero.” While this “do language” may very well be correct, and may state very clearly what steps the student should follow to solve the problem, it is just as important, if not more so, for the student to understand WHY (s)he is doing these steps. The “think language” in this particular example might be prompted by a series of open-ended questions: What kind of equation do I have here? How do I know that? What am I able to do with this equation that could help me solve it? If I do a certain process (such as moving all terms to one side of the equals sign), how does that get me closer to solving the equation? Why is it allowable to set both factors equal to zero?

These questions give rise to a way of looking “in between” the steps of a problem, where students have the most trouble. When you tell students to follow a pre-defined sequence of steps, most of them can do it. The real problem lies in starting the problem, or moving from one step to the next when you forget the algorithm, or knowing when you can apply a particular algorithm.

In order to determine the “think language” behind the solution, you will need to unpack your thinking about the problem. Turn off the auto-pilot, and go back to the fundamental questions you need to answer in order to know how to work through it.

Exercise: “Do Language” and “Think Language”

In this exercise, you will be put into pairs and given a problem. First solve the problem and write down your steps. Using these steps as your guide, write down the “do language” for the solution. Next write down a series of open-ended questions that will reveal the “think language” in this problem. Share with the other pair of TAs at your table.

Establishing and Maintaining an Appropriate Classroom Culture

In order to create a positive classroom environment, it will be up to you to establish clear expectations for the class, both academically and behaviorally.

The First Day of Class

The first day or two of class are probably the most critical of the entire semester. These are the days when students form their opinions about you, about the course, and about what is expected of them. Therefore, it is important that you plan carefully for what you will do and say to create that first impression.

Below are some things that you will want to try to accomplish on the first day*.

- Establish a warm and welcoming, yet structured classroom environment
 - Greet students at the door as they walk in
- Introduce yourself and give students an opportunity to meet each other
 - If you have had teaching experience let them know, or your background in mathematics
 - You can start this early by emailing students before the semester starts
- Take careful attendance, and collect some written information
 - Write down pronunciations or nicknames students prefer
 - Hand out a form at the beginning of class that they fill out with background information you can look over later
- Start learning students' names
 - This is the most important management technique
 - Putting them in assigned seats for the first couple of weeks can really help with this
 - Try name tents, photos, or D2L profile pictures
 - Ask students to write something about themselves that will help you remember them
- Establish ground rules
 - Spend time the first day either discussing these or having students help to come up with ground rules
 - Make sure to review them the following class period or anytime you have a new student come in
- Establish the tone for 100 percent student participation and engagement
 - Having an activity the first day where they are responsible for working in pairs or groups sets the tone for the class. Having them come up with ground rules in pairs is a great start.
- Discuss course objectives and important policies
- Have students start engaging in the cognitive work of the course (i.e. do some math!)

*Note: Some of these things may be started BEFORE the semester starts.

Setting Expectations



“I expect you all to be independent, innovative, critical thinkers who will do exactly as I say!”

College is predicated on the concept of academic freedom. High schools for most part take the approach illustrated in the above cartoon. Strange as it may sound, most of the students we will be teaching in the lower level mathematics courses will mistake academic freedom for there being no expectations. They mistake the freedom they now have in their time for not having to do anything. While one can take the philosophy that they will get it eventually, most instructors find that process is extremely painful for their students and for them. With a few simple statements at the beginning of the course, as well as consistently guiding them throughout the first several weeks, this transition can be much smoother for all involved.

When setting expectations it can be helpful to think of it in two ways: ground rules and procedures.

Ground Rules

Ground rules are different from course policies. These are the basic standards of behaviors that students must abide by in order to facilitate the cognitive work that will be done in class. Generally there should be only a few, stated in a positive way and ones that you are willing to enforce consistently. Ground rules are usually best created by some form of consensus with the class. The reasons for doing so include:

- Establish “buy in” from the students
- Establish a sense of shared responsibility for creating an atmosphere conducive to learning
- Establish the tone for interactive engagement for the rest of the semester

Examples of Ground Rules:

- Raise your hand to be called on
- Keep cell phones put away
- Be respectful (listen while others talk, appropriate language)
- Create original work

Procedures

Procedures refer to the specific activities and methods for accomplishing normal daily routines. These should be explained and practiced either the first several days of class or as each new activity presents itself in class. The reasons for doing so include:

