

**CALIFORNIA STATE UNIVERSITY SAN MARCOS
COLLEGE OF EDUCATION**

**EDSS 543A – Fall 2010
SECONDARY MATHEMATICS EDUCATION – Sem. 1
University Hall Room 273
Monday 5:30 pm – 8:15 pm**

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College of Education Mission Statement

The mission of the College of Education Community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research and on-going service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance. (*Adopted by COE Governance Community, October, 1997*).

Course Description

Focuses on developing an understanding of theory, methodology, and assessment of Mathematics in integrated and secondary classrooms, Part A. *This course is aligned with California's SB 2042 Standards.*

Prerequisites

Admission to the Single Subject Credential Program.

Unique Requirements

Observation and participation in the public schools.

Student Learning Outcomes

Objectives

Learning to teach mathematics is difficult, and thus you must expect that this course, in concurrence with your clinical practice, will only begin your education in learning how to teach mathematics. Furthermore, this course is intentionally focused on developing professionals in the field of secondary mathematics education. The course is but one stage in what I hope will be a continuing evolution for you as a mathematics teacher; learning to teach mathematics well will be the work of your career.

Specifically, the foci of this course is to: (1) develop an understanding of the current practices in mathematics, best practices in teaching mathematics, and the ways in which these practices intersect and conflict; (2) learning to teach content-specific concepts, algebraic thinking in particular, using effective, appropriate, and equitable strategies; and (3) practicing how to teach for mathematical understanding.

Enfolded into this course will be learning about children's mathematical ways of thinking and operating, creating a classroom environment that promotes the investigation and growth of mathematical ideas, developing strategies to ensure the success of all students in multi-cultural, heterogeneous settings, consideration of curriculum development, and the ongoing formation of a personal theory of mathematics teaching and learning grounded in work for social justice.

Teacher Performance Expectation (TPE) Competencies

The course objectives, assignments, and assessments have been aligned with the CTC standards for Single Subject Credential (Mathematics). This course is designed to help teachers seeking the California Single Subject Credential (Mathematics) to develop the skills, knowledge, and attitudes necessary to assist schools and district in implementing effective programs for all students. The successful candidate will be able to merge theory and practice in order to realize a comprehensive and extensive educational program for all students.

The following TPEs are given primary emphases:

- TPE 1b Subject Specific Pedagogical Skills for Single Subject Teaching (Mathematics)
- TPE 2 Monitoring Student Learning During Instruction

The following TPEs are given secondary emphases:

- TPE 3 Interpretation and use of assessments
- TPE 4 Making content accessible
- TPE 5 Student engagement
- TPE 6c Developmentally appropriate practices in grades 9-12
- TPE 6d Developmentally appropriate teaching practices for special education: teaching the special education population in the general education environment
- TPE 7 Teaching English learners
- TPE 8 Learning about students
- TPE 9 Instructional planning
- TPE 10 Instructional time
- TPE 11 Social environment
- TPE 13 Professional growth
- TPE 14 Educational technology in teaching and learning
- TPE 15 Social justice and equity

California Teacher Performance Assessment (TPA)

Beginning July 1, 2008 all California credential candidates must successfully complete a state-approved system of teacher performance assessment (TPA), to be embedded in the credential program of preparation. At CSUSM this assessment system is called the CalTPA or the TPA for short.

To assist your successful completion of the TPA a series of informational seminars are offered over the course of the program. TPA related questions and logistical concerns are to be addressed during the seminars. Your attendance to TPA seminars will greatly contribute to your success on the assessment.

Additionally, COE classes use common pedagogical language, lesson plans (lesson designs), and unit plans (unit designs) in order to support and ensure your success on the TPA and more importantly in your credential program.

