

**PEIL Project Final Report**  
**ChaRM: Changing Remedial Math**  
**2013-2014**

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**EXECUTIVE SUMMARY:**

**What has been created**

**Restructuring of lowest level remedial math course, Math 805**

- Shift in culture to the requirement of “mastery” of math content versus learning enough to earn a passing grade.
- Emphasis on “productive persistence” by reading about how one learns and creating social ties between students.
- Greater student accountability throughout the full quarter.
- Students sign contract agreeing to work with their classmates to master the material in Math 805.
- Students “earn” the right to take an exam by doing homework and attending class.
- All three exams must be passed at the 85% level.
- Students given three attempts to pass each of the exams.
- Use of manipulatives to increase student understanding of math concepts.
- Use of online ALEKS program – which uses adaptive questioning, tailoring questions for each student. Again requiring “mastery” of the material versus a “passing grade.”
- Classroom workbook in which students actively construct math concepts leading to a deeper understanding of the material.
- Test bank to ensure consistency across sections

**Robust Teaching Associate teacher training course, Math 6005\***

- Weekly meetings to discuss math concepts found in next week’s course material.
- Creation of a feedback loop to continually improve course materials and structure.
- Provide overall support to TAs.
- This professional development opportunity will increase future employability.

**Data**

- ChaRM Math 800A Pass Rate in Spring 2014 – 77%
- Aggregate Spring Math 800 Pass Rate 2010-2013 – 54%
- ChaRM Math 800A Percent of students earning an A or B – 50%
- Aggregate Spring Math 800 Percent of students earning A or B 2010-2013 – 19%
- Student “notecard” feedback
- TA reflections on student challenges
- Classroom observation

***Bottom Line: The trial run of ChaRM in Spring 2014 was a success and shows enough promise to warrant extending the ChaRM model to a full year.***

**OVERVIEW:**

One of the Institutional Learning Outcomes for students at CSUEB is to “think critically and creatively and apply analytical and quantitative reasoning to address complex challenges and everyday problems.” Analytic and quantitative reasoning skills are integral to succeeding in a STEM major, and one of the core subjects required for all STEM careers is college-level algebra. Yet about 49% of our entering freshman require at least one quarter of remedial math, thus delaying entry into a gateway course for pursuing a major in a STEM field.

The pass rate for any level of remedial math, across the 23 CSUs, ranges from 40% to 80%, and at CSUEB, in MATH 800, averages around 65%, depending on the quarter. Even those students who do pass the remedial math classes may not truly have a strong grasp of the material, as is evident when they continue taking classes in physics, chemistry, business, economics, statistics, and many more subjects. Typically these students may have struggled in their high school math sequences, and at college, they see the same material, taught in the same lecture-only mode, at a faster pace, and somehow are expected to have light bulbs go off in their heads regarding the material.

Generally, the pass rates decrease as the year progresses, as we encounter repeat students. Many of the students enrolled in the Fall might have just missed the ELM cutoff and almost could have placed out of 800. The two tables below shows some of our pass rates. Table 1 has the pass rates for the 16 sections of MATH 800 taught in Fall 2012, and the 6 sections taught in Winter 2013, sorted in increasing numerical order, and averaged. Table 2 compares the pass rates for the past few Spring Quarters, where the classes are comprised of students who have failed at least once already.

<b>Table 1 MATH 800</b>		
<b>% Pass Rates</b>		
<b>Fall 2012</b>		<b>Winter 2013</b>
50	71	13
50	73	23
60	75	48
65	77	50
65	79	67
67	83	69
68	86	
70	89	
Aggregate = 71%		Aggregate = 47%
323 students		87 students

<b>Table 2 MATH 800</b>		
<b>% Pass Rates Spring Quarters</b>		
<b>2010</b>	<b>2011</b>	<b>2012</b>
38	25	38
44	75	50
Aggregate = 41%	Aggregate = 61%	Aggregate = 44%
39 students	28 students	27 students

At CSUEB the Math and Computer Science Department (MCS) offers a three-quarter sequence in remedial math, with each course serving as a prerequisite for the next course in the sequence.

- *MATH 800 Introduction to Algebra:* fractions, signed numbers, percentages, introduction to geometry, simplifying algebraic expressions, solving linear equations, straight lines.
- *MATH 900 Elementary Algebra:* Operations with integers, exponents, order of operations, solving linear equations, operations with polynomials, operations with rational expressions, complex fractions, slopes and intercepts, solving and graphing inequalities.
- *MATH 950 Intermediate Algebra:* Operations with algebraic expressions, exponents and radicals; linear and quadratic equations; systems of equations and inequalities; linear and quadratic functions and their graphs; elementary conic sections; word problems.

The entry point for each student is based on his or her Entry Level Math (ELM) Exam score. A score of 50 or above means the remedial math flag is lifted and the student continues on to College Algebra or

Trigonometry or higher, depending on background, SAT scores, etc. The grading for the remedial math courses is A, B, C, or no credit. Once students pass Math 950, the remedial math flag is lifted and they are free to take college-level classes for credit.

*Our goal is to improve not only the pass rate of our students, but also their inherent conceptual understanding of the material, reflected in a higher percentage of top grades. To achieve this, we propose moving away from the traditional classroom where the teacher lectures, students learn and practice formulas, and hopefully absorb the material.*

### **STRUCTURE OF THE CHARM CLASS:**

The major components to any class are (1) how the material is organized, (2) the textbook, (3) the homework, and (4) the assessments. All four components in the ChaRM classes have been altered from the regular MATH 800 class.

