

**Course: Pre-Algebra 2008-2009**

**Instructor:** Mrs. Conlin

**Course philosophy:** Welcome to my class! Mathematics is an extremely interesting and exciting pursuit. In this course, you have the opportunity to reinforce and extend your understanding of concepts learned in previous mathematics courses as well as to learn more sophisticated skills. Throughout the course, emphasis is placed on the processes used to find solutions, not on the solutions themselves. It is necessary to learn different problem solving strategies and to be able to explain the methods used to find solutions to problems both in oral and written form. Mathematics is a skill that requires practice, practice, practice. Also, you have opportunities to apply your mathematical knowledge and skills to real life situations via word problems. In addition, technology is used in a variety of ways to enhance learning.

**Materials required:** Text  
Notebook for homework

**Classroom expectations:**

1. Come to class on time.
2. Come to class prepared. Bring all the required materials and completed homework to class each day.
3. When you arrive in class, immediately get out your homework and begin work on the indicated warm-up exercise. Do not wait for me to start class.
4. You are responsible for any material covered or announcements made during your absence.
5. Respect yourself and others. Dishonest and inappropriate behaviors are not acceptable.
6. Finally, give each task your best effort and remain positive. You may find some of the concepts and problems quite challenging, but do not give up. There is great satisfaction found in persevering until a concept is mastered! Mathematics is an extremely interesting and exciting subject to explore!

**Homework policies:**

Mathematics is a skill, and, like all skills, it must be practiced. Homework is an important part of the learning process and is assigned almost every night. All homework should be done in pencil and kept in a notebook. It must be labeled with the page number and problem numbers. You must include the work for each problem, not just the answer. Most assignments are due at the beginning of the next class period. The maximum amount of focused, uninterrupted time spent on math homework should be 30 minutes/night for a regular course and 40 minutes/night for an honors course.

**Grading procedure:**

Grades are determined by points earned out of points possible. Major tests are cumulative and are always announced; quizzes may or may not be announced. Weighting factors are as follows:

tests and quizzes 90%  
homework 10%

**Tentative Pre-Algebra Schedule Text: Pre-Algebra  
(Larson, Boswell, Kanold & Stiff, 2005)**

Week Chapters Sections Topics

1 1 All Variables, expressions, and integers  
2 1 All Variables, expressions, and integers  
3 1 All Variables, expressions, and integers  
4 2 All Solving equations  
5 2 All Solving equations  
6 2 All Solving equations  
7 3 All Multi-step equations and inequalities  
8 3 All Multi-step equations and inequalities  
9 3 All Multi-step equations and inequalities  
10 4 All Factors, fractions, and exponents  
11 4 All Factors, fractions, and exponents  
12 Review and exam

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13 4 All Factors, fractions, and exponents  
14 5 All Rational numbers and equations  
15 5 All Rational numbers and equations  
16 5 All Rational numbers and equations  
17 6 All Ratio, proportion, and probability  
18 6 All Ratio, proportion, and probability  
19 6 All Ratio, proportion, and probability  
20 7 All Percents  
21 7 All Percents  
22 7 All Percents  
23 8 All Linear functions

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24 8 All Linear functions  
25 8 All Linear functions  
26 8 All Linear functions  
27 11 All Data analysis and probability  
28 11 All Data analysis and probability  
29 11 All Data analysis and probability  
30 11 All Data analysis and probability  
31 12 All Polynomial and nonlinear functions  
32 12 All Polynomial and nonlinear functions

- 33 12 All Polynomial and nonlinear functions
- 34 12 All Polynomial and nonlinear functions; review
- 35 Final exam

## **Pre-Algebra Outline**

### **I. Variables, expressions, and integers**

#### A. Expressions

- 1. Types
  - a. Numerical
  - b. Variable
- 2. Evaluating a variable expression
- 3. Writing variable expressions from verbal models

#### B. Powers and exponents

- 1. Definitions
- 2. Writing products using exponents
- 3. Evaluating expressions with powers
- 4. Using powers in formulas

#### C. Order of operations

- 1. Grouping symbols
  - 2. Problem solving plan
- #### D. Comparing and ordering integers

- 1. Graphing on a number line
- 2. Absolute value
- 3. Opposites

#### E. Operations with integers

- 1. Addition
  - a. Same signs
  - b. Different signs
  - c. Opposites
  - d. Additive inverse property
- 2. Subtraction (defined in terms of addition)
- 3. Multiplication
  - a. Same signs
  - b. Different signs
  - c. Product of integer and 0
- 4. Division (defined in terms of multiplication)