- Spend time on the cognitive work instead of the administrative details
- Establish that instructor is thoughtful about the classroom environment and expects students to be as well

Examples of Procedures:

- Bring all materials to class including: book, notebook, calculator, pen or pencil.
- Use bathroom as needed or Ask permission to use bathroom
- Homework is turned into the folder within the first five minutes of class
- Head paper with name, date, class day and time on top right hand of paper
- Test days: all items are off desk, flip test over when completed

Exercise: The First Day of Class

Discuss in your group how you will approach the first day of class. Create a lesson plan that includes:

- An activity for the students to meet or get to know you and each other
- An opportunity for you to start learning names
- Administrative details
- Some mathematical content

Professionalism

Professionalism is a key element of a positive classroom environment. It is important that you exercise professionalism in all your dealings with students.

- Expect and give respect. Learn students' names.
- Remember that this is your job.
- Dress appropriately for class. While Arizona is a pretty laid-back place, there is a minimum standard of decorum to which you should adhere.
- Be to class on time and start class on time. You are obligated to meet with the class on the specified days for the specified amount of time. You are required to hold class every day that it is scheduled, even if that is the day before Thanksgiving or Spring Break.
- Stick to your policies throughout the semester. Policies constitute a contract that you make with the student. Failure to follow your policies can cause all kinds of problems down the road.
- Stay on top of grading. If you find yourself falling behind, talk to your supervisor immediately to come up with a plan for getting back on track.
- Keep accurate records.
- Office hours are part of your commitment to your students. You will need to be available during office hours, at the specified location.
- Respond to email and other communications from students in a timely manner.
- Listen to your students. Be sensitive to their situation, while keeping a professional distance. If you find yourself dealing with an unusual student situation, contact your supervisor or course coordinator for advice or assistance.
- Be encouraging, yet realistic. Let students know where they stand in the class, but realize that, ultimately, the student must make his/her own decisions about things such as dropping the class.
- Keep in touch with your students. You can easily use D2L or UAccess Student – Instructor Center to email students about important announcements. Use a web page or D2L to post important class information, such as test dates, homework policy, homework assignments, etc.
- Keep your emotions in check. If you need time, you can always tell the student that you can talk with them later.
- Maintain a certain amount of distance in your relationships with students. You should not be friends with, flirt with, or date your students. This is a risky behavior that could create all kinds of unnecessary problems.

When Things Go Wrong – Practice Progressive Intervention

The following is a brief list of intervention techniques that can be used when there is disruptive or inappropriate behavior happening in the classroom. Each of the steps is progressively more invasive; therefore it is best to start at the beginning and move to the next step if necessary. Depending on the severity of the infraction, or your ability to use one or more of the steps, you may want to skip one or more steps and start further down the list.

A Six-Step Plan for Progressive Intervention

STEP 1: Non-invasive (nonverbal) intervention

- Proximity
- Eye contact
- Signals (eyes on paper, silence, etc.)
- Self-interrupt

STEP 2: Positive group correction

- Brief, positive
- Reminder of what students should be doing, not what they shouldn't be doing
- E.g. "Everyone needs to be working on problem #1 now."

STEP 3: Anonymous individual correction

- No names mentioned
- Specific behaviors that need to be corrected are stated
- E.g. "Please remember to keep your eyes on your paper."
- E.g. "Two people are still talking. I need everyone's full attention."

STEP 4: Semi-private individual correction in class

- Stand near the student
- Speak quietly, but with conviction
- Clearly state what student should be doing

STEP 5: Public individual correction

- Keep it brief
- Keep things factual, keep emotions out of it
- E.g. "Holly, Please put your phone away."

STEP 6: Private correction outside of class

- State clearly and concisely the problem
- State the change that you expect the student to make
- Check for understanding by having them repeat back what they need to do

Remember that you have back-up. Your supervisor, the course coordinator, and other administrators in the department are here to help you with any problems you might encounter. You also have the Code of Academic Integrity and the Student Code of Conduct to fall back on.

Exercise: Practicing Progressive Intervention

For each of the following scenarios, describe how you could implement each of the five steps of progressive intervention. At which step would you start and why? What types of preventive measures could have been taken to lessen the likelihood of this behavior occurring?