Organization of the material: In preparation NOT to repeat material throughout the year-long course, or even in different sections of the book, we have organized the material into eight Units, so that all the content regarding Fractions, for example, occurs in the Unit on Fractions. The eight units are:

1. Fundamentals
2. Integers
3. Fractions
4. Decimals
5. Percents
6. Expressions
7. Equations
8. Coordinate System – this spills over into the next quarter, MATH 806

This organization differs from the textbook in that, for example, order of operations appears many times throughout the textbook: first with integers, again with fractions, and again with decimals. We treat it once.

The Textbook: There is no formal textbook for the ChaRM classes. Rather, we have created the curriculum from scratch, based on our experiences and knowledge. The biggest difference between our curriculum and the textbooks is that they serve as in-class workbooks. Definitions, examples, and non-examples are included in the workbooks for reference, but a large majority of the “textbook” is work to be done in class, so that students immediately practice the material, or explore a new concept through exercises. This format has been used in all the professional development for K-12 teachers in which Prof. Olkin has been involved, and always receives high reviews for this methodology.

One of the key differences in the ChaRM classes is how the material is introduced. We try to use concrete materials (e.g. two-color chips for integers, algebra tiles for expressions and equations) so that students truly understand and internalize the underlying math concepts. Then we transition to a semi-concrete portrayal of the concrete material by using appropriate diagrams, and finally, move to the abstract. The unfolding of each new concept is handled by having students do explorations, looking for patterns on their own so that a “rule” is something they discover, rather than being told by the teacher. In this way, math concepts and rules fall into place in a meaningful way.

Homework: Predominantly, homework is handled online, to be completed regularly during the week. The online program is ALEKS, a web-based adaptive program that uses “artificial intelligence” to learn and adjusts its math questions based on the student performance. Students must master a skill set before moving on to the next skill set. Each Unit includes two or three written assignments, providing a chance to look over student work, to reinforce that the process is as important as the answer, and to ask more penetrating “why” questions. Additionally, each Unit contains several Checkpoints, providing a quick way for the instructor to check understanding from the class.

Assessments: Since San Jose State University has the highest pass rates in remedial math in the CSU system, we met with Sandra DeSousa, an adjunct faculty who has been teaching remedial math

classes at SJSU for awhile. She explained the system and conventions used in their classes, many of which we have incorporated into our ChaRM classes. What we especially like is the system of assessments. Namely,

- There are three exams over the quarter, each one covering approximately two Units. In order to pass the course, students must receive at least 70% on EACH exam. Thus, no content knowledge falls through the cracks.
- Students must earn the right to take an exam by getting at least 70% correct on their homework, and attending class. Those who are not ready to take the exam must fulfill a worksheet, completely correctly, in order to take the Make Up exam.
- Any student who fails the first exam, can earn the right to take the Make Up exam.
- If all exams are passed, then students are exempt from taking a Final Exam. If only one or two exams are not passed, students can repeat just those exams during the week of Final Exams. Otherwise, a cumulative exam is required. This system appeals to students.

### **THE CHARM TEAM:**

The team consists of two professors in the Math and Computer Science Department, three Math Masters students, and two graduates from our Masters program. Here is what we each bring to the table.

Professors: Kevin Callahan and Julia Olkin both have years of experience in creating and giving professional development to K-12 teachers and creating curriculum for students. Julia has been the Principal Investigator (PI) on two California Math and Science Partnership grants, teaching 180 hours' worth of curriculum to 3<sup>rd</sup>-8<sup>th</sup> grade teachers. She is PI on the multi-year Math Achievement Academies, which provides summer support to students struggling in math. She serves as the CSU Director to Statway, a program from The Carnegie Foundation for the Advancement of Teaching, which teaches a combined statistics and remedial math class in a inquiry-based setting. Kevin is a contributing author, reviewer, and trainer for the Workshop Calculus and Workshop Statistics projects, funded by NSF. He has been in charge of the remedial math program, staffing the classes, running the Early Start summer program, and teaching a training course for the Masters students who teach the remedial classes.

Masters Students: Based on teacher evaluations, math knowledge, and general ability in the classroom, we chose Christopher Rozeville, Lindsay Wylie, and Amanda Lien to help us on this project. Lindsay and Amanda were in their final year of the Masters program, and Chris was in his first year.

All three students share some commonality. They have all experienced teaching to a certain extent. Chris has the most experience, as a Credentialed single subject teacher, he has taught high school for seven years in urban areas with high needs populations. To survive this environment he has needed to be dynamic, able to adapt quickly to an ever-changing environment, learn how to deal with people from a wide variety of backgrounds, and output an incredible amount of work. Amanda had field placements in secondary schools near to Berkeley when she in their pure math program with a teaching concentration. She was afforded many opportunities to go to the board and explain math. Lindsay worked at her local elementary school which she was at community college, serving as a math specialist and math tutor for struggling students. All three have expressed a desire to teach at community colleges.

Another commonality is that all three have struggled with math at one time or another. For Chris, he was bad at math as a child, but took this as a challenge and pushed himself. Amanda struggled in high school, repeating Algebra I and II twice. For her, it clicked in later, when the abstract was made more concrete by seeing applications to real life situations. Lindsay has dyslexia, a learning disability. To compensate, she has to work really, really hard. Understanding does not come natively.