The CalTPA Candidate Handbook, TPA seminar schedule, and other TPA support materials can be found on the COE website: <http://www.csusm.edu/coe/CalTPA/ProgramMaterialsTPA.html>

Students with Disabilities Requiring Reasonable Accommodations

Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

Authorization to Teach English Learners

This credential program has been specifically designed to prepare teachers for the diversity of languages often encountered in California public school classrooms. The authorization to teach English learners is met through the infusion of content and experiences within the credential program, as well as additional coursework. Students successfully completing this program receive a credential with authorization to teach English learners. (*Approved by CCTC in SB 2042 Program Standards, August 02*)

Course Requirements

Required Texts

Cohen, E. G. (1994). *Designing groupwork: Strategies for the heterogeneous classroom*. New York: Teachers College Press.

Driscoll, M. J. (1999). *Fostering algebraic thinking: A guide for teachers, grades 6-10*. Portsmouth, N.H.: Heinemann.

Fendel, D.M., Resek, D., Alper, L., & Fraser, S. (1997). *Baker's choice*. Berkeley: Key Curriculum Press. [ISBN: 978-1-55953-145-0; purchase online at <http://www.keypress.com/x5480.xml>]

National Council of Teachers of Mathematics (2009). *Focus in high school mathematics: Reasoning and sense-making*. Reston, VA: Author.

***Several other readings are required and will be made available for download.

Recommended Texts

Boaler, J. (2008). *What's math got to do with it?: Helping children learn to love their most hated subject—and why it's important for America*. New York: Viking.

California Department of Education (2005). *Mathematics framework for California public schools: Kindergarten through grade twelve*. Sacramento, CA: Author. This document can be found at <http://www.cde.ca.gov/ci/ma/cf/index.asp>.

Carr, J., Carroll, C., Cremer, S., Gale, M., Lagunoff, R., Sexton, U. (2009). *Making mathematics accessible to English learners*. San Francisco: WestEd.

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author. An overview of this document can be found at <http://standards.nctm.org/> (NCTM members have free and full access).

STAR Test Blueprints for Standards Items: <http://www.cde.ca.gov/ta/tg/sr/blueprints.asp>

Key Assignments

1. *Weekly Homework (30%)* – Each week, teacher candidates will be assigned to read, respond to readings, and prepare some mathematical investigation. Each of these are intended to be in preparation for discussion during the next course session. As such, it is critical that they are completed on time. The specifics of each weekly assignment will be provided in class. Work is to be submitted online in the Cougar Course; in addition, responses are to be brought to class in hard copy.

2. *Classroom Observations (5%)* – Each week during school site visits, teacher candidates will observe a variety of classrooms. Several of these weeks, I will provide a specific instruction to direct the observation. This data will be used in class for discussion on the following week.

3. *Professional Reading (10%)* – Teacher candidates will select an article from a professional mathematics education journal to read, summarize, and present to colleagues in the course. Further details are attached.

4. *Student Interview (15%)* – In small groups, teacher candidates will design prompts and/or a task in order to conduct a clinical interview with a grades 6-11 student. This interview protocol will be designed to inquire into the student's algebraic ways of thinking. Each of you will carry out an actual student-interview based on this protocol. Groups will then reconvene to study student responses. The purposes of this activity are to begin thinking about students' mathematical understanding, to learn how to effectively pose questions and interpret the meaning of students' answers, and to provide you with an opportunity to interact with students about mathematics. Further details are attached.

5. *Resources & Lesson Plan (20%)* – Working in small groups, teacher candidates will first compile resources on a predetermined mathematical topic (5%) and then design a lesson that you will present in a secondary mathematics class (10%). You will conclude this assignment with a group presentation (5%) to our class outlining the lesson, experiences with students—including student work, reflections, and

changes for the next use of the lesson. The purpose of this activity is to help you learn how to design effective mathematical lessons, to provide you with an opportunity to begin compiling mathematical resources, and to provide an opportunity for you to practice teaching mathematics. Further details are attached.