1. Two students are texting each other during class and giggling.
2. After getting a test back, one student begins talking loudly to another student, swearing and saying that this test was not fair.

Once you reach Step 6, it's time to plan for the confrontation with the student. You may find these kinds of conversations difficult, so it's important that you be prepared and know exactly what you want to say. Here is one framework for such conversations:

- Remove the student from the room, or meet in your office
- State clearly and concisely the problem
- State the change that needs to occur
- Ask the student to repeat back the change that he/she needs to make
- Document

Exercise: Role-playing Confrontation

In this exercise each group will be given some scenarios to discuss. Let's assume that you have exhausted Steps 1-5, and it's time to confront the student. For each scenario, discuss with your group what you would say to the student. Be specific about the language you would use.

Now it's time to confront! Everyone will be given a chance to role-play as both an instructor and as a student. Observers, take notes in order to give helpful feedback.

Grading

Grading is an important aspect of teaching. It provides a mechanism for you to provide feedback to students, both as to their progress, and their current grade.

Suggestions for Grading

The following is a set of suggestions for grading. You will undoubtedly think of many others as you grade this semester.

1. Create clear criteria for assigning points when grading.
2. Construct the point structure according to the difficulty of the question or the number of steps required to solve the problem. Make sure that the point structure allows you to assign points in a systematic and consistent way. At the same time, make sure that enough points are allotted to the more basic problems to maintain a reasonable distribution of scores.
3. Try to enumerate the steps that students will earn points for (e.g. 1 point for grouping the first two terms together, 1 point for factoring out the leading coefficient correctly, etc.)
4. Use a well-refined scale. A problem that involves several steps should be worth several points.
5. Take off an appropriate percentage of points for small algebraic errors.
6. Give points, instead of taking them away. Think of this as the students earning points for various steps accomplished in the problem.
7. Mark points as a number out of a total (e.g. $+2/3$), rather than just giving a score (e.g. $+2$) or a number of points missed (e.g. -1). This helps students to understand how much of the problem they missed, and will help avoid complaints.
8. Grade exams page by page, or even problem by problem, to ensure fairness in the distribution of partial credit. Do not attempt to grade one test at a time.
9. Write lots of constructive comments on exams/homework. Try to create a grading rubric for homework that enables you to focus more of your time and attention on the feedback, rather than on the assignment of points.
10. Mark up the paper enough so that you could recreate your thought process for the students, if it were necessary. Think of what you write on a student's paper as a sort of code, and use markings that are consistent from paper to paper. Some examples:
 - Circle or X out mistakes, put a check mark by steps done correctly.
 - If a problem is blank, put an X through the space. This prevents students from writing in answers after the fact and trying to get points for them.

Exercise: Grading Case Study Part I

In this exercise, you will be given examples of three students' work on a particular problem. Grade the student work on a 3-point and on a 10-point scale. Discuss results with your group, then work on establishing a set of grading criteria for the problem. Regrade with your group's established criteria. What impact did the creation of your criteria have on your grading?

Exercise: Grading Case Study Part II

Together with your group, establish grading criteria for the problem given to you. Use your criteria to grade three students' work.

Mechanics

Boardwork

Writing on a board is a skill that you will hone over time. It's a bit harder than it looks to get a very neat and organized looking board. Many of our classrooms have white boards, but there are still some classrooms on campus that use chalk. You will want to check out your classroom ahead of time to determine which type of writing implement you will need.

When you look at a clean board, try to think of it as a blank canvas. You will be creating your "artwork" as you go through the class. You may want to divide up the board into sections – maybe 2, 3, or 4, depending on the size of the board. You can draw lines between the sections or just keep them in mind as you are writing. In each section, start writing in the upper left hand corner, and write as you would on a piece of paper, leaving the bottom $\frac{1}{4}$ of the board blank (otherwise students in the back will have a difficult time reading). Then continue writing in the upper left hand corner of the next section. Erase only by section – that will keep you from writing something and then erasing it too quickly.

Be sure that your writing is big enough for everyone in the room to read. This might mean that you have to ask on occasion. Get the students' perspective - look at your board from the back of the room once in a while.

If you are in a classroom with a white board, use different colors to emphasize different things. For example, if you are drawing two graphs on a single set of axes, you should probably use 3 different colors: one for the axes and one for each graph.

