

OFFICIAL SYLLABUS
MATH 112a – Math for Elementary Teaching:
Number Sense and Algebra

(Adopted – Spring 2017; Committee: C. Eames, T. Voepel)

Textbook: *Mathematics for Elementary Teachers*, 5th edition, by S. Beckmann

Chapter 1. Numbers and the Base-Ten System

- 1.1 The Counting Numbers
- 1.2 Decimals and Negative Numbers
- 1.3 Reasoning to Compare Numbers in Base Ten
- 1.4 Reasoning about Rounding

Chapter 2. Fractions and Problem Solving

- 2.1 Solving Problems and Explaining Solutions
- 2.2 Defining and Reasoning about Fractions
- 2.3 Reasoning about Equivalent Fractions
- 2.4 Reasoning to Compare Fractions
- 2.5 Reasoning about Percent

Chapter 3. Addition and Subtraction

- 3.1 Interpretations of Addition and Subtraction
- 3.2 The Commutative and Associative Properties of Addition, Mental Math, and Single-Digit Facts
- 3.3 Why the Standard Algorithms for Addition and Subtraction in Base Ten Work
- 3.4 Reasoning about Fraction Addition and Subtraction
- 3.5 Why We Add and Subtract with Negative Numbers the Way We Do

Chapter 4. Multiplication

- 4.1 Interpretations of Multiplication
- 4.2 Why Multiplying by 10 is Special in Base Ten
- 4.3 The Commutative and Associative Properties of Multiplication, Areas of Rectangles, and Volumes of Boxes
- 4.4 The Distributive Property
- 4.5 Properties of Arithmetic, Mental Math, and Single-Digit Multiplication Facts
- 4.6 Why the Standard Algorithm for Multiplying Whole Numbers Works

Chapter 5. Multiplication of Fractions, Decimals, and Negative Numbers

- 5.1 Making Sense of Fraction Multiplication
- 5.2 Making Sense of Decimal Multiplication
- 5.3 Extending Multiplication to Negative Numbers

Chapter 6. Division

- 6.1 Interpretations of Division
- 6.2 Division and Fractions and Division with Remainder
- 6.3 Why Division Algorithms Work
- 6.4 Fraction Division from the How-Many-Groups Perspective

- 6.5 Fraction Division from the How-Many-Units-in-1-Group Perspective
- 6.6 Dividing Decimals

Chapter 7. Ratio and Proportional Relationships

- 7.1 Motivating and Defining Ratio and Proportional Relationships
- 7.2 Solving Proportion Problems by Reasoning with Multiplication and Division
- 7.3 The Values of a Ratio: Unit Rates and Multipliers
- 7.4 Proportional Relationships
- 7.5 Proportional Relationships Versus Inversely Proportional Relationships

Chapter 8. Number Theory

- 8.1 Factors and Multipliers
- 8.3 Divisibility Tests
- 8.4 Prime Numbers
- 8.5 Greatest Common Factor and Least Common Multiple
- 8.6 Rational and Irrational Numbers

Chapter 9. Algebra

- 9.1 Numerical Expressions
- 9.2 Expressions with Variables
- 9.3 Equations
- 9.4 Solving Algebra Word Problems with Strip Diagrams and with Algebra

Any instructor should cover all of the material specified.