6. Problems of the Week (10%) – During the semester, teacher candidates will investigate 3 open-ended mathematical problems. Each teacher candidate will be asked to initiate and lead classroom discussion (10-15 min.) of the problem by sharing your thinking about the task. At the end of the semester, each teacher candidate will select one problem to formally write-up using a 5-stage write-up format.

7. Portfolio of Linear Programming Unit (10%) – As ongoing classwork and homework, teacher candidates investigate a unit developing mathematics of Linear Programming. A record what was learned and the experiences of learning will be submitted at the close of the semester. Further details will be provided in class.

Grading Standards

Course grades will be based on the following grading scale:

| | | | | | | |
|---|-------|---------------|-------|-----------|---|------|
| A | ..... | Excellent | ..... | 90 | – | 100% |
| B | ..... | Above Average | ..... | 80 | – | 89% |
| C | ..... | Average | ..... | 70 | – | 79% |
| D | ..... | Below Average | ..... | 60 | – | 69% |
| F | ..... | Failing | ..... | less than | | 60% |

I assign grades to individual assignments based on the following interpretation:

- B achieves expectations/purpose of the assignment;
- A and impresses in some manner;
- C falls short of the assignment expectations in some way.

Please remember that a *B* is not for *Bad*.

Unless *prior arrangements* have been agreed to with the instructor, work submitted late, but within one week of the due date will be reduced by one letter grade, and work received over one week late will receive no credit.

College of Education Attendance Policy

Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum, students must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. *Individual instructors may adopt more stringent attendance requirements.* Should the student have extenuating circumstances, s/he should contact the instructor as soon as possible. (*Adopted by the COE Governance Community, December, 1997.*)

Attendance and Participation: Due to the fast paced and highly interactive nature of the course, regular attendance and full participation are expected. Learning is difficult. It is even more difficult, if not impossible, if one is not present for and engaged in the process. Therefore, the above COE Attendance Policy is amplified as follows:

- Missing more than one class meeting will result in the reduction of one letter grade.
- Arriving late or leaving early on more than two occasions will result in the reduction of one letter grade.

You are expected to inform the instructor *prior* to an absence.

All-University Writing Requirement

All CSU students must demonstrate competency in writing skills as a requirement for graduation. At California State University San Marcos, students complete the graduation writing assessment through the All-University Writing Requirement. This requirement mandates that every course at the University must have a writing component of at least 2,500 words (approximately 10 pages). The assignments for this course meet this requirement.

CSUSM Academic Honesty Policy

“Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral presentation assignments must be original work. All ideas/materials that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor’s attention. The instructor reserves the right to discipline any student for academic dishonesty in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole.”

Incidents of Academic Dishonesty will be reported to the Dean of Students. Sanctions at the University level may include suspension or expulsion from the University. Consult the University catalog for further questions about academic honesty.

Plagiarism: As an educator, it is expected that each student will do his/her own work, and contribute equally to group projects and processes. Plagiarism or cheating is unacceptable under any circumstances. If you are in doubt about whether your work is paraphrased or plagiarized see the Plagiarism Prevention for Students website <http://library.csusm.edu/plagiarism/index.html>. When relying on supporting documents authored by others, cite them clearly and completely using American Psychological Association (APA) manual, 6th edition.

Schedule – Tentative

| Date | Topic* | Assignment to be completed BEFORE Class Session** |
|---|--|--|
| Session 1 30 aug 10 | Course Introduction Doing Mathematics | |
| Session 2 6 sep 10 (holiday) | Equity & Social Justice in Mathematics Education Mathematics Standards | |
| Session 3 13 sep 10 | Developing Mathematical Understanding Doing Mathematics | |
| Session 4 20 sep 10 | Doing Mathematics – Technology Algebraic Thinking & Student Interview Developing Lessons, and Lesson Plans | 3. Professional Reading |
| Session 5 27 sep 10 (online) | Algebraic Thinking | |
| Session 6 4 oct 10 | Developing Lessons, and Lesson Plans Assessment | 4. Interview |
| Session 7 11 oct 10 | Learning & Knowing | 5. Resources & Lesson Plan, Part I |
| Session 8 18 oct 10 | Strategies for Differentiation & Language Learners | 6. Problem of the Week 7. Portfolio |
| Session 9 5-6 nov 10 (off-campus) | Mathematics Education as a Learning Profession | |
| Session 10 15 nov 10 | Reflections on Student Teaching (Mathematics) Classroom Management --Engaging students --Building community | 5. Resources & Lesson Plan, Part II |