Communication Skills

Communication is critical in your success as a teacher. You can think of teaching as a two-way communication between you and the student. While you may be doing a lot of the talking in the classroom, the students are a big part of the communication equation – whether the communication is verbal or non-verbal. Strong communication skills will be very helpful in becoming an attentive and effective teacher.

Some Suggestions for In-Class Communication

- Speak loudly enough for students in the back of the room to hear you. This may mean projecting your voice more than you are used to doing.
- Speak slowly enough that students can follow what you are saying and take notes if needed. Don't be afraid to repeat things more than once for emphasis or clarity.
- Make eye contact with students, even those who are trying to avoid your gaze. Look directly at individuals, but don't direct your discussion towards a single person.
- Pay attention to body language. Students won't always tell you when they don't understand something, but they have a difficult time hiding it in their posture or the expressions on their

faces. Non-verbal cues are a very important form of communication during lecture, and they give you the feedback you need about pacing, difficulty, etc.

- Hone your listening skills.
- Give your students positive reinforcement when they speak in class. Try to find something in every answer that you or another student can build on.

Organization

Being organized in and outside of class will help you keep up with the work involved in teaching a class, and ultimately will make your life much easier.

Items you may want to take to class with you:

- Textbook, workbook
- Lesson plan with objectives and materials listed
- Student roster/attendance sheet
- Binder clips or folders for work that you collect, work that you are returning
- Calculator, calculator viewscreen panel if needed (can put equations in calculator ahead of time)
- Auxiliary teaching materials, such as visual aids and worksheets
- Extra paper, pencils, pens, etc.
- Dry erase markers (and/or chalk) and an eraser
- Transparencies and pens
- Homework assignment list with due dates, and homework solutions
- Printed grade sheet

Items to have available in your office during office hours:

- All materials that you take to class
- Extra dry erase markers or chalk, pens, and pencils for students
- Scratch paper – make sure that it is suitable for student use (no personal, private, or department information on it)
- Gradebook/printed grade spreadsheet
- D2L or Web page, if you have one
- MyMathLab assignments, grades

Most of the supplies listed above can be obtained from the math department office.

Record Keeping

Having accurate records of student grades is absolutely essential. Even if you are generally not an organized person, it is important that you be organized in this aspect of your life.

The following are some suggestions for keeping track of grades.

1. Keep ALL of your grades, even homework and quiz grades, on a spreadsheet. This will make your job much easier at the end of the semester, and will help you avoid making arithmetic errors when calculating grades. This is especially true if you are going to adopt a homework policy whereby you drop a certain number of the lowest grades.
2. BACK UP grades after every edit.
3. Identify all grades with a descriptive title in your grade book. You should be able to identify the corresponding assignment for each grade in your records.
4. When you teach College Algebra or Trigonometry, you will receive a grade spreadsheet from the office staff that you will use to record the test scores (and ultimately the final grades) for your class. Please make a back-up of this spreadsheet every time you edit it, and print out a copy. This spreadsheet will be turned in to the office staff after each test using the “filedrop” system. Go to <http://intranet.math.arizona.edu/~filedrop/> for more information . Make a copy of the spreadsheet in a different file to keep track of homework/quiz grades.
5. Alphabetize all papers before you record grades. This will help expedite the process of recording grades, and it will also make turning back papers easier. It will also minimize the number of errors made by putting the grade on the wrong line in the grade book.
6. Devise some way of indicating an assignment that was not turned in, rather than leaving a blank space in your grade book. For example, you may want to put an “x” when an assignment was not turned in, and reserve “0” for assignments that were graded and received a zero. This serves a couple of purposes. First, it forces you to record something for every assignment for each student – this will mean fewer oversights in the recording process. Second, it keeps a student who actually turned in an assignment and received a zero from coming back later and claiming that you didn’t grade the paper.
7. Always input grades immediately into the master grade spreadsheet. Do NOT keep grades written on a piece of scratch paper, with the thought of writing them in your grade book later.
8. Print out a hard copy of all grades after each test. Keep these in a safe place where you will be able to find them later.
9. If for some reason you lose some grades, avoid making the problem worse, and talk to your supervisor immediately. Do NOT make up grades, or otherwise try to “fudge” the records.