#### F. Coordinate plane

- 1. Vocabulary
- 2. Finding coordinates of given points
- 3. Plotting points

## **II. Solving equations**

- A. Properties and operations
  - 1. Commutative properties
  - 2. Associative properties
  - 3. Identity properties
  - 4. Distributive property
- B. Perimeter and area
  - 1. Square
  - 2. Rectangle
  - 3. Triangle
- C. Unit analysis
  - 1. Writing unit rates
  - 2. Using formulas
- D. Simplifying variable expressions
  - 1. Terms
    - a. Like terms
    - b. Constant terms
  - 2. Coefficients
- E. Variables and equations
  - 1. Translating words into symbols
  - 2. Solving equations using mental math
- F. Solving equations
  - 1. Using addition or subtraction
  - 2. Using multiplication or division
  - 3. Properties of equality
- G. Decimals
  - 1. Review of operations with decimals
  - 2. Solving equations with decimals

## **III. Multi-step equations and inequalities**

- A. Solving equations
  - 1. Solving two-step equations
  - 2. Solving equations having like terms and parentheses
  - 3. Solving equations with variables on both sides
    - a. Equations with no solutions
    - b. Equations with infinitely many solutions (identities)
- B. Solving inequalities
  - 1. Using addition or subtraction
  - 2. Using multiplication or division
  - 3. Properties of inequalities
  - 4. Solving multi-step inequalities

## **IV. Factors, fractions, and exponents**

- A. Factors and prime factorization
  - 1. Prime and composite numbers
  - 2. Factor trees
  - 3. Factoring monomials
- B. Greatest common factor
  - 1. Relatively prime
  - 2. Finding the GCF of monomials
- C. Equivalent fractions
  - 1. Writing a fraction in simplest form
  - 2. Simplifying a variable expression
- D. Least common multiple
  - 1. Finding the LCM of monomials
  - 2. Least common denominator
- E. Rules of exponents
  - 1. Product of Powers Property
  - 2. Quotient of Powers Property
- F. Negative and zero exponents
- G. Scientific notation
  - 1. Conversion to and from standard form
  - 2. Ordering numbers written in scientific notation
  - 3. Multiplying numbers written in scientific notation

## **V. Rational numbers and equations**

- A. Rational numbers
  - 1. Definition
  - 2. Terminating and repeating decimals
  - 3. Writing fractions as decimals
  - 4. Writing decimals as fractions
  - 5. Ordering rational numbers
- B. Adding and subtracting
  - 1. Like fractions
  - 2. Unlike fractions
  - 3. Mixed numbers
  - 4. Variable expressions
- C. Multiplying
  - 1. Fractions
  - 2. A mixed number and an integer
  - 3. Mixed numbers
  - 4. Variable expressions
- D. Dividing

1. A fraction by a fraction
2. A mixed number by a mixed number
3. A whole number by a mixed number
- E. Using multiplicative inverses to solve equations
- F. Solving equations and inequalities with rational numbers
  1. By clearing fractions
  2. By clearing decimals

## **VI. Ratio, proportion, and probability**

- A. Ratios and rates
  1. Writing ratios
  2. Comparing and ordering ratios
  3. Finding a unit rate
  4. Writing an equivalent rate
  5. Using equivalent rates
- B. Writing and solving proportions
  1. Using equivalent rates
  2. Using algebra
  3. Using cross products
  4. Determining if ratios form a proportion
- C. Geometry concepts
  1. Points, lines, planes
  2. Segments, rays, angles
  3. Triangles, quadrilaterals, congruent parts
  4. Similar and congruent figures
    - a. Identifying corresponding parts
    - b. Finding the ratio of corresponding side lengths
    - c. Checking for similarity
  5. Similarity and measurement
    - a. Finding an unknown side length in similar figures
    - b. Using indirect measurement
    - c. Using algebra and similar triangles
- D. Scale drawings
  1. Using proportions with scale drawings
  2. Finding the scale of a drawing
  3. Finding a dimension of a scale model
- E. Probability and odds
  1. Theoretical probability
  2. Experimental probability
  3. Using probability to make a prediction
  4. Finding odds
    - a. In favor
    - b. Against