*This schedule is an *approximation*. Given the nature of this course, we will likely be altering the scheduled topics and possibly times and dates in order to accommodate student interest, observe and teach in mathematics classrooms, and take advantage of professional development opportunities.

4. Student Interview Assignment

Task: In a one-on-one setting you will conduct an interview with a student from grades 6-11. Instructions are attached below. This interview protocol is designed to inquire into the student's algebraic ways of thinking.

Purpose: The student interview is designed to provide you with opportunities to focus on and build a model of a single child's thinking about mathematics. The purposes of this activity are to begin thinking about students' mathematical understanding, interpret the meaning of students' answers, and to provide you with an opportunity to interact with students about mathematics. It will also help you to improve your use of inquiry for assessment purposes and to better understand secondary level students with different understandings.

Prior to the interview:

- Identify a student. Although there are many good reasons to select a student from within a classroom you may be teaching, any student (grades 6-11) should make for a productive experience. Arrange with the student and his/her teacher to interview this one child for 20-30 minutes in a quiet place outside the classroom.
- Consider what clarifying prompts you may have to give to the student during the interview.

During the interview:

Work with the child in a setting removed from the classroom environment. Begin the interview by informing the child that you will be giving her/him a series of math problems to solve and that you are interested in his/her thinking process and in the strategies s/he uses to solve these problems. Inform the child that s/he can solve the problems in any way s/he wants. Please remind the child that the interview is voluntary and that s/he can end the interview at any time (if a student does cut the interview very short, then please find another willing student). Do everything you can to help make the child comfortable.

Orally provide the child with your task and provide her/him with sufficient time to complete each problem. You will be challenged to establish comfort, for both you and the student, to think quietly for the extended period of time necessary for the child to meaningfully engage in the task. You may also want to prepare a written copy of each problem, in case you find the child prefers this way of interpreting the task.

Note the questions you ask and the child's responses. It may be necessary to ask the child to wait while you are writing—it is OK to ask the child to wait. *You should not tape-record/video-tape the interview.*

During the interview, be sure to consider the following:

- The best thing you can be is genuinely curious. Remember the point of the interview is to discover how the child thinks—*NOT* to guide the child to the correct answer (try to fight the urge to be “teacher”).
- Although you may prepare a script to help guide your interview, I encourage you to not feel limited to your script. Allow your interaction to explore a student's idea, to learn more about the child's insights into a question, their disposition toward exploration, what may constrain what they are able to do, and to practice your own interaction with children.
- Do respect the suggested and arranged time limit.
- Be careful to respond similarly to all responses, whether you may consider it to be a “correct” or “incorrect” answer. Be curious about all solution strategies; how is this student thinking? what question may they be asking?—is it the one you first assumed they were asking? what question may they be answering?—is it the one you first assumed you asked?
- This is not a teaching episode; it is an interview.
- Your primary role is to listen (Davis, 1997). Make sure you allow enough *wait time*—many children need time to think before speaking and/or answering.
- Make sure the child feels comfortable during the entire interview. If the child clearly cannot answer a problem, you may need to probe to help develop connections the child may have to similar mathematical experiences. Two useful questions: *tell me what you do know about the problem*, and *tell me about a similar problem you've worked on before*. If you feel that the child is really struggling and frustrated, you may want to end the interview or give the child a problem you are fairly certain s/he can solve and then end the interview. It is worthwhile to come with this sort

of simpler problem, as well as an extension to the task you intend to ask for those who respond quickly. If you cut an interview short for any reason, be sure to discuss in your write-up.

