

Math 3803
Algebra for Teachers
Spring Semester 2008

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Office Hours: TTh – 11:00 a.m. – 3:00 p.m.
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(Office hours are subject to change)

Course Objectives

After completion of the course, the student will demonstrate

- An understanding of standard vocabulary and symbols associated with algebra;
- A better understanding of fundamental concepts of algebra, including linear and quadratic equations in one and two variables, linear inequalities, functions, polynomials, exponents, and radicals;
- The ability to recognize and correct “common errors” made by algebra students;
- A better understanding of appropriate strategies for teaching algebra;
- A better understanding of the uses of a variety of manipulatives, technology, and other materials for teaching algebra P-8; and
- An ability to relate algebra topics studied in this course to the mathematics taught in grades P-8.

Text (Optional)

Becker, J. (2004). *Flash Review for Algebra*. New York, NY: Addison Wesley.

Additional Required Supplies

Math 3803 course packet of handouts which is available at the university bookstore
Four children’s books related to mathematics
Two Pocket Folder
Three Ring Binder

Course Evaluation

<u>Assignments</u>	<u>Points</u>
Test - 3 @ 150 points	450
Portfolio	225
In-class group work & presentations	125
Comprehensive Final Exam	200
Total	1000

Final course grades will be assigned as follows: A (900-1000 points); B (800-899 points); C (700-799 points); D (600-699 points); F (0-599 points).

Test

Math 3803 will consist of three regular exams and a comprehensive final exam. The instructor reserves the right to alter the exam schedule/format as conditions may warrant.

Test 1 – Patterns, The Equal Sign, Relational Thinking, Hands-On Equations

Test 2 – Systems of Equations, Inequalities, Linear Equations in Two Variables

Test 3 – Functions, Exponents, Polynomial Addition, Subtraction, and Multiplication, Factoring, Classes of Functions

Final Exam – Comprehensive Final

Test Dates

February 5th – Test 1

March 27th – Test 2

April 24th – Test 3

May 8th – Final 8:00 – 10:00 a.m. – For 9:30 Class

May 8th – Final 2:00 – 4:00 p.m. – For 3:30 Class

Math Portfolio

Portfolio

Each student will create an algebra portfolio that will contain six sections. The final portfolio is due on or before April 15th. Any portfolio turned in after the due date will be assessed a late penalty of **twenty points**. Parts of the portfolio will be turned in on different dates during the semester. Each section is expected to be neat and well organized, incorporating correct spelling and grammar.

Due dates for these particular assignments are as follows:

Section 1 – Algebra and Me

You are to write a paper titled “Algebra and Me”. In this paper, you should describe your algebraic history at each of the grade levels (elementary, middle school, high school, and college). Describe both positive and negative memories. Be descriptive in relaying how you feel about algebra and why you believe you have those feelings.

This paper should be 1 _ to 2 pages long – typed (due January 22rd). This assignment has an assigned point value of five points of the portfolio’s final grade.

Section 2 – Journal

This semester you will create a journal. Note the following:

- Journal entries will be written either during class sessions or outside of class.
- Journal entries should be brought with you to class each day.
- If you are absent, you are still expected to complete the assigned journal entry. It is your responsibility to complete this missed entry. It is important to keep current in your writing and not fall behind.
- Journal entries should be written in complete sentences with correct spelling, grammar, and punctuation.
- Neatness is important!
- Please do not place your journal entries in plastic, protective coverings.
- Journal entries will be collected for grading purposes and to provide feedback on the specified dates (see below).
- Not all journal writings will be scored. Some will merely be read to provide feedback.
- Once a journal entry has been graded, it will not be regraded.

Journal entries will be scored according to the following:

- 0 = The entry is missing OR only the journal prompt is included OR no meaningful response is given.
- 1 = A meaningful attempt to respond to the journal prompt was made but it was either incomplete or it fell far short of providing an accurate solution/response.
- 2 = A complete but inaccurate response was given OR a correct response was provided without a clear explanation. For example, an inappropriate strategy led to an incorrect answer OR some condition of the problem was ignored OR work leading up to the correct response is omitted.
- 3 = A thorough, accurate, clear response is provided.

The journal counts for 30 points of the total portfolio's final grade.

Math 3803 Journal Entries

There should be daily entries in your journal except for the first day of class, review days, and test days. On days where journal entries are not specifically given, you should reflect on the mathematics and the activities you did in class. The following should be used for journal entries on the specific dates.

