California State University SAN MARCOS | School of Education

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EDSS 543A – SECONDARY MATHEMATICS EDUCATION

FALL 2014 University Hall 273
Thursdays 4:15-7:00 pm

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Engaging diverse communities through leading and learning for social justice.

School of Education Vision & Mission Statements

Adopted by SOE Governance Community, January 2013

Vision

To serve the educational needs of local, regional, and global communities, the School of Education advances innovative practice and leadership by generating, embracing, and promoting equitable and creative solutions.

Mission

The mission of the School of Education community is to collaboratively transform education. We:

- Create community through partnerships
- Promote and foster social justice and educational equity
- Advance innovative, student-centered practices
- Inspire reflective teaching and learning
- Conduct purposeful research
- Serve the School, College, University, and Community

Conceptual Framework

- Student centered education
- Research and theory specific to the program field inform practice
- Connections and links between coursework and application
- Strong engagement between faculty and candidates
- Co-teaching clinical practice
- Culturally responsive pedagogy and socially just outcomes

Table of Contents

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, including collaborative planning with teachers.

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)*

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 4300, 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.

STUDENT LEARNING OUTCOMES

Course 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 are to: (1) developing 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 (CCSS-M) content-specific concepts, algebraic thinking in particular, using effective, appropriate, and equitable strategies; and (3) experiencing and practicing how to teach for mathematical understanding through engaging students in practices of a mathematician (CCSS-M SMPs).

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 districts 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. You will be required to formally address the following TPEs in this course:

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 (CalTPA)

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, SoE 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 SoE website: http://www.csusm.edu/education/CalTPA/ProgramMaterialsTPA.html

Assessment of Professional Dispositions

Assessing a candidate's dispositions within a professional preparation program is recognition that teaching and working with learners of all ages require not only specific content knowledge and pedagogical skills, but positive attitudes about multiple dimensions of the profession. The School of Education has identified six dispositions – social justice and equity, collaboration, critical thinking, professional ethics, reflective teaching and learning, and life-long learning—and developed an assessment rubric. For each dispositional element, there are three levels of performance - *unacceptable*, *initial target*, and *advanced target*. The description and rubric for the three levels of performance offer measurable behaviors and examples.

The assessment is designed to provide candidates with ongoing feedback for their growth in professional dispositions and includes a self-assessment by the candidate. The dispositions and rubric are presented, explained and assessed in one or more designated courses in each program as well as in clinical practice. Based upon assessment feedback candidates will compose a reflection that becomes part of the candidate's Teaching Performance Expectation portfolio. Candidates are expected to meet the level of *initial target* during the program.

COURSE REQUIREMENTS

Required Texts

California Department of Education (2013/2010). *California Common Core Content Standards for Mathematics*. Sacramento, CA: Author. [free online at http://www.cde.ca.gov/ci/cc/]

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, NH: Heinemann.

Fendel, D.M., Resek, D., Alper, L., & Fraser, S. (1997). *Baker's choice*. Berkeley: Key Curriculum Press. [ISBN: 978-1-55953-145-0. I can loan you copies of this book. If you decide to purchase, contact the new publisher, It's About Time, at 1-888-698-TIME or purchase online at http://www.iat.com/imp-2nd-edition-isbn/]

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 (2012). *California English language development standards for grades 9–10*. Sacramento, CA: Author. [free online at http://www.cde.ca.gov/sp/el/er/eldstandards.asp]

California Department of Education (2012). *California English language development standards for grades 11–12*. Sacramento, CA: Author. [free online at http://www.cde.ca.gov/sp/el/er/

eldstandards.asp]
Carr, J., Carroll, C., Cremer, S., Gale, M., Lagunoff, R., Sexton, U. (2009). *Making mathematics accessible to English learners*. San Francisco: WestEd.
Smith, M. S., Stein, M. K. (2011). *5 Practices for Orchestrating Productive Mathematics Discussions*. Reston, VA: NCTM.

Key Assignments

1. *Weekly Homework & Participation (20%)* – Each week, teacher candidates will be assigned to read, respond to readings, and prepare some mathematical investigation. Each of these activities are designed 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. *Interactive Notebook (10%)* – In essence, you will keep all classroom work, thinking, and who knows what as it relates to this class in this notebook—much like a personal journal. This for me is my "teacher experiment" for the course. At the semester, together we'll review what impact it had and evaluate it's usefulness personally for you and as a classroom tool. My colleague Elizabeth kick-started this idea for me. Read more from her at http://cheesemonkeysf.blogspot.com/2012/08/starting-new-year-right-buckle-up-for.html
3. *Student Interview (10%)* – 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.
4. *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.
5. *Lesson Plan Development & Implementation (30%)* – Working in small groups and in conjunction with practicing teachers, teacher candidates will develop several iterations of a lesson plan, the last of which will be implemented in a secondary mathematics class. TCs will conclude this assignment with a presentation by the working group outlining the lesson, experiences with students, demonstration of formative assessment through the analysis of student work, teacher reflections, and change designed for the next use of the lesson. The purpose of this activity is to engage fully in the teaching cycle, with particular focus on the design of effective mathematical lessons. Further details will be distributed.
6. *Problems of the Week (10%)* – During the semester, teacher candidates will investigate 2-3 open-ended mathematical problems. Each teacher candidate will be asked to initiate and lead classroom discussion (10-15 min.) of one of these problems 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. Further details are attached.
7. *Portfolio of Linear Programming Unit (10%)* – As ongoing classwork and homework, teacher candidates investigate a unit developing mathematics of Linear Programming. A record of 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

