

### ***42-MATH-091 Elementary Algebra I Course Content***

- Most of the material in this course (including in many cases the algebra topics) will be review for the students (although students cannot be expected to be proficient in any of the subject matter). For this reason, some topics can be covered in conjunction with other topics. For instance, estimation and rounding might be discussed in an application problem where students need to add several numbers.
- Because of the amount of material, most days it will be necessary to cover more than one section. Students must realize that it will be important for them to spend time outside of class in the Resource Center working with a tutor or on the computer.
- The first two modules will take more time than the third and fourth modules.
- Applied problems should be stressed.
- The “Combining Concepts” exercises should be assigned when appropriate.
- Solving equations is integrated throughout the course.
- Students should practice reading graphs when they occur in a section.
- Students may NOT use calculators for the material on whole numbers, integers, fractions and decimals (Module I and Module II material).
- Scientific calculators MAY be used for the remainder of the quarter (Module III and Module IV material).
- The comprehensive Final Exam should be given in two parts:
  - ~ Part 1 over the material from Modules I and II – students may NOT use a calculator for this part.
  - ~ Part 2 over the material from Modules III and IV – students MAY use a scientific calculator.
- Cell phones may NOT be used as calculators at any time.
- Students scoring lower than 75% on any test must take a Retake of that test in the Math Resource Center by one week following the date that the graded test was returned to the student *and* before the next Module Test. (The *highest* of the two test scores will be given as the score for that Module test.)

Note: In all sections where applications are included, working with application problems should be assumed as an additional objective. Often a concept can be introduced in the context of an application problem.

## **Module I**

### **Chapter 1: Whole Numbers and Introduction to Algebra**

#### **1.2 Place Value and Names for Numbers**

Find the place value of a digit in a whole number.

Write a whole number in words, standard form and expanded form.

Compare whole numbers.

#### **1.3 Adding Whole Numbers and Perimeter**

Add whole numbers.

Use the properties of addition (commutative, associative, etc.)

Find the perimeter of a polygon. (This can be mentioned briefly here since it will be covered in detail in Chapter 8.)

#### **1.4 Subtracting Whole Numbers**

Subtract whole numbers.

#### **1.5 Rounding and Estimating**

Round whole numbers to a given place value.

Estimate sums and differences.

#### **1.6 Multiplying Whole Numbers and Area**

Multiply whole numbers.

Use properties of multiplication (commutative, associative, etc.)

Find the area of a rectangle. (This can be mentioned briefly here since it will be covered in detail in Chapter 8.)

#### **1.7 Dividing Whole Numbers**

Divide whole numbers.

Find the average of a list of numbers.

#### **1.8 Exponents and Order of Operations**

Use exponential notation.

Use the order of operations.

#### **1.9 Introduction to Variables and Algebraic Expressions**

Evaluate algebraic expressions.

Translate phrases into variable expressions.

## **Chapter 2: Integers**

### **2.1 Introduction to Integers**

Graph integers on a number line.  
Compare two integers.  
Find absolute value.  
Find the opposite of a number.

### **2.2 Adding Integers**

Add integers.  
Evaluate algebraic expressions.

### **2.3 Subtracting Integers**

Subtract integers.  
Evaluate algebraic expressions.

### **2.4 Multiplying and Dividing Integers**

Multiply integers.  
Divide integers.  
Evaluate algebraic expressions.

### **2.5 Order of Operations**

Use the order of operations.

## **Chapter 3: Solving Equations and Problem Solving**

### **3.1 Simplifying Algebraic Expressions**

Combine like terms.  
Multiply expressions.  
Simplify expressions.

### **3.2 Solving Equations: The Addition Property**

Determine if a given number is a solution to an equation.  
Use the addition property to solve equations.

### **3.3 Solving Equations: The Multiplication Property**

Use the multiplication property to solve equations.  
Translate word phrases into algebraic expressions.

### **3.4 Solving Linear Equations in One Variable**

Solve equations using the addition and multiplication properties.  
Solve equations containing parentheses.  
Write sentences as equations.