- 1) **January 10th** – No entry
- 2) **January 15th** – Class
- 3) **January 17th** – Frankie created a growing pattern using bicycle wheels. He said, “One bicycle has 2 wheels, two bicycles have 4 wheels, and three bicycles have 6 wheels.” He extended the pattern writing, “2, 4, 6, 8, 10” and said the generalization was “add 2.” Decide whether Frankie has generalized the pattern. If so, explain how his generalization is correct. If not, what is wrong with his generalization and what should his generalization be.

- 4) **January 22nd** – Class
- 5) **January 24th** – No entry
- 6) **January 29th** – a) Compare and contrast Ricardo’s response with Gina’s response. b) Use Gina’s reasoning to determine whether the following is true or false. Explain your reasoning.

$$142 + 257 = 145 + 254$$

- 7) **January 31st** – Compare and contrast the following two responses below for solving the equation $4(m - 6) = 28$. Which of the responses exhibits relational thinking? Explain your thinking.

Response A: First, I divided both sides by 4. This left me with $m - 6 = 7$. Next, I added 6 to both sides of the equation and got $m = 13$. The solution is 13.

Response B: I looked at the equation and asked myself 4 times what is 28. Well that is 7 so I know that whatever is in the parentheses has to equal 7. So I know that m is 13 because 13 minus 6 is 7.

- 8) **February 5th** – Class

- 9) **February 7th** – Problem-centered teaching:

- What is it?
- How does it differ from how problem solving is traditionally taught?
- What are its benefits?

- 10) **February 12th** – Class

- 11) **February 14th** – Create a problem that can be represented with a system of equations (similar to the moles, lizards, & skunks problem from class). Your problem should have three unknowns. After creating your problem, you should solve the problem first using manipulatives and then by substitution.

- 12) **February 19th** – Class

- 13) **February 21st** – Class

- 14) **February 26th** – Provide a thorough description of what you learned in class about keywords.

- 15) **February 28th** – Benny’s Burgers (see handout from class).

- 16) **March 4th** – Explain in your own words why it makes sense that the point of intersection is the solution to a system of equations.

- 17) March 6th** – Class
- 18) March 11th** – Class
- 19) March 13th** – Class
- 20) March 25th** – No entry
- 21) March 27th** – No entry
- 22) April 1st** – Explain in your own words the results of the paper folding activity.
- 23) April 3rd** – Class
- 24) April 8th** – Class
- 25) April 10th** – “Algebra & Me – Chapter 2” – Write a thoughtful reflection about your experience in this class. Be sure to address the following:
- What have you learned?
 - How have your views about algebra changed, if at all?
 - What role will algebra play in your future classroom?

Section 2 – Journals will be taken up on these dates and should include any entries from the following dates.

January 31st – Entries from January 10th – January 29th
February 26th – Entries from January 31st – February 21st
April 1st – Entries from February 26th – March 13th
April 15th – Entries from April 1st – April 10th

Section 3 – Algebra in Teaching

This section deals with classroom scenarios or assignments involving algebraic ideas. There will be four assignments worth a total of 65 points. Due Dates for the assignments are listed below.

Assignment 1 – 15 points – February 5th
Assignment 2 – 15 points – February 14th
Assignment 3 – 20 points – March 13th
Assignment 4 – 15 points – April 15th

Section 4 – Article Reflections

Throughout the semester you will read a variety of journal articles and be required to write reflections about them. Your reflection should follow the format and guidelines contained in this document. Reflections should be between 1 _ to 2 pages in length and should be typed, double spaced. These are due at the beginning of the class on the specified date. **Article reflections which are turned in after the start of class or emailed after class has started on the due date will be assessed a two point late penalty.** Each article reflection is worth five points. Students in Elementary Education should reflect on the first article listed and students in Middle School Education should reflect on the second article listed.

Reflection 1 – January 29th – Children’s Understanding of Equality: A Foundation for Algebra

Reflection 2 – February 7th – Algebraic Problem Solving in the Primary Grades
OR

Some “Big Ideas” of Algebra in the Middle Grades

Reflection 3 – March 27th – Functions From Kindergarten through Sixth Grade
OR

Transition Toward Algebra

Reflection 4 – April 15th – Developing Elementary Teachers’ “Algebra Eyes and Ears”
OR

Creating Connections: Promoting Algebraic Thinking with Concrete Models

Reflection section is worth 20 points of the portfolio’s final grade.

Section 5 – Performance Task

This section consists of a performance-based task that is created using the GRASPS model. This model is recommended as part of the mathematics GPS. You will begin work on the task in class in your groups. You will finish the task individually. This performance task is due at the beginning of class on March 6th.

This section of the portfolio is worth 25 points.