Thus, without our prior knowledge, our fellow curriculum developers and teachers had experience with teaching, and experience with struggling in math, which helps them relate more to the population in remedial math.

Graduate Students: Brandon Fitzgerald and Michaela Jesse are experts in the online program ALEKS. We use ALEKS for our online homework, but need it to be specifically tailored to our program, which requires expertise. The knowledge required would be a very steep learning curve for anyone new to ALEKS, so it is key to have the help of these two experts.

### **THE DEVELOPMENT PHASE:**

Collectively, the team developed a full four-units' worth of curriculum from scratch (40 hours' worth). Additionally, we created written homework, weekly checkpoints, and exams. Our team met weekly to go over drafts. This communication and multiple sets of eyes proved invaluable as we grappled with ongoing major decisions.

The ChaRM workbook tries to use student exploration to introduce every topic. For the instructors to resist the urge to lecture is difficult. As we created the curriculum we could envision how we would teach the material. The big question came on every page, how to convey our thoughts to the future instructors? Thus, we inserted frequent "Note to Instructor" boxes, and we discussed how much or little had to be included in these notes.

Another major topic of discussion was determining the best way to introduce terminology and vocabulary in a coherent, natural way. We encourage students to be mathematicians and think like mathematicians, but this does not mean shoving down a litany of new mathematical terms with no context. So the team thought very carefully about how to unfold the topics in the correct order.

Overall, the mathematical and philosophical discussions from our weekly meetings proved invaluable in creating our material.

## RESULTS:

### A. Comparison of Pass Rates

In the Evaluation and Assessment section of our grant proposal, the first two measures to be considered were (i) the pass rates in 800 and (ii) the percentage of students who earn an A or B.

We recognize the dangers of drawing strong conclusions when comparing student performance from year to year across a variety of class times and instructors. That said we've collected the data for Spring 800 pass rates for the past five years and the last three quarters and will let the numbers speak for themselves.

Overall, we were pleased by the pass rates in the two Spring sections of ChaRM 800A. This is a population of students highly likely to fail a remedial math course. The vast majority of these students have already taken Math 800 twice before and failed. There were 26 students enrolled in the two sections. A total of 77% passed the course. This aggregate pass rate is the highest compared to other aggregate pass rates in the past 5 years of Spring Math 800. The aggregate pass rate in Spring 800 from 2010 to 2014 is only 54%.

Math 800					
% Pass Rates Spring Quarters					
2010	2011	2012	2013	2010-2013	2014
44%	25%	50%	86%		75%
38%	75%	38%	47%		78%
Aggregate = 41%	Aggregate = 61%	Aggregate = 44%	Aggregate = 70%	Aggregate = 54%	Aggregate = 77%
39 students	28 students	27 students	37 students	131 students	26 students

Furthermore, we compared the aggregate % of students who earned either an A or B. It is our perception that many students aim to earn a C because Math 800 is a CR/NC course, so only the "minimum" amount of effort is required to "succeed."

Math 800					
% Earning either an A or B					
2010	2011	2012	2013	2010-2013	2014
Aggregate = 3%	Aggregate = 11%	Aggregate = 19%	Aggregate = 43%	Aggregate = 19%	Aggregate = 50%
39 students	28 students	27 students	37 students	131 students	26 students

A total of 50% of Math 800A students earned either an A or a B, whereas the aggregate percent that earned either an A or B over the previous four years is 19%. If these higher grades is an indication of a deeper understanding of the material, then we hope that this will be reflected in greater student success in subsequent courses, which we will follow.

### B. Student feedback.

As part of our project, we developed a pre and post attitudinal survey to be filled out by the students via BlackBoard. The students were not given course credit for completing these surveys, since the questions did not contain math content and hence were not a direct measure of their mathematical understanding. Perhaps as a result of that decision, almost none of the students filled out either survey despite encouragement from their instructors and a plea from Professor Callahan via email.

Yet the students were willing to fill out an index card to the prompt “What do you think of this course?” A total of 21 out of 26 students gave written in-class feedback. All of it was very positive, with only two students requesting that the material could have been covered at a slower pace. All student responses can be found in Appendix A.

### **C. Teaching Associate reflections on challenges encountered by our remedial math students.**

**Reading/Writing Ability:** Many students (currently over 70% in my current CHARM 800 course) have difficulty reading. This lack of literacy can be tied to a variety of causes from simple lack of practice, students with special needs and E.L.L. students. When homework problems have multiple steps (such as Integers Unit, HW 1 problem 1) students often fail to follow the directions. Some students also avoid problems that ask them to “explain in their own words.” When students do attempt explanation problems, their grammar and hand writing is extremely arrested.

**Lack of College Skills:** Many of the student in the remedial program not only lack basic math or reading abilities, but also, lack basic student skills. They do not know what is required to be a successful college student. They feel that showing up to class most of the time, doing some of the homework, and trying the exam should be enough to pass the class. The skills that are lacking include: showing up for class consistently and in a timely fashion, lack of a consistent work habit, lack of organizational skills, unable to connect work time inside/outside of class to success on exams, have a difficult time keeping track of deadlines, and actually turning assignments in. Some students also lack awareness of acceptable in-class behavior. For example, in the middle of lecture I had a student walk up and hold a piece of paper to my face. This student felt that it was okay to do homework in class and then interrupt lecture when they were ready to turn in the assignment. (I have students turn homework in at the beginning of class. I announce that I am collecting homework and I have them fold their papers and place them in a homework tray.) I also have students say things like, "I am missing some assignments" and expect me to keep track of what assignments they have and have not done.