After the Interview:

Write a three to four-page (double spaced) reflection that includes a brief discussion on each of the following points:

- What *specifically* did you learn about this child's mathematical understanding? Here you will want to make some claims about the mathematics your student understands or doesn't understand. I intend for this portion to emphasize what the child **CAN** do, and what might be a worthwhile next instructional focus, rather than what the child *cannot* do.
- Suggest some specific ideas for instruction based on what you have observed about the students understanding and methods of approaching the problems.
- Discuss what types of algebraic thinking you observed the student use.
- Share some thoughts on your role as a listener in this activity, and as you consider your profession as a mathematics teacher.
- Attach any recorded work generated by the student without the student's "actual" name listed.

Grading: Specifically, I expect a well-written paper (3-4 pages, double-spaced) that clearly and specifically expresses what you learned about: (a) the child's mathematical understanding, (b) the experience of observing mathematical thinking.

Due: 4 oct 2010, posted to Cougar Courses

Student Interview Prompts: Prompts/Problems to elicit Algebraic Thinking

Select only *one* of these problems. The prompt is to be read aloud. Although you can add to the prompts for clarity, suggesting paths to solutions changes your role to instructor; you are to be an interviewer only. Provide options of tools for the student to use as well as plain or grid paper. The student should be allowed to choose whatever they want.

I. Sneaking up the Line

Eric the Sheep is at the end of a line of 50 sheep waiting to be shorn. But being an impatient sort of sheep, Eric sneaks up the line two places every time the shearer takes a sheep from the front to be shorn. So, for example, while the first sheep is being shorn, Eric moves ahead so there are two sheep behind him in line. If at some point it is possible for Eric to move only one place, he does that instead of moving ahead two places.

How many sheep get shorn before Eric?

1. Predict a solution "in your head."
2. Use any method or tools or objects you would like to solve these two problems...

II. Age Problem

1. Classify all numbers that leave a remainder of 3 when divided by 5 *and* a remainder of 1 when divided by 3.
2. If my age is divided by 3, the remainder is 2. If my age is divided by 5, the remainder is also 2. If my age is divided by 7, the remainder is 5. How old am I?

III. Clock Problem

At what time after 4:00 will the minute hand of a clock overtake the hour hand?

5. Lesson Resources & Plan Assignment

Students will participate in small groups to design, construct, and teach a single lesson on a selected mathematical topic—preferably Algebraic in nature—that matches the learning trajectories of students in the Clinical Practice classroom. The purpose of this activity is to help you learn to design effective mathematical lessons for a particular group of students, learn where to find mathematical resources, provide you with an opportunity to practice teaching mathematics and to receive feedback, and to learn how to effectively collaborate with colleagues in order to improve your teaching.