## **Module II**

### **Chapter 4: Fractions**

#### **4.1 Introduction to Fractions and Equivalent Fractions**

Identify the numerator and denominator of a fraction.  
Write a fraction to represent the shaded area in a figure.  
Graph a fraction on a number line.  
Simplify fractions in the form  $a/a$ ,  $a/1$ , or  $0/a$ .  
Write equivalent fractions.

#### **4.2 Fractions and Simplest Form**

Write a number as a product of prime numbers.  
Write a fraction in simplest form.

#### **4.3 Multiplying and Dividing Fractions**

Multiply fractions.  
Evaluate exponential expressions with fractional bases.  
Divide fractions.  
Evaluate expressions containing fractions.

#### **4.4 Adding and Subtracting Like Fractions and Least Common Denominator**

Add or subtract like fractions.  
Evaluate expressions containing fractions.  
Find the least common denominator of a list of fractions.

#### **4.5 Adding and Subtracting Unlike Fractions**

Add or subtract unlike fractions.  
Write fractions in order.  
Evaluate expressions containing fractions.

#### **4.6 Complex Fractions and Review of Order of Operations**

Simplify complex fractions.  
Use the order of operations in expressions containing fractions.

#### **4.7 Solving Equations Containing Fractions**

Solve equations containing fractions.

#### **4.8 Operations on Mixed Numbers**

Illustrate mixed numbers.  
Write mixed numbers as improper fractions.  
Write improper fractions as mixed numbers or whole numbers.  
Multiply or divide mixed numbers.  
Add or subtract mixed numbers.  
Perform operations on negative mixed numbers.

## **Chapter 5: Decimals**

### **5.1 Introduction to Decimals**

Know the meaning of place value in a decimal.

Write decimals in words and in standard form.

Write decimals as fractions.

Compare decimals.

Round decimals to a given place value.

### **5.2 Adding and Subtracting Decimals**

Add or subtract decimals.

Evaluate expressions containing decimals.

Simplify expressions containing decimals.

### **5.3 Multiplying Decimals and Circumference of a Circle**

Multiply decimals, including multiplication by powers of ten.

Evaluate expressions and check solutions with decimal replacement values.

Find the circumference of a circle. (This can be mentioned briefly here since it will be covered in detail in Chapter 8.)

### **5.4 Dividing Decimals**

Divide decimals, including division by powers of ten.

Evaluate expressions and check solutions with decimal replacement values.

### **5.5 Estimating and Order of Operations**

Estimate operations on decimals.

Simplify expressions using the order of operations.

Evaluate expressions and check solutions with decimal replacement values.

### **5.6 Fractions and Decimals**

Write fractions as decimals.

Compare fractions and decimals.

### **5.7 Equations Containing Decimals**

Solve equations containing decimals.

## **Module III**

**Chapter 6: Percent - Note:** Instructors may choose to use *either* Section 6.3 or 6.4 (or both, if time permits).

### **6.2 Percents, Decimals, and Fractions**

Write percents as decimals and fractions.

Write decimals as percents.

Write fractions as percents.

Convert percents, decimals and fractions.

### **6.3 Solving Percent Problems with Equations**

Write percent problems as equations.

Solve percent problems.

### **6.4 Solving Percent Problems with Proportions**

Write percent problems as proportions.

Solve percent problems.

### **6.5 Applications of Percent**

Solve problems involving percent.

Find percent increase and percent decrease.

### **6.6 Percent and Problem Solving: Sales Tax, Commission and Discount**

Calculate sales tax and total price.

Calculate commissions.

Calculate discount and sale price.

### **6.7 Percent and Problem Solving: Interest**

Calculate simple interest.

**Chapter 8: Geometry and Measurement - Note:** Students should know the formulas for circles, rectangles, squares, triangles, and volume of rectangular solids. They can be given a formula sheet for other formulas. (*Attached*)

### **5.8 Square Roots and the Pythagorean Theorem**

Find the square root of a number.

Approximate square roots.

Use the Pythagorean Theorem.

### **8.2 Linear Measurement**

Convert from one unit of measurement to another.