**Low Moral with Mathematics:** A large majority of remedial students suffer from low or poor self esteem when it comes to mathematics. Most of which (probably) comes from years of doing poorly in mathematics.

### **D. Classroom observation by Bruce Simon.**

Bruce Simon, the Associate Director of Gateways EastBay STEM Network observed Lindsay Wylie’s class for about 45 minutes on May 23. His notes follow:

Lindsay’s class had 11 students (all male!). She was working with her group on simplifying and solving algebraic equations involving polynomials. Her approach was very relaxed and friendly. She clearly had developed very positive relationships with her students. They felt very comfortable asking questions and interacting with her and with each other. All but one student were very engaged during the class. She used algebra tiles to solve a couple of problems, but only as a demonstration, she remarked that the desks in the room she was assigned are too small to accommodate both tiles and the workbooks at the same time. She used many opportunities to reinforce essential vocabulary and concepts (identity, commutative, associative, distributive). She referred to “definitions that the students had created themselves reinforcing that as long as they are accurate, they are as good as the “proper” definition. She referred to mathematicians as being lazy which is the reason we do things in certain specific ways because they are very clear and efficient. Her teaching reminded me of a set of strategies in which I was

trained collectively called SDAIE (specially designed academic instruction in English) – previewing vocabulary, encouraging students to develop definitions to support meaning-making, using regular affirmations, encouraging peer support, frequently checking for understanding.

### **NEXT STEPS OF ChaRM 800A AND THE FOLLOW ON GRANT ChaRM BC**

- A. In the Fall Quarter, seven sections of the ChaRM course will be taught as Math 805. Meanwhile, we will offer eight sections of the standard Math 800 course as a control group. Entering freshman will be assigned to one of these two courses randomly by the GE Office. The 800 students will follow the standard 800/900/950 sequence, while our 805 students will take the full ChaRM sequence of 805/806/807. Curriculum for Math 806 and 807 is currently being developed as part of the ChaRM BC PEIL project. We will then track each population throughout the academic year, looking at pass rates in 800, 805 and subsequent courses.
- B. In June, the development team went through the ChaRM text and made all corrections. We also used Instructor Headnotes to make adjustments to the text. This instructor feedback loop will also be used in the Fall Quarter in order to improve the text. It is now ready for submission to the Bookstore to be copied as a “reader” for purchase by the students. Students will also pay for access to the web software ALEKS.
- C. The development team is finishing the development of the Math 6005\* TA Training course. All TAs teaching 805 will attend a day long orientation in September at which
- i) the flow of the course will be explained in detail, since the expectations and class structure is unlike most math classes.
  - ii) class culture building activities will be explained and demonstrated
  - iii) use of the software ALEKS will be covered
  - iv) the first week of lessons will be discussed as a group
  - v) peer evaluation training
- The Math 805 TAs will meet weekly for 70 minutes to
- i) discuss the mathematical concepts found in next week’s course material
  - ii) discuss the previous week detailing what was successful and what needs improvement
  - iii) address technical difficulties
  - iv) address class management issues
  - v) remind the group of various course management components
- D. ChaRM BC: The goal is to create a cohesive one-year remedial math sequence for freshmen placed into the lowest level of remediation. The sequence will consist of Math 805/806/807, with a small class size of 20 students and will use the same course format and pedagogical approach found in Math 805. After the 2014–15 academic year, in which we will have experimental (805) and control (800) sections, all lowest level remedial math students will take the 805/806/807 sequence. The math content of this yearlong sequence will be equivalent to the material currently covered in Math 800/900/950. Students who currently place into Math 900 or 950 will not be affected by this project. They will continue to take these standard courses, with a class size of 35 students.

## **THE ROLE OF PEIL IN THE PROJECT**

Both PIs have recognized for years that the remedial courses, along with Math 6005, could stand improvement. Both of us have been involved in curriculum development and realize how large the effort is to make real change happen. But, on our own, we had neither the time nor the resources to actually change the remedial math program. The PEIL grant has given us the opportunity to do it and (hopefully) to do it well.

The beneficiaries of the PEIL grant go beyond the remedial math undergrads. Our TA Training course, Math 6005, will give a much richer professional development environment for our Teaching Associates. Our meetings will now include detailed discussions in pedagogy. Also, TAs will be required to do peer evaluations. This will benefit the TAs as they search for community college positions once they graduate.

We found the two day development session in Summer 2013 to be very helpful. The conversations with the PEIL team caused us to think more deeply about the project and led us to broaden some aspects of the project as far as teacher training and how we measure success. Furthermore, the quarterly check-in sessions made us step back and think about the overall project. The questions and conversations with our fellow colleagues also caused us to rethink some aspects of the project. In other words, regularly talking to a group of academics in which we're called upon to explain the aspects of our project has been helpful.

As part of the development process, we have recognized the importance of making a cultural change, of increasing student expectations to "mastery" along with improving the structure to enable student success. We've recognized that several of these elements can be brought into the other remedial math classes, Math 900 and 950, which are not part of the PEIL project. In this way, PEIL has had an impact beyond just the Math 800 course.

## Appendix A: Math 800, Spring 2014 Student Notecard Feedback

The prompt given to the students was “Please take a few minutes to reflect on this course. We value your feedback, both positive and negative. Do not write your name on the card.”