Homework Policies

As a part of your particular teaching assignment, you are required to write a homework policy. Department policy requires that each instructor assign and grade homework on a regular basis. Even if an electronic grading system such as MyMathLab is used, you should supplement online homework, as necessary, with other written assessments in order to ensure that grading reflects an emphasis on set-up, process, and notation, not just correct answers. The exact statement of this policy can be found in the Instructor Resource Manual.

In addition to being required, there are many reasons to assign and grade homework. Among the many purposes of homework are:

- To practice and apply the concepts presented
- To provide continuous feedback of progress to students
- To provide continuous feedback of students' comprehension to instructor
- To practice for the exam
- To make sure that students are keeping up with the class
- To ensure attendance of students

Writing a Homework Policy

Policies are an important part of the student-teacher relationship. In essence, any policy that you give to students is like a contract for the class. You agree to abide by the policy as you have written it, while the student agrees to be subject to the terms of the policy. For example, if your policy states that MyMathLab will be used for your class, then you must agree to use it all semester and your students must agree to purchase access to MyMathLab if they stay in your class.

First and foremost, policies should ensure CONSISTENCY and FAIRNESS. In particular, your homework policy should:

- Be thorough to cover (nearly) all eventualities
- Be clear and concise
- Be fair and consistent to ALL students
- Be presented in written form
- Be created to reflect your expectations of the students
- Be something you can live with for the entire semester
- Follow the departmental guidelines for homework as spelled out in the Instructor Resource Manual

The goal is to close the loopholes as much as possible, but build in enough flexibility to allow for the unexpected.

Exercise: Drafting a Homework Policy

Use this outline to draft a homework policy.

1. Breakdown of points
 - HW vs. quiz
 - Electronic assignments vs. hand-written ones
2. When is homework due?
3. Late assignments
 - How late is late?
 - Will they be accepted?
 - Are they worth full credit?
4. Absences – how will HW and quizzes be handled?
5. Calculation of points
6. Grading of assignments
 - All problems or selected ones?
 - Allowance for effort?
 - When returned?
7. Building in some flexibility
 - No extra credit
 - Replacement assignments
 - Dropping a certain number of the lowest grades before averaging
8. Special Requirements (stapling, neatness, fringes, etc.)

Sample Homework Policies

The following are sample homework/quiz policies. Please note that not every policy contains all of the elements described above, as your policy should.

SAMPLE #1

Homework is assigned for each class period. It is due at the beginning of the class. Late homework will be graded but NOT counted. Actual homework points will be scaled to a total possible 100 points. If you have notified the instructor of an unavoidable absence, turn in the homework on the DATE DUE. Be sure to include your name, section, date and my name on the paper. It is your responsibility to get the information regarding the new homework due for the next class.

Homework is assigned daily to practice skills and applications, and also to give both the student and the instructor feedback on the student's understanding of the material. Show your work for the problems, do the work in an organized manner and staple multiple pages. Label answers and use complete sentences where appropriate. Keep up with the pace and come in for extra help whenever needed. There are no opportunities for extra credit or to redo previous work, so please do not ask.

SAMPLE #2

Homework will be assigned regularly. Selected homework will be graded and a final score (out of 100 points possible) will be assigned. Homework will be due by 4pm on the due date, and *late homework will not be accepted for any reason*. Instead, several low/missing homework scores will be dropped at the end of the semester.

Homework is an essential component of the course as the best way to learn math is by DOING math. Before attempting the homework problems, students are expected to read the appropriate section (seriously! It helps!). Students' assignments are expected to be neat, and all work must be shown. Keep in mind that "solutions" will be worth more than "answers". Many homework problems will ask for a written explanation. In such cases, sentences (in English), which clearly and completely answer the question, are expected. Also keep in mind that homework will be not be graded on "effort" but on understanding and correctness.

Discussion of homework problems ("working together") is encouraged, but each student is expected to write up his/her own solutions (see academic integrity note below). Students are also encouraged to ask questions during office hours and to use the free tutoring available.

In addition to homework, quizzes may be given to assess student progress during the semester. Quizzes may be announced or unannounced, and make-up quizzes will only be given at the discretion of the instructor. Any quizzes given will be factored into the homework score.