Section 6 – Children’s Literature Related to Mathematics

Students will select four children’s books related to mathematics and prepare an activity along with relative questions pertaining to the book. The book along with information about the book, activity, materials need to complete the activity, and questions should be placed in the two pocket folder and turned in on the due date. Do not include items such as food, scissors, tape, glue, and crayons in your folder.

Children’s Literature Assignment 1 – February 5th

Children's Literature Assignment 2 – February 21st
 Children's Literature Assignment 3 – March 4th
 Children's Literature Assignment 4 – March 13th

The children's literature section is worth 80 points.

Suggested Textbook Problems

The following problems have been suggested for you to work related to each chapter. These problems will not be turned in but you are responsible for working through the list. Related problems could appear on the chapter test and/or your comprehensive final.

Prior to Test	Suggested Problems
One	Page 24 #1, 2, 3 Page 26 #1 Page 28 # 1-8
Two	Page 36 #1 Page 38 #1, 2 Page 43 #1 – 5 Page 41 #1 Page 58 #1 Page 59 #1 Page 61 #1 Page 62 #1, 2 Page 63 #1 Page 64 #1 Page 65 #1
Three	Page 80 #1, 2 Page 82 #1 Page 77 #1, 2 Page 79 #1, 2 Page 84 #1 Page 99 #1, 2 Page 103 #1

In-class Group Work & Presentations

Students will be participating in group work in class. It is the responsibility of the group to make sure that each member of the group is prepared to present their solutions to the remainder of the class. **Students must be in class and actively participating in the group work to receive these points.**

Attendance Policy

Students are expected to attend all classes. This term a student may withdraw with a grade of W through March 3rd, regardless of grades, absences, etc. This deadline has been established by the University. After this deadline, if a student accumulated more than five absences throughout the semester, he/she will normally receive a grade of WF. (A grade of WF counts as an F.) The five absences should be saved for sickness and

other emergencies. **Late arrivals and early exits count one-half of an absence.** If a student is absent for a test and has an excuse from someone in authority, then the final exam grade will be used for the missed test in the calculation of the final course grade. No make-ups will be given. Students who maintain a perfect attendance record (i.e. no excused or unexcused absences) will have 6 points added to their Total Points at the end of the semester. Students should understand that **NO EXTRA CREDIT WILL BE GIVEN FOR ANY REASON!**

Conferences

Conferences can be beneficial and are encouraged. All conferences should occur during the instructor's office hours, whenever possible. If these hours conflict with a student's schedule, then appointments should be made. The conference time is not to be used for duplication of lectures that were missed; it is the student's responsibility to obtain and review lecture notes before consulting with the instructor. The instructor is very concerned about the student's achievement and well-being and encourages anyone having difficulties with the course to come by the office for extra help. **Grades will be based on coursework, not on Hope Grant needs, financial aid, GPA, or any other factors outside the realm of coursework.**

Individual Accommodations

Students requiring individual educational accommodations should discuss their needs with the instructor within the first week of class.

Conduct and Academic Integrity

It is expected that students be familiar with the Student Conduct Code, Disciplinary Procedures and Disciplinary Sanctions in the Student Handbook. Cheating and/or any conduct that disturbs the classroom, the instructor, or the students WILL NOT be tolerated!! Any evidence that may show otherwise will be reported; appropriate actions will be taken; and consequences will result. If you are caught cheating on the reflections, journal entries, performance task, Algebra in Teaching assignments, children's literature assignments, tests, or final exam, you will receive an F for the course.

Pagers and Cell Phones

Students are not allowed to carry pagers and cell phones in the classroom unless they are set to an inaudible setting.

Important Dates to Remember

January 22nd – Algebra and Me Due

January 24th – No Class – AMTE Conference in Tulsa, OK

January 29th – Reflection 1 Due

January 31st – Journals Due

February 5th – Test 1; Children's Literature Assignment 1 Due; Algebra in Teaching Assignment 1 Due

February 7th – Reflection 2 Due

February 14th – Algebra in Teaching Assignment 2 Due

February 21st – Children’s Literature Assignment 2 Due
February 26th – Journals Due
March 4th – Children’s Literature Assignment 3 Due
March 6th – Performance Task Due
March 13th – Children’s Literature Assignment 4 Due; Algebra in Teaching
Assignment 3 Due
March 17th – 21st – Spring Break
March 27th – Test 2; Reflection 3 Due
April 1st – Journals Due
April 15th – Portfolios Due
April 24th – Test 3
April 29th – Last Day for Class
May 1st – Reading Day
May 8th – Final 8:00 – 10:00 a.m. – For 9:30 Class
May 8th – Final 2:00 – 4:00 p.m. – For 3:30 Class