Grammar has been minimally corrected for. The comments have been sorted, with comments primarily about the course appearing earlier, followed by feedback focusing solely on the instructor.

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- This class taught me the reason behind every step I make in order to solve any problem.
- I feel that this class was a great idea. They should have come up with this type of method long ago. I don't believe that this class needs any changes.
- The class was amazing. Also, the materials were incredible. Just keep it like that.
- I like the class. It's a lot better than my previous 800 class. The method is helpful, especially the binder.
- I like how the class is taught with the doc camera. I also like using ALEKS versus WebAssign. This class lets being in remedial math easier.
- This class had a nice pace. Good lectures and visually helpful. In class lectures were mastered thoroughly and quickly.
- What I liked about this course was how slow the pace was. Mr. Rozeville was a very energetic teacher and always made sure each and everyone of us understood each section. I really learned a lot more and actually understood almost everything in this math class. We need more classes and instructors like Professor Rozeville.
- I liked the class. I was afraid that I would never improve my math skills, because it has always been a problem for me, but when I took this class I noticed that I have improved a lot. I liked the way that our teacher taught.
- This was organized very well. I would say that the instructor tried her best to help us keep up with the math.
- I would personally change nothing in the class. It was very helpful!
- The class was good. It goes by slower than the others. We go through a lot of detail. I liked it.
- I think that you have done a great job. I think that sometimes we need a little more time to work on the class work.
- The class was very helpful, especially the teacher. One thing that I would like to change is that the teacher should go slower when explaining the math.
- More practice was great.
- I thought this class was good.
- I like how it was a small class. You paid attention to all of us. You tried your hardest to make sure that all of us were on task. It was way better than my other classes.
- You are such a great teacher. I really did benefit from your class. Nothing should be changed.
- It was a pleasure to have this class. I was afraid of math. However, you made it much easier for us, especially your encouragement. Thanks for all of your efforts.
- This class was fun, entertaining and meaningful. The teacher did a great job. I understand a lot more. I hope to have her as a teacher again.
- Overall, the class was good and the instructor, herself, tried her best to make sure every student understood the material.
- I really enjoyed this class. The professor taught us very well. He was kind, helpful and understanding. He made us feel comfortable in the class and was always prepared. This class was super helpful.

## Appendix B:

### Math 800A Exams and a Math 800 Exam for comparison

100 points total: \_\_\_\_\_

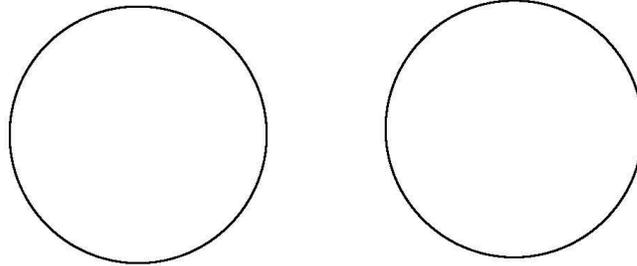
Name: \_\_\_\_\_

5 points Extra Credit: \_\_\_\_\_

Date: \_\_\_\_\_

#### Math 800A – Exam 2: Units 3 (Fractions), Unit 4 (Decimals), Unit 5 (Percents)

1. (3 pts) Make two pie charts representing  $\frac{3}{8}$  and  $\frac{1}{4}$ . Using your pie charts, determine which fraction is larger.



2. (3 pts) Explain why the statement  $\frac{3}{4} + \frac{1}{5} = \frac{4}{9}$  is incorrect. You may use words and/or pictures.
3. (4 pts) Convert 0.78 into a fraction and then a percent.
4. (4 pts) John did a problem below. Determine if John did his problem correctly. If it is correct state it is **correct**. If it is incorrect, then state so and identify the error, and redo the problem correctly.

John's Original problem:  $\frac{8}{9} - \frac{8}{10} = ?$

John's Work:

$$\begin{aligned} \frac{8}{9} - \frac{8}{10} &= \frac{8}{9} - \frac{4}{5} \\ &= \frac{8 \cdot 5}{9 \cdot 5} - \frac{4 \cdot 9}{5 \cdot 9} \\ &= \frac{40}{45} - \frac{36}{45} \\ &= \frac{4}{45} \end{aligned}$$

Math 800 Exam 2 As of 5/9/14

1

For this page, be sure to write improper fractions as mixed numbers, and simplify completely.

5. (4 pts) Simplify  $\frac{2}{20} - \frac{7}{12} =$

6. (4 pts) Simplify  $\frac{1}{7} + \frac{7}{5} =$

7. (4 pts) Simplify  $\left(\frac{3}{5}\right)\left(\frac{1}{-3}\right) =$

8. (6 pts) Jimmy did a math problem below incorrectly. Describe what mistake Jimmy made while trying to solve the problem  $\left(\frac{3}{5}\right) \times \left(\frac{2}{5}\right) =$  and solve the problem correctly.