Planning your lesson

1. As a group, identify what you would like to try to work on for this collaborative project to design and implement a lesson. It may emphasize the development of a particular mathematical topic, skill, or habit of mind; and/or it may focus on other necessary classroom and lifelong learning goals.
2. Design a timeline and distribute predicted work so that each member of the group participates fully in the design of the lesson and that the workload—both intellectual and labor-intensive—is shared equitably. The group will submit a concise statement that describes the fair distribution of work among group members, and the agreed upon timeline for tasks to be completed. This report must include specifics and a brief collective statement as to why the distribution was fair.
3. Identify the objective(s) of your lesson and situate it within the context of the overall goals and objectives of a unit particular to each group members' class. I hope to see goals aligned with CA *Frameworks* (not only CA Math Content Standards), CCSSO's *Common Core State Standards*, NCTM *Principles and Standards*, and NCTM's *Focus on High School Mathematics* document.
4. To some degree, a part of this project is to learn to utilize the classroom resources available (such as a typical high school textbook) to develop worthwhile lessons, but also to search for resources beyond what the textbook may offer, when necessary, in order to engage kids in meaningful, interactive mathematical experiences. Carry out this resource investigation.
5. Identify (i.e. assess) students' prior knowledge before making final decisions about curriculum and instructional practices for this lesson. Do this by conferring with your Cooperating Teacher, as well as through your own observations of and teaching of the students. As part of your written report, each member must include a short description *their* students' prior knowledge, and comment on the impact of the design implications/modifications for their implementation of the lesson.
6. Group members will carry out the lesson individually in their classroom. Prior to the lesson, please discuss your teaching goals (mathematical for the students, and pedagogical and exploratory in terms of your own learning) with your Cooperating Teacher. After teaching, please debrief with your Cooperating Teacher as well. The Cooperating Teacher's feedback, what went well, not so well, surprises, and modification possibilities will all be part of a post-lesson reflection, for which each group member is responsible.
7. Group members will assemble, face-to-face or online—so long as synchronous in time—to share experiences of the lessons and thoughts about refinement.
8. Turn in via Cougar Courses:
 - a. [group] An annotated bibliography of resources.
 - b. [group] A lesson plan for your activity (using the format discussed in your Curriculum & Instruction Course, or an appropriate and complete modification thereof). If group members' lesson plans diverge in significant ways, submit all versions. Include an appendix of materials, resources referenced or utilized in the high school classroom, or anything else appropriate for others' implementation of the activity.
 - c. [indiv] Assessment of students' (a) current understandings, related to the lesson (mathematics & other) goals; (b) post-lesson understandings, and (c) how these were determined.
 - d. [group] A document briefly summarizing (a) an overview of the lesson, a simple introduction, the initial design and intent; (b) statements of each member's experience teaching the lesson;

(c) a commentary on refinements; and (d) and a statement of the group's collaboration process (timeline and tasks, as defined in 2. above).

9. Each group member will videotape this lesson. You might ask your Cooperating Teacher to help with this, balancing the filming between you and your students. The video is only meant for you, unless you elect to do more with it—related to TPAs, your group debrief, or even your course presentation.

Grades:

For this activity, which will be worth a total of 20 points (20%), I am as interested in the process your group goes through as much as the final product. I want this to be an opportunity for you to learn such things as where to go for mathematical resources, to learn how to prepare lesson plans and what to consider when writing a lesson plan (I expect you to draw upon the *Thinking Through a Lesson Protocol*), to recognize the many challenges of teaching mathematics, to learn how to reflect upon and critique lessons, and to begin to understand the importance of on-going professional development opportunities—namely the value of a professional learning community. Your grade on this assignment will be based on the following:

5 points

- *Resources:* Upon having identified the topic, your group will gather information on the topic to be taught, including (but not limited to) how other curricula develop and then present this topic, how other teachers have presented this topic, research and/or articles on student learning of this topic, and other related information. As a group you will locate 8 (or more) resources for the lesson connected to goals set forth by the group. These must include at minimum 3 sources that are scholarly, that is have undergone some sort of peer review (such as a research article or a professional journal—e.g. *Mathematics Teacher*). These resources should be briefly reviewed, and summarized in an annotated bibliography (max 120 words, reference formatted in APA 6th Ed.).

10 points

- *Lesson Plan:* This Lesson Plan should not only adhere to identified lesson plan format described in your Curriculum and Instruction course, but also be matched to the standards documents, make good use of student thinking, be grade appropriate, be sensitive to the needs of *all* students, and include a plan for assessment. Finally, this lesson plan should respond to the nuances of teaching mathematics—especially algebraic habits of mind as well as students interacting and thinking—to the extent discussed during the first semester of the Secondary Mathematics Education course.

5 points

- *Professionalism:* This category will be assessed primarily through the documentation of pre- and post-assessment of student understanding, thoughts for revision, and planning for fair distribution of work. However, much more of this work I name *professionalism* is not so readily measurable; instead my intent is to recognize the group's efforts that will bring this project to life and carry personal meaning, such as planning and debriefing together, upholding commitments, etc.

