

# Math 164 Fall 2009

Office Hours: M-F 9-10:50, 11-12:50 and by arrangement

## Special Points of Interest:

- > Homework is assigned but not collected
- > Homework quizzes will be announced, worth 20 points, and cover assigned homework problems. Daily homework and notes may be used during these quizzes. Quizzes may not be made up. There will be about 5 homework quizzes during the quarter.
- > We will have 2 100-point in-class exams. You may use a handwritten 3x5 note card on these exams. These exams may be retaken outside of class time by arrangement.
- > As many as 40 group activities or presentations will be assigned and worth 5-10 points each.
- > 5 writing assessments plus a math autobiography will be worth about 20 points each.
- > 4 take home quizzes will be worth 20 points each.
- > The final take home exam will be worth 200 points.
- > You will be required to keep a binder which will be worth 50 points.
- > Grades are based on total point percentages, calculated to the nearest whole number.

A=93%, B=83%, C=73%,  
D=63%

A minus grade would be (-3%) and a plus grade would be (+4%)

## Course Summary

Mathematics for Elementary Teachers is the course designed to meet the needs of prospective elementary teachers. The course not only emphasizes math concepts and skills, but also stresses learning by activity and collaboration.

This course focuses heavily on the standards of the National Council of Teachers of Mathematics and also the curriculum focal points for each grade level.

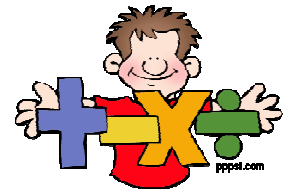
Topics covered in this course include: Structure of the real number system. Properties of and operations on integers, rationals, decimal representation, percentages and

elementary problem solving.

At CWU, we recognize that there are differences in not only the math content taught in first grade versus 6th grade, but also in the abilities of students in the classroom. While Math 164 is not a teaching methods course, it is important for Math 164 students to understand not only the mathematics they will be teaching, but also the difficulties their students will face and know how to teach a wide variety of math content. Basic course goals include:

- To use problem solving as an integral part of mathematics.

- To approach mathematics in a sequence that instills confidence and challenges students at the same time.
- To provide communication problems to develop writing skills and allow students to practice explanation.



- To provide core mathematics for prospective teachers in a way that they are challenged to determine why mathematics is done as it is.

## Necessities

1. Come to class. You need the interaction. You need the information. You need to contribute to your groups. You need to show your commitment.
2. The required text is [A Problem Solving Approach to Mathematics for Elementary](#)

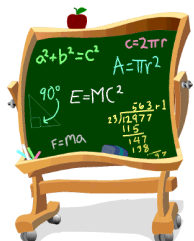
[School Teachers, 10th Edition](#), by Billstein, Lebeskind and Lott. You will also need [Mathematics Activities for Elementary School Teachers](#) by Dolan, Williamson, and Muri.

3. You will need plenty of lined paper and sharp

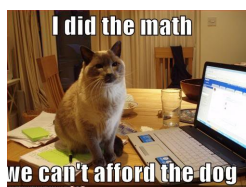
pencils, a calculator, a ruler, a few protective covers, and a 3 ring binder with 7 dividers

4. Get yourself the help you need. I am more than happy to help you as much as possible. Beyond that, form study groups.

## Assigned Problems



Section	Exercises
1.1	A:1-3,6-12,17; B:1,3-5,7,9,12,13, C: 2,3,5,7,10
1.2	A: 1-14; B:1-3,11-13,16; C: 1-3,8,11,12,16
2.1	A: 3,5-13; B: 10-12; C: 1,3,5
2.2	A: 2,5-9,11,13; B: 6,9,10; C: 2,3,11a,12
2.3	A: 1,3-5,9,10,17,19; B: 3,9,16,20; C: 1,7,12
3.1	A: 2,5,6,9,14,15,17,18; B: 2,5-8,11,13-15; C: 2,5,6,16
3.2	A:3-12,17; B: 3-7,9-11,19; C: 1-3,6
3.3	A: 3-9,11-13,17; B: 3,6,10,14; C: 1-6,13
3.4	A: 1-7,11,18-21; C: 5,9-11
3.5	A: 1-12,15,17,18; B: 1-7; C: 1,9
4.1	A: 1-10; B:8; C: 1,6
4.2	A: 1-10; B: 1,2,4,8; C: 3,5,6,8
4.3	A: 1,4,8,9,11,13,15,18; B: 10a, b,12; C: 8,9,14,16
5.3	A: 1-13; B: 1-4,7,8; C: 1,3,4,11
5.4	A: 1-13; 1,2,5,12,15,18; C: 1,2,4,6
5.5	A: 1-19; B: 4,17; C: 4,7,11
6.1	A: 1-22; B: 5,8,14,16,17; C: 3,6,17,23
6.2	A:1-15; B: 68,9; C: 2,-5,16,17
6.3	A: 1-23; B: 6,8,19; C: 3,6,8,16,18
8.2	A:1,2,5,6,8,9,12,15,26; B: 16; C: 1,8