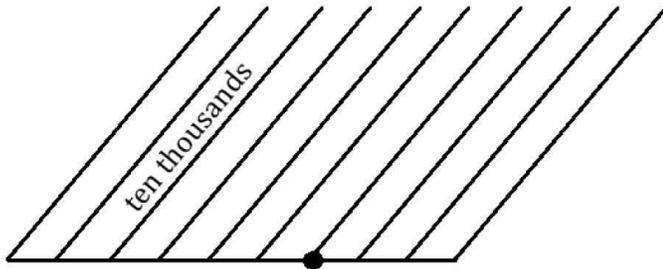
*Jimmy's Work:*  $\left(\frac{3}{5}\right) \times \left(\frac{2}{5}\right) = \frac{10}{15} = \frac{2}{3}$

9. (5 pts) Simplify  $\frac{4}{\frac{5}{3}}$

10. (5 pts) Simplify  $\frac{\left(\frac{4}{5}\right)}{\left(\frac{3}{10}\right)}$

11. (6 pts) Simplify  $\frac{\frac{3}{5} - \frac{4}{5}}{\frac{2}{3} - \frac{5}{6}} =$

12. (5 pts) Fill in the blank place value number chart below.



13. (3 pts) Write out 45,323.09 in words.

14. (2 pts) Round 45,323 to the nearest hundreds place.  
 15. (4 pts) Add 234.83 and 65.323 to get a sum.  
 16. (5 pts) Simplify  $3.123 \div .0012$ .  
 17. (5 pts) Describe in words why 5% is **not** written as 0.5 when you convert it to a decimal.

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18. (5 pts) What is 40% of 80?  
 19. (6 pts) A sweater is priced at \$35. You have a coupon for 20% off. What will you pay for the sweater?  
 20. (6 pts) The sales tax is 8.5%. You must buy a textbook for your class that costs \$120. How much will you pay in total, including the sales tax?  
 21. (6 pts) You are at a restaurant and your bill is \$70.00. You want to leave a 15% tip. How much will the tip be?  
 22. (5 pts) Suppose you want to simplify  $\frac{0.31}{3}$ . You can either (a) convert the decimal in the numerator to a fraction, or (b) perform decimal division. Choose **one** of these methods and simplify the complex fraction. Please **circle** which method you are using.

- a) Converting 0.31 to a fraction                      OR                      b) Decimal division

**Extra Credit:** Describe in words the relationship between fractions, decimals, and percents.

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Then fill in the chart:

Decimal	Percent	Fraction
0.03		
		$\frac{3}{5}$
	75%	

# Math 800 Exam for Comparison

**Math 800**  
**200 possible points**

**Midterm 1**

**Date: 2-1-08**

(26 pts) Solve the expressions (reduce), and then write the formulas using only variables.

Example:  $\frac{1}{3} \cdot \frac{1}{2} = \frac{1 \cdot 1}{3 \cdot 2} = \frac{1}{6}$   
Example:  $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d} = \frac{ac}{bd}$

$$\frac{5}{3} \cdot \frac{12}{25}$$

$$\frac{4}{15} - \frac{1}{5}$$

$$\frac{a}{b} \cdot \frac{c}{d}$$

$$\frac{a}{b} - \frac{c}{d}$$

$$\frac{2}{7} + \frac{4}{3}$$

$$\frac{27}{16} \div \frac{9}{8}$$

$$\frac{a}{b} + \frac{c}{d}$$

$$\frac{a}{b} \div \frac{c}{d}$$

(20 pts) Find the Prime Factorization of the following numbers and write them in Exponential Form.

120

72

(15 pts) Fill in the Notation Table:

Percent Form	Decimal Form	Fraction Form (reduce)
45%	0.45	$\frac{45}{100} = \frac{9}{20}$
12.4%		$\frac{12.4}{100} = \frac{124}{1000} = \frac{31}{250}$
	0.08	
		$\frac{17}{100}$

(14 pts) Translate and Solve the following expressions:

60% of 72 is what?

What percent of 70 is 35?

(27 pts) Find the LCM of each set of numbers, write in exponential form.

(12, 24, 8)

(140, 120, 630)

(10 pts) Simplify

$$3 \cdot \{1 \cdot 10.5 + [(8 - 4) \div 0.2]\}$$

(15pts) During a sale, a price decreased from \$90 to \$72.

What is the original price?

What is the decreased amount?

What are the two formulas we need to use?

1)

2)

What is the percent of decrease?

(21 pts) Solve the following expressions and write the rules for each.

$13.234 + 51.4$

Rule:

$12.7 - 1.34$

Rule:

$3.0027 \cdot 0.04$

Rule:

$3.14 \div 0.2$

Rule:

(10 pts) If you receive a score of 66 points on a test after studying 8 hours,  
what score would you get if you studied 12 hours?

(8 pts) Working in sales you get a 4.5% commission rate, if you sell \$138 of merchandise,  
what would be your commission?

(8 pts) Simplify

$$\frac{\left(\frac{5}{4} - 1\right)}{\left(2 - \frac{7}{4}\right)}$$

(11pts) You are a waiter or waitress, you serve a couple a meal and drinks that cost \$ 71.32,  
You are expecting a 15% tip, and you find they left you \$ 12.50.  
Is this 15% ? more or less? by how much?