SAMPLE #3

Homework Policies:

Your homework grade will consist of two parts – homework done by hand and turned in to your instructor, and homework submitted electronically in MyMathLab.

Textbook homework problems from each section are listed on the homework list (see web page) and will be due two class periods following the one in which the section covered by that assignment is finished. Selected problems from each assignment (usually even-numbered ones) will be graded. In addition to the problems from the text, there will be assignments from the workbook and in-class work that will count toward your homework grade.

A computer grading program called MyMathLab will be used for some problems. Student accounts can be purchased on-line at _____ MyMathLab homework will be assigned on a regular basis and given a due date. You must complete the assignment by the due date in order to receive credit. You will be required to keep a notebook of your work for all MyMathLab homework. This will be collected periodically in class on pre-announced dates, and checked for completion. Each time you turn in your notebook, you will be given a homework grade that will be recorded and counted as a handwritten assignment.

All assignments (both electronic and handwritten) will be worth 15 points. A few of the lowest scores from all of the homework assignments will be dropped, and the remaining scores will be averaged together to comprise your homework grade.

You are encouraged to discuss homework problems with me, with tutors, and especially with each other. However, you are expected to write up your own solutions. Most homework questions are to be handled in your instructor's office hours and in the tutoring room. On the day before the assignment is due, I will entertain questions for the first few minutes of class.

Procedures for Handwritten Homework:

- Homework is due at the beginning of the class period. No exceptions.
- Do your homework on regular 8.5 x 11" notebook paper. You may write on both sides of the paper. No fringes, please.
- Your name and the textbook section number should be written at the top of every page, with multiple pages should be stapled together.
- Each problem should be neatly written, with all intermediate steps included and the problem number clearly marked. Written explanations should be included whenever appropriate. Include units on answers. Graphs should be labeled, with the window clearly marked.
- You will not be given credit for problems that are not legible. If your handwriting is illegible, you will be given a warning, after which I will no longer accept your assignments unless they are legible.
- Because the few lowest homework scores will be dropped, late homework will not be accepted.

Procedures for Electronic Homework:

- All homework is due on the due date. No exceptions.
- Keep a careful record of your work in a spiral notebook. This notebook will be collected on a regular basis, so be sure that it is organized and legible.
- If you have questions about a MyMathLab problem, please bring your notebook with you to office hours or tutoring.

- If you have computer related questions (ex. unable to download a file, hardware compatibility problem, etc.) contact MyMathLab directly at _____. You will find a link for technical support and a guide after logging-in.
- If you have math-related questions, contact your instructor.

Instructions for MyMathLab:

Go to _____ and _____. Enter the following information:

username

institution

initial password

_____ (more directions) _____

SAMPLE #4

Homework will be assigned regularly. Homework is an essential component of the course, and will help you prepare for the exams. Homework will be due at the beginning of class, usually on Monday morning and Wednesday morning. No late homework will be accepted. There will usually be a quiz at the beginning of class on Friday morning. The lowest 3 homework scores and the lowest 2 quiz scores for the semester will be dropped. Homework must be done in pencil (not pen). You may write on both sides of the paper, but multiple pages must be stapled. No fuzzy edges. Homework not complying with these policies may not be graded. Any solution or problem that is at all difficult to read may not receive any credit. Selected homework problems will be graded, and the total homework score will be scaled to be worth 75 points in the class. The total quiz score will be scaled to be worth 25 points in the class. Together, homework and quizzes will account for 100 points, which is one seventh of the total grade.

SAMPLE #5

The written homework and the in-class assignment/quizzes account for 100 points of your final grade.

Homework: You will usually have two homework assignments for each section we cover in the book. I will give you a list of homework problems and due dates at the beginning of the semester and after each test. This list will also be posted on the class web page. I expect homework to be handed in on its due date at the beginning of class. In case of an emergency, you may turn in your homework by 4:00pm on its due date to receive credit.

I expect homework to be stapled (one staple per assignment, as needed) and readable. Right answers which are not accompanied by coherent back-up work will be worth 0 (zero) points in all cases. You may work together on homework, but you need to hand in your own write up of the problems.

Quizzes: Occasionally I will give in class assignments/quizzes. Assignment/quizzes may sometimes be open notes, but not always. They may cover both old and new material. Assignment/quizzes CANNOT be made up for credit.