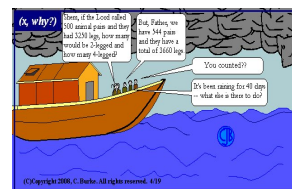


## Course Objectives By Chapter

After completing the given chapter, you should be able to:

### Chapter 1

- Determine what is being asked when presented with a problem-solving situation;
- Apply an appropriate strategy to solve a problem;
- Explain or state the name of a strategy you use;
- Write the answer to a problem in a sentence and explain the method you used to solve the problem;
- State whether a sequence is arithmetic, geometric, or neither;
- Given an arithmetic or geometric sequence, write a formula for it using the appropriate form (either  $a + (n-1)d$  or  $a \cdot r^{(n-1)}$ );
- If a sequence is neither, describe the pattern using words;
- Given a formula for a sequence and a term number, find a specific term;
- Use sequences and formulas to solve problems;
- Identify/describe/complete the Fibonacci sequence

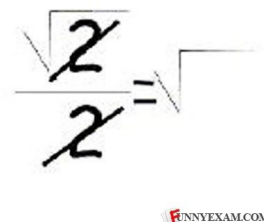


### Chapter 2

- Given a number system like Roman, Egyptian, Babylonian, Mayan, or ours, discuss its features. Include how numerals are formed, whether it has a base, whether it has lots of symbols, whether it has a placeholder and if the placeholder is efficient, and compare it to our system;
- Write a numeral in any base from 2 through 9 for a given base 10 numeral, and vice versa;
- Count in any base from 2 through 9;
- Add and subtract in any base from 2 through 9.
- Identify and use these terms: set, member, equal sets, equivalent sets, on-to-one correspondence, finite, infinite, empty or null set, universal set, subset, intersection, union, complement;
- Identify and use these symbols:  $\{, \cap, \emptyset, \cup, \subseteq, \in$ ;
- Give one reason why the ideas of sets are important in elementary school;
- Use a Venn diagram to solve a problem;
- Know the difference between whole numbers and natural numbers.

### Chapter 3

- Draw a picture and describe at least two models of addition, subtraction, multiplication, and division;
- Identify and apply the properties of addition and multiplication;
- Explain why some properties do not work for subtraction and/or division
- Translate into English the Division Algorithm;
- Explain the three special cases that involve division and 0;
- Apply the order of operations;
- Demonstrate and explain algorithms for addition, subtraction, multiplication, and division that are not traditional;
- Demonstrate and explain method of mental math and a method of estimation.



### Chapter 4

- Explain what algebra is;
- Explain the difference between an expression and an equation and apply that knowledge

- Explain why the word “variable” gives students trouble;
- Write expressions for problems;
- Write equations for problems;
- Substitute a number into a formula and state the result;
- Solve an equation, using either traditional algebra properties or other methods used in class;
- Discuss how students progress from using very concrete models for solving equations to formal steps for solving equations;
- Identify and use these terms: ordered pair, relation, function, domain, range, input, output;
- Represent a given function in four ways and name the four ways;
- Take a function represented in one form and translate that function to the three other forms;
- Answer a question or solve a problem using a function.

### Chapter 5

- Write the definition of a prime and a composite number;
- Explain why “1” is neither prime nor composite;
- Explain and/or apply the divisibility rules for numbers given in class;
- Factor a composite number and write it as a product of primes;
- Given a number, list the factors to check to determine whether it is a prime number;
- Find the GCD, GCF, LCM of two numbers;
- Apply the rule about the number of divisors of any number;
- Explain why GCF and LCM can be confusing for students;
- Describe and use the Neat Trick for GCF and LCM
- Solve application problems related to the GCF and LCM.



### Chapter 6

- Know the meaning of all terms introduced in the chapter, not limited to numerator, denominator, simplest form, fraction, rational number, etc.;
- Know how sets of numbers relate;
- Know all the information on Fractions: Fact or Fiction. Explain why the statements are fact or fiction;
- Model equivalent fraction; mixed numbers and their improper fraction equivalents; and addition, subtraction, multiplication, and division of rational numbers;
- Add, subtract, multiply, and divide (using a paper and pencil algorithm) any given rational numbers and/or mixed numbers and express the answer in a required form;
- Change improper fractions to mixed numbers and vice versa;
- Find a rational number that is between two given rational numbers. (apply the Density Property);
- Arrange a list of rational numbers in order by magnitude;
- Solve word problems containing rational numbers;
- Know what the Fundamental Law of Fractions says and what it is good for.

### Chapter 8

- Solve an is/of percentage problem
- Solve percent increase/decrease problems
- Convert between percents, decimals, and fractions