(15 pts) Simplify

$$[(5 - (-2) + 3) \cdot 2 \div 5 + (-5 + 7 - 2)] \cdot 25 - [3 \cdot (2 + 1) \cdot (13 - 2)]$$

## Appendix C: Syllabus

### Math 805 – Introduction to Algebra Cal State University, East Bay

Instructor	Insert Name (TTh 10 – 11:50am)
Office Hours	Insert Hours: Mon 10:00am to 10:30am; or by appointment
Email	Insert Email
Required Materials	Math 805 Spiral-bound textbook is required and must be purchased at bookstore. These textbooks must be brought to class every class period. An 11-week access to ALEKS is required.
Course Description	Manipulations and calculations with integers, fractions, decimals and percents; algebraic expressions and equations; introduction to coordinate systems and graphing linear functions.
Homework	It is important for you to do your assignments in a timely manner. Much of the homework will be online with ALEKS. However, each week there will be short written assignments. Thus, there is both written and online homework.
Calculators	In general, calculators are not allowed for this course. There are a few topics where arithmetic or scientific calculators are allowed and the instructor will specify these topics. No graphing or programmable calculators, or cell phones, tablets, computers are allowed in class.
Grading	In order to pass this course, all three tests (or the comprehensive Final) must be passed with a minimum score of 85% on each exam. Students who pass all tests will be excused from the Final Exam.
Blackboard	Please check your horizon email and blackboard regularly for announcements, reminders, changes, etc.
Attendance	It is essential that you participate in class and regularly ask questions in order to succeed in this course and your future math courses. Therefore, <b>attendance is required</b> . Attendance may be taken at any point during the class. You may miss 2 classes for any reason with no penalty to your Course Grade. Each additional absence will lower your Final Average by 5%. However, if you miss a total of 6 classes you will be in danger of receiving no credit for the course.
Exams	<ul style="list-style-type: none"><li>• There will be three exams, approximately every three weeks. These exams are one hour each.</li><li>• <b>To be eligible to take an exam, you are required to earn at least 85% on the relevant homework for those units (online and written). Your lowest homework grade will be automatically dropped to compute your average (no late homework accepted).</b></li><li>• On test days make sure you are on time since no additional time will be given.</li><li>• If you are absent on the test or makeup date, you will lose those opportunities to take that test.</li><li>• You must pass <u>all three exams</u> with a grade of 85% or better.</li></ul>

Makeup Exams	<ul style="list-style-type: none"> <li>• If you fail to earn 85% on any test you will have the opportunity to retake the test on a scheduled Test Makeup day. You will have at most 3 times to take an exam: (i) the original exam day in class, (ii) on a scheduled Make Up day, (iii) during the Final Exam day. Each time, you must qualify to take the exam.</li> <li>• There will be scheduled Test Makeup Days during the Quarter. Any test not yet passed at the end of the Quarter can be taken during the Final Exam.</li> <li>• If you fail an exam and want to take a make up exam, then you must download a Exam Worksheet, complete it with 100% correct, and go to the TA office (MJ 3100) to have a TA grade it and stamp it. Turn in the <i>stamped</i> Worksheet to the Proctor on specific Make Up days, within one week.</li> <li>• Each MakeUp Session is a two-hour block. You must arrive at the <i>beginning</i> of the block, to give your stamped Exam Worksheet to the proctor.</li> </ul>
Final Exam	<ul style="list-style-type: none"> <li>• The Final Exam is on <b>Monday from 10am to noon</b>. Students who have passed all of the exams will be excused from taking the Final Exam. Students can retake a final version of any exam that they have failed. Students who need to take more than two exams will have to take a comprehensive Final Exam.</li> <li>• <b>To be eligible to take any version of the Final Exam, a student must have taken at least one version of that test, or in the case of the comprehensive Final, a student must have taken each test at least once.</b></li> </ul>
Course Goals and Student Learning Objectives	Students will review topics from elementary and intermediate Algebra. Students will master the four operations (addition, subtraction, multiplication, division) of integers, fractions, decimals, percents, and algebraic expressions. Students will know how to solve algebraic equations. Students will practice the coordinate system and graph linear functions.
SCAA	The <b>Student Center or Academic Achievement</b> provides tutoring and learning support for all students, free of charge. The SCAA is located in the University Library on the 2 <sup>nd</sup> floor near the Diversity Mural. Students may sign up for regular appointments for the entire quarter, or students can drop in anytime between 10am and 5pm, Mon-Thurs, and 2-5pm on Sundays. Website: <a href="http://www20.csueastbay.edu/library/scaa/">http://www20.csueastbay.edu/library/scaa/</a>
Executive Order 665:	EO 665 is the CSU systemwide mandate regarding remediation. Enrollment in required remedial coursework is a condition of enrollment at the University for any student who enters as a frosh or lower division transfer. Students have two chances to pass Math 805. If students do not pass Math 805 by the second attempt, then they will need to complete further remediation at a community college.
Academic Integrity	By enrolling in this class the student agrees to uphold the standards of academic integrity described in the Grading and Academic Standards section of the online catalog, see <a href="http://www20.csueastbay.edu/academic/academic-policies/academic-dishonesty.html">http://www20.csueastbay.edu/academic/academic-policies/academic-dishonesty.html</a> Cheating on exams will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified.

- American Disabilities Act. If you need course adaptations or accommodations because of a disability, please register with the Accessibility Services Department in the Library Complex 2400. Website: <http://www20.csueastbay.edu/af/departments/as/>  
Please let me know about any academic accommodations.
- Emergency Situations Information on what to do in an emergency situation (earthquake, electrical outage, fire, extreme heat, severe storm, hazardous materials, terrorist attack) may be found at <http://www20.csueastbay.edu/af/departments/risk-management/ehs/emergency-management/index.html>
- Classroom Protocol The atmosphere in a classroom is a very strong component of the learning process. For those students who are serious about their education, these rules will provide you with a much better environment to learn in.  
For others, this may be a wake-up call that you must take your education more seriously. Failing to pass a developmental math course could result in you being disenrolled from CSUEB. You are here to learn and so are your classmates.