5. The counting principle
6. Tree diagrams

## **VII. Percents**

- A. Percents and fractions
  1. Writing percents as fractions and vice versa
  2. Writing a probability as a percent
  3. Finding a percent of a number
- B. Percents and proportions
  1. Finding a percent
  2. Finding a part of a base
  3. Finding a base
- C. Percents and decimals
  1. Writing decimals as percents and vice versa
  2. Finding a percent of a number
- D. Using equations to solve percent problems
- E. Percent applications
  1. Percent of change
    - a. Increase
    - b. Decrease
  2. Markups and discounts
  3. Sales tax and tips
  4. Simple and compound interest
    - a. Finding interest
    - b. Finding a balance

## **VIII. Linear functions**

- A. Relations and functions
  1. Identifying the domain and range
  2. Representations of relations
    - a. Ordered pairs
    - b. Table
    - c. Graph
    - d. Mapping diagram
  3. Vertical Line Test
- B. Linear equations in two variables
  1. Checking solutions
  2. Graphing by using a table
  3. Horizontal and vertical lines
    - a. Equations
    - b. Graphs
  4. Writing an equation in function form

### C. Intercepts

1. Finding intercepts of a graph
2. Using intercepts to graph a linear function

### D. Slope of a line

1. Finding slopes
2. Positive and negative slopes
3. Zero slope and undefined slope
4. Interpreting slope as a rate of change

### E. Slope-intercept form of a line

1. Identifying the slope and  $y$ -intercept
2. Graphing an equation in slope-intercept form
3. Finding slopes of parallel and perpendicular lines

### F. Writing linear equations

1. Given the slope and  $y$ -intercept
2. Given a graph
3. Given a table
4. Of parallel and perpendicular lines

### G. Function notation

### H. Solving systems of linear equations by graphing

1. Solving a linear system with no solution
2. Solving a linear system with many solutions

### I. Graphs of linear inequalities

## **IX. Data analysis and probability**

### A. Data displays

1. Stem-and-leaf plots
2. Frequency tables
3. Histograms
4. Box-and-whisker plots
  - a. Five-number summary
  - b. Interquartile range
5. Review of bar graphs, line graphs, circle graphs

### B. Using data displays

1. Choosing appropriate data displays
  - a. Categorical data
  - b. Numerical data
2. Comparing data displays
3. Identifying misleading data displays

### C. Collecting data

1. Sampling methods
  - a. Random
  - b. Systematic
  - c. Stratified

- d. Convenience
- e. Self-selected
- 2. Biased samples
- 3. Biased questions
- D. Interpreting data
  - 1. Making a population prediction
  - 2. Margin of error
- E. Permutations
  - 1. Definition of  $n!$
  - 2. Formula for permutations
  - 3. Finding the number of permutations
  - 4. Finding a probability using permutations
- F. Combinations
  - 1. Listing combinations
  - 2. Formula for combinations
  - 3. Relationship between permutations and combinations
  - 4. Finding the number of combinations
  - 5. Finding a probability using combinations
- G. Probabilities of disjoint and overlapping events
  - 1. Identifying disjoint and overlapping events
  - 2. Formulas
  - 3. Complementary events
- H. Independent and dependent events
  - 1. Identifying independent and dependent events
  - 2. Formulas

## **X. Polynomial and nonlinear functions**

- A. Polynomials
  - 1. Identifying and classifying polynomials
  - 2. Finding the degree of a polynomial
  - 3. Writing a polynomial in standard form
  - 4. Evaluating a polynomial
- B. Operations involving polynomials
  - 1. Adding and subtracting polynomials
  - 2. Multiplying and dividing a polynomial by a monomial
  - 3. Multiplying binomials
    - a. Using a table
    - b. Using the distributive property
    - c. Using the FOIL method
- C. More rules of exponents
  - 1. Power of a Product Property
  - 2. Power of a Quotient Property
  - 3. Power of a Power Property

D. Quadratic functions

1. Evaluating a quadratic function
2. Graphing a quadratic function by making a table
  - a. Opens upward or downward
  - b. Minimum and maximum values

E. Exponential growth and decay

1. Graphing an exponential function by making a table
2. Solving problems involving exponential growth and decay

F. Sequences

1. Arithmetic

- a. Finding common difference
- b. Finding the next three terms

2. Geometric

- a. Finding the common ratio
  - b. Finding the next three terms
3. Graphing sequences