According to the *CSUSM Course Catalog*, each grade means that student performance has been:

- **A** at the highest level, showing sustained excellence in meeting all course objectives and exhibiting an unusual degree of intellectual initiative. ***Excellent***
- **B** at a high level, showing consistent and effective achievement in meeting course objectives. ***Good***
- **C** at an adequate level, meeting the basic objectives of the course. ***Satisfactory***
- **D** less than adequate, meeting only the minimum course requirements. ***Passing***
- **F** such that minimum course requirements have not been met. ***Failing***

I interpret these levels of student performance to mean that meeting the basic requirements detailed for a course assignment will typically result in a **B**-level grade. An **A** grade is meant to acknowledge achievement that goes beyond specified requirements and/or criteria. **A**'s are reserved for special efforts that exceed expectations, that demonstrate exceptional creativity, boldness, commitment, involvement, ingenuity, or elegance. By this nature, **A**-level performance cannot be spelled out clearly in advance; else it would not be unexpected.

Weights for each assignment are provided. Assignments will be provided feedback only, no grades, numbers, or rubric scores[1] (cf. http://blog.mathed.net/2011/08/rysk-butlers-effects-on-intrinsic.html). Compare the nature of the feedback received with the expectations described above. A student is encouraged to confirm their self-assessment of their progress toward meeting course objectives in the class at any time with the professor. Similarly, if a student would like feedback on projecting a final course grade, a similar conversation is welcome. Please request an office appointment.

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.

School of Education Attendance Policy

Due to the dynamic and interactive nature of courses in the School 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 College of Education 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 SOE 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.

[1] Butler, R. (1988). Enhancing and undermining intrinsic motivation: The effects of task-involving and ego-involving evaluation on interest and performance. *British Journal of Educational Psychology, 58.* (pp. 1-14). [https://www.dropbox.com/s/kc5lmw3cey6zes2/feedback%20and-or%20grades%3F.pdf?dl=0]
Lipnevich, A. A. & Smith, J. K. (2008). *Response to assessment feedback: The effects of grades, praise, and source of information.* [online at http://www.ets.org/Media/Research/pdf/RR-08-30.pdf]

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. If there are questions about academic honesty, please consult the University catalog.

TENTATIVE SCHEDULE

Date	Topic*	Assignment to be completed BEFORE Class Session**
Session 1 28 aug 14 4:15-7:00	Course Introduction Mathematics Standards	*Read the CaCCSS-M, pp. ii-4, 57-60, & 122-144*
Session 2* 4 sep 14 3:00-6:00	Developing Mathematical Understanding	*Read Boaler & Gutstein* *Mathematics assignment*
Session 3 11 sep 14 4:15-7:00	Equity & Social Justice in Mathematics Education Algebraic Thinking & Student Interview	*Read Davis & Driscoll* *Mathematics assignment*
Session 4 17 sep 14 4:15-7:00	Algebraic Thinking Developing Lessons, and Lesson Plans	*Read Smith, & Driscoll* *Mathematics assignment* **3. Interview**
Session 5 25 sep 14 4:15-7:00	Learning & Knowing Maths	*Read Brooks & Brooks, & Smith* *Watch Annenberg video* *Mathematics assignment*
Session 6 2 oct 14 4:15-7:00	Strategies for Differentiation & Language Learners Mathematics Education as a Learning Profession	*Read WestEd* *Mathematics assignment* **4. Lesson Plan**
Session 7* TBD	Lesson Observation Mathematics Education as a Learning Profession	*Read Fendel et al.* *Mathematics assignment* **5. Professional Reading**
Session 8 16 oct 14 4:15-7:00	Assessment	*Read Stuzman & Race (and 1-2 more articles)* *Mathematics assignment* **6. POW**
Session 9 13 nov 14 4:15-7:00	Reflections on Student Teaching (Mathematics) Classroom Management --Engaging students --Building community	*Read NCTM* *Mathematics assignment* **2. Interactive Notebook** **7. Electronic Portfolio**

*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. In particular, **reading assignments (in italics) are likely to adjust as the class unfolds.

3. 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 few mathematical questions to consider, 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, concise 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.

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. Professional Reading Assignment

Task: Select an article from a professional mathematics education journal to read, summarize, and present to colleagues in the course.