**All Developmental Math instructors will enforce the following rules.**

1. Arrive on time. If you are unavoidably late, enter quietly.
2. No materials should be out unless they pertain to the class.
3. No laptops. It is nearly impossible to take math notes on a computer, so put them away and take out a notebook.
4. No earphones. You can't actively participate in class if you are listening to music.
5. No books other than the text. No newspapers or other reading materials should be out during class.
6. Cell phones should be turned off and put away, not just on vibrate.
7. Apart from group work, no talking except to ask questions of the instructor or answer questions posed by the instructor. Even one side conversation can carry throughout the room and distract other students.

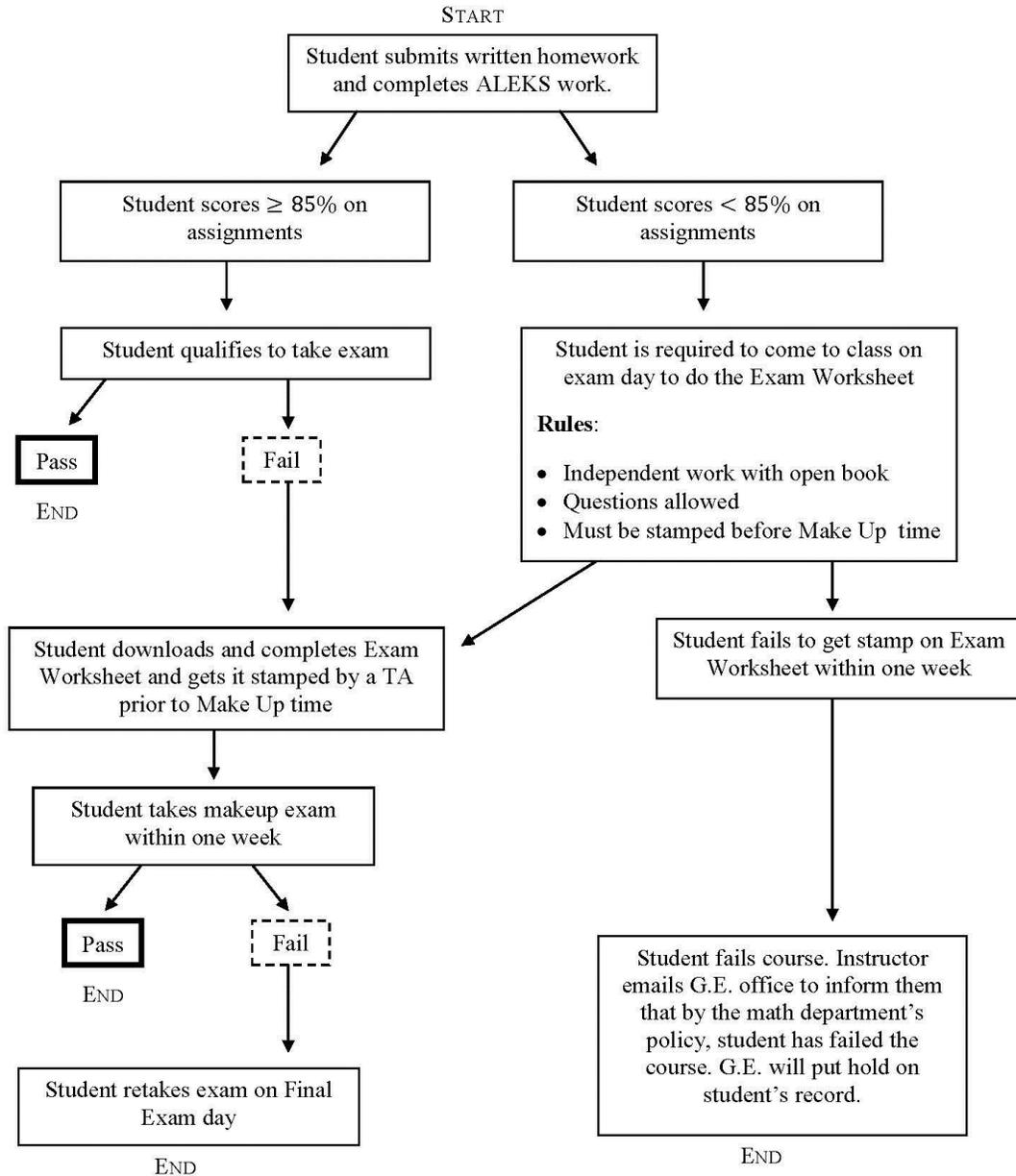
*Above all, come to class to learn and to participate.*

<b>Grading Policy</b>	
Written Homework/Participation + Checkpoints	20%
Online Homework (ALEKS)	20%
Exam 1 (Fundamentals/Integers)	20%
Exam 2 (Fractions/Decimals/Percents)	20%
Exam 3 (Expressions/Equations)	20%
Final Exam	Replaces Exam Grade(s)
You will fail this class if any of the following hold.	(1) Don't earn at least 85% on EACH exam OR the Final, (2) Don't master 85% of your ALEKS pie by the end of the course (3) Overall Course Grade is less than a C (4) Lack of attendance.

## Appendix D:

Students are required to “master” the material, hence a score below 84% is considered failing. To compensate for the increased expectation, students are given three opportunities to pass each exam.

### CHARM EXAM FLOWCHART



**If neither an exam nor its makeup is taken, then you fail the course. The G.E. office will immediately be notified and a hold will be put on student’s record.**