(This section only covers linear measurement. You may wish to supplement it with examples of other kinds of conversions if time permits.)

### **8.3 Perimeter**

Find perimeter and circumference.

### **8.4 Area and Volume**

Find the area of geometric figures.

Find the volume of geometric figures.

## **Module IV**

### **Chapter 9: Equations and Problem Solving**

#### **9.1 Symbols and Sets of Numbers**

Define the meaning of symbols such as  $=$ ,  $>$ , etc.

Translate sentences into mathematical statements.

Identify integers, rational numbers, irrational numbers, and real numbers.

#### **9.2 Properties of Real Numbers**

Use the commutative, associative, distributive, identity and inverse properties.

(This section should be a quick review of properties covered earlier in the course.)

#### **3.5 Linear Equations in One Variable and Problem Solving**

Write sentences as equations.

Apply the steps for problem solving.

#### **9.3 Further Solving Linear Equations**

Apply the general strategy for solving a linear equation.

Solve equations containing fractions or decimals.

Recognize identities and equations with no solution.

#### **9.4 Further Problem Solving**

Translate a problem into an equation.

Use the equation to solve the problem.

#### **9.5 Formulas and Problem Solving**

Use formulas to solve problems.

Solve a formula or equation for one of its variables.

## Geometric Formula Sheet

Students should know formulas for:

Perimeter and Area: Rectangle, Square, Triangle

Circumference and Area: Circle

Volume: Rectangular Solid

Students should be able to identify and use the formulas for:

Area of a Parallelogram:  $A = bh$

Area of a Trapezoid:  $A = \frac{1}{2}(b + B)h$

Volume of a Sphere:  $V = \frac{4}{3}\pi r^3$

Volume of a Circular Cylinder:  $V = \pi r^2 h$

Volume of a Cone:  $V = \frac{1}{3}\pi r^2 h$

Volume of a Square-based Pyramid:  $V = \frac{1}{3}s^2 h$

(Plus any other formulas such as surface area if necessary)

**Weekly schedule for WINTER Quarter - 2005**, including sections to be covered and a short description of topics. (Lectures meet four hours per week – one hour per day for four days. TA's meet with students two hours per week – one hour in a computer lab and one hour in the normal classroom. There are no classes on: Monday, Jan. 17, as it is MLK holiday; Tuesday, Jan. 18, if you are attending the CAT Retreat and it is during your class time. )

***Week of:***

- 1/3** 1.2 – 1.9: operations with whole numbers, rounding, estimating, exponents, order of operations, introduction to algebra topics  
(In computer lab this week: Register students in Course Compass/My Math Lab.)
- 1/10** 2.1 – 2.5: operations with integers, order of operations  
3.1 – 3.3: simplifying algebraic expressions; solving equations using the addition property and the multiplication property
- 1/17** (Mon., Jan 17, is a holiday; Tues., Jan. 18, is CAT Faculty/Staff Retreat)  
3.4: solving linear equations  
Test on Module I material– calculator may NOT be used
- 1/24** 4.1 – 4.6: operations with fractions, complex fractions
- 1/31** 4.7 – 4.8: solving equations with fractions, mixed numbers  
5.1 – 5.4: operations with decimals
- 2/7** 5.5 – 5.7: estimating, order of operations, solving equations with decimals  
Test on Module II material – calculator may NOT be used
- 2/14** 6.2, 6.3 *or* 6.4, 6.5 – 6.7: percents, applications
- 2/21** 5.8: Pythagorean Theorem  
8.2 – 8.4: measurement, perimeter, area, volume  
Test on Module III material– scientific calculator MAY be used
- 2/28** 9.1 – 9.3: solving equations  
3.5, 9.4: problem solving
- 3/7** 9.5: formulas  
Test on Module IV material – scientific calculator MAY be used  
Review for Final Exam
- 3/14** Exam Week – give comprehensive Final Exam on scheduled date.  
The comprehensive Final Exam should be given in two parts:  
~ Part 1 over the material from Modules I and II – students may NOT use a calculator for this part.  
~ Part 2 over the material from Modules III and IV – students MAY use a scientific calculator.