Purpose: To become aware of resources available to professional mathematics educators, and how to access them. To learn about a particular area of interest connected to secondary mathematics education. To share what you learned with peers.

Details:

1. Find a print article on teaching mathematics at the high school (or middle grades) level. I suggest seeking out an area that you have an interest, curiosity, concern, …. How to find one? Ask me. Ask a librarian. Ask your cooperating teacher for one they liked or would recommend. Consider NCTM's journals: *Mathematics Teacher*, and *Mathematics Teaching in the Middle School.*
2. Read the article.
3. Write a 500-800 word summary and critique. The critique should include:
   - How the ideas of the article informs your thoughts about teaching mathematics
   - Questions for and/or of the author.
4. Create a simple poster, approximately 17" x 11", that includes:
   - The complete reference (APA 6th edition) to the article, and
   - A 2-5 sentence summary of the article (120 words or less—see format examples below).
   - The rest of the design and content is your choice, with a goal to highlight what you found most interesting and to capture the interest of your classmates as they read your poster.
5. Be prepared to share your summary & critique in class on due date. Bring 1 copy of the article—the whole journal is preferred—for sharing, as well as your poster. I would prefer if you could find a way to share the article electronically.

Grading: I will assess based on thorough completion of the task specifics, and quality of the response.

Examples of APA formatting with an annotated reference:

Boaler, J. (2006). Promoting respectful learning. *Educational Leadership, 63*(5), 74-78.

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O'Brien, T. C. (1999). Parrot math. *Phi Delta Kappan, 80*(6), 434-438.

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Stutzman, R. Y., & Race, K. H. (2004). EMRF: Everyday rubric grading. *Mathematics Teacher, 97*(1), 34-39.

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6. *Problem of the Week* Assignment

Task: Teacher candidates (TCs) will investigate 2-3 mathematical "Problems of the Week" (POW) during the semester. From among these, each TC will present their thinking on the problem to the class, in a manner intended to initiate discussion of the task. Finally, each TC will write up **one** of the 2-3 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) an overview of both *content* and *process* standards (and had done previously in 1989). A similar structure is presented in the 2013 California Core Content State Standards (CCSS) for Mathematics. These include standards for *content* and *mathematical practices*. While the CCSS content standards include a characterization of appropriate understanding of concepts from Number & Quantity, Algebra, Functions, Modeling, Geometry, and Statistics & Probability, the process or practice standards define ways of doing and understanding mathematics. Both types of ways of knowing mathematics are held at an equal weight in the discipline. The process standards include: Make Sense & Persevere, Reason, Explain, Model, Use Tools, Attend to Precision, Use Structure, and Generalize.

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*.[2] 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 questions such as:

- 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?

[2] 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.

Grading: Scored based on completion of the task specifics, and the quality of the response. Do not simply write an essay describing what an observer of your work may say. Rather, write a paper that puts mathematics in the foreground. State your ideas, conjectures, findings, justifications… Focus more on demonstrating your representations of your ways of thinking, than carefully crafted sentenced that might be evaluated by an English teacher. I expect to see symbols, tables, pictures…

7. *Electronic Portfolio* Assignment

Task: Teacher candidates (TCs) will assemble a portfolio of their mathematical work on the unit *Baker's Choice*. The portfolio will be assembled and submitted in an electronic format, of the TC's choosing.

Purpose: Assessing students knowledge and learning is a complex endeavor, one that cannot be accomplished without multiple and diverse authentic opportunities for students to demonstrate what they know. A portfolio is one such tool that can be used for student assessment.

This task is meant to involve the TC directly in experiencing the process and continued learning that occurs for students when building a portfolio. The act of revisiting, summarizing, and reflecting upon work is a metacognitive activity. By experiencing this activity as if a mathematics student, the TC will have a better understanding and value for use of portfolios as an assessment tool in the classroom.

Details – The Portfolio: Follow the instructions provided in the *Baker's Choice* Teacher's Guide. There will be three distinct sections, the Cover Letter, the Selected Papers, and the statement of Personal Growth.

You should complete the activities *Homework 15: Beginning Portfolio Selection* and *Baker's Choice Revisited* to include in this portfolio, as instructed. You will not be required to include In-Class and Take-Home tests.

I prefer you do not include more activities than what is asked for. I wish for you to highlight what was most meaningful to you, not include everything you did. This is like showing the pictures you took on a trip—please don't show me every one that you took.

Finally, I wish to encourage you to develop a way to assemble this in an electronic format, then submit electronically/online. For example, maybe you gather all materials into a single Word or pdf file. Maybe you find a portfolio authoring tool that designs a single file, or posts something online. Maybe you develop your own website for your portfolio. My goal with this component is to press you to consider how this sort of end of unit self-assessment can be *better* accomplished through the use of technology. I do not expect to see anything super high-tech or fancy, but I will have expected you to have pressed yourself to try something new with this component of the portfolio assignment. ***Have some fun with this.***

Grading: Scored based on completion of the task and the quality of the response.