There is no length requirement; I would have a hard time predicting. Write in a manner that is both thorough and concise. To achieve this, you will certainly need some planning and several drafts.

The actual presentation of the lesson to students will NOT be factored into your grade, but again, group members should request feedback from their Cooperating Teacher and videotape their delivery. I believe that this is a time for you to try things out and to make mistakes, not to be judged. Don't be afraid to take some risks and to make mistakes.

Due: I: Steps 8a.-8b. due 11 oct 2010. II: Steps 8c.-8d. due 15 nov 2010. Post to Cougar Courses.

6. Problem of the Week Assignment

Task: Teacher candidates will investigate 3 mathematical “Problems of the Week” (POW). From these, select one to present to the class, in a manner intended to initiate discussion of the task. Finally, write up one of the 3 problems utilizing the report format described below. (Note: if the POW you’ve selected includes particular suggestions about this format, please adhere to the suggestions while following the format below.) You will have to make a decision on how far you wish to explore the problem you select to write up. At bare minimum, respond to each question posed in the task, even if you feel your response is only partial, for the moment.

Purpose: Doing and being mathematical is much more than learning and applying formulae, algorithms, and other procedural techniques. The *National Council of Teachers of Mathematics* (NCTM) set forth in their *Principles and Standards for School Mathematics* (2000) document an overview of both *content* and *process* standards. While content standards include a characterization of appropriate understanding at the conclusion of a secondary education concepts from Number & Operations, Algebra, Geometry, Measurement, and Data Analysis & Probability, the process standards define ways of doing and understanding mathematics, and are held at an equal weight to the content standards. These process standards include: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation. The importance of these process standards are re-emphasized in the *Focus on High School Mathematics* (2009) in which NCTM recommends that all high school mathematics programs focus on reasoning and sense-making.

This task is meant to involve you directly in experiencing mathematics as characterized by these standards, but also to provide an experiential context to think about teaching mathematics in such a way that students come to know the NCTM’s vision for mathematics as well.

Details – The Report:

Problem Statement: State the problem clearly in your own words. Your problem statement should be clear enough that someone unfamiliar with the problem could understand what it is that you are being asked to do. This means they have been provided all necessary information to solve the task for themselves.

Process: Describe what you did in attempting to solve the problem, using your notes as a reminder. Include things that didn’t work out or that seemed like a waste of time. Do this part of the write-up even if you didn’t solve the problem. If you get assistance of any kind on the problem, you should indicate what the assistance was and how it helped you.

Solution: State your solution as clearly as you can. It should be apparent to the reader you have provided a response to the question posed in the *Problem Statement*. Explain how you know that your solution is correct and complete. (If you obtained only a partial solution, give that. If you were able to generalize the problem, include your general results.) Your explanation should be written in a way that will be convincing to someone else—even someone who initially disagrees with your answer.

Extensions: Invent some extensions or variations to the problem. That is, write down some related problems. They can be easier, harder, or about the same level of difficulty as the original problem. (You don’t have to solve these additional problems.)

Evaluation:

Option A: Begin the process to write a *specific rubric* for assessing this mathematical task as if you were to use it in a high school classroom. Determine whether you wish to write a *holistic rubric*, or an *analytic rubric*.¹ At minimum, create a statement(s) to define the rubric level *Meets Expectations*.

Option B: Discuss your personal reaction to the problem. For example, you might respond to the questions below.

- Did you consider it educationally worthwhile? What did you learn from it?
- How would you change the problem to make it better?
- Did you enjoy working on it?
- Was it too hard or too easy?

Grading: Worth 10 points, awarded for completion of the task specifics, and the quality of the response.

Due: 18 oct 2010, posted to Cougar Courses

¹ Class, or other course resources may provide these definitions/distinctions (for example, an article by Stutzman & Race: *EMRF – Everyday Rubric Grading*). If not, do a little research to learn the difference.