College of Applied Science

Department of Mathematics, Physics, and Computing Technology

Center for Access and Transition

42-MATH-101 Elementary Algebra III Course Content

Module I

Chapter 7: Factoring
(Stress to the students that a great deal of practice is required to become proficient in factoring.)

7.1 Greatest Common Factors; Factoring by Grouping
- The first step in factoring a polynomial is to find the greatest common factor (if one exist).
- Factor by grouping – students should be able to group the terms, factor within the groups and then factor the entire polynomial.

7.2 Factoring Polynomials of the Form $x^2 + bx + c$
- Factor trinomials when the coefficient of the squared term is 1.
- Factor completely.

7.3 Factoring Polynomials of the Form $ax^2 + bx + c$
- Factor trinomials when the coefficient of the squared term is not 1.
- Using trial factors and by grouping.
- Emphasize the importance of this section as it relates to subsequent sections.

7.4 Special Factoring
- Factor the Difference of Two Perfect Squares.
- Factor Perfect-Square Trinomial.
- Factor the Sum or Difference of Two Perfect Cubes.

7.5 Solving Equations by Factoring
- Solve equations by factoring.
- Emphasis on solving application problems.

Module II

Chapter 8: Rational Expressions

8.1 Multiplication and Division of Rational Expressions
- Define rational functions and explain why the denominator cannot be "0".
- Simplify a rational expression and write in lowest terms.
- Simplify a rational expression by multiplication or division.

8.2 Addition & Subtraction of Rational Expressions
- Write in terms of a common denominator.
- Add and subtract rational expressions with different denominators.

8.3 Complex Fractions
- Simplify complex fractions by simplifying the numerator and denominator.

8.4 Solving Equations with Rational Expressions
- Define the domain of a rational equation.
- To solve rational equations.
- Describe why an answer is "no solution".

8.5 Ratio and Proportion
- Solve applications using proportions.
- Define a ratio and a proportion - optional.
- Solve a proportion - optional.
- Solve applications using similar triangles - optional.

8.6 Literal Equations
- Solve a formula for a specified variable.

8.7 Application Problems
- Solve work problems.
- Solve uniform motion problems using rational expressions.

8.8 Variation - Optional
- Solve direct variation, inverse variation, and joint variation problems involving a constant of proportionality.

Module III

Chapter 9: Exponents and Radicals

9.1 Rational Exponents and Radical Expressions

- Simplify expressions with radical exponents.
- Convert between radicals and rational exponents.
- Find roots of numbers.
- Use the Rules for Exponents with rational exponents.
- Use exponential notation for the n^{th} root.

9.2 Operations on Radical Expressions

- Simplify radical expressions using a calculator.
- Add or subtract radical expressions.
- Multiply radical expressions using The Product Property.
- Divide radical expressions using The Quotient Property.
- Rationalize denominators with one radical term and with binomials involving radicals.

9.3 Solving Equations Containing Radical Expressions

- Solve radical equations by raising to a power.
- Recognize every solution of the radical equation must be checked in the original equation.
- Solve equations with indexes greater than 2.
- Solve application problems involving and stressing radicals including the Pythagorean Theorem.

9.4 Complex Numbers

- Introduce the concept of an imaginary number; a complex number is a number of the form of $a+bi$.
- Simplify a complex number.
- Adding, multiplying, and dividing complex numbers.
- Rationalizing the denominator of complex numbers.

Module IV

Chapter 10: Quadratic Equations

10.1 Solve Quadratic Equations by Factoring or by Taking Square Roots

- Learn and use the Principle of Zero Products.
- Write a quadratic equation given its solution.
- Solve quadratic equations of the form $(x+b)^2 = c$ by using the square root property.

10.2 Solve Quadratic Equations by Completing the Square

- Solve quadratic equations by completing the square (including those where the solution are not real numbers).

10.3 Solve Quadratic Equations by Using the Quadratic Formula

- Solve the quadratic equations using the quadratic formula (the formula needs to be memorized).

10.4 Solving Equations That are Reducible to Quadratic Equations

- Solve equations that are quadratic in form; e.g. equations using x^4 or $x^{\frac{1}{2}}$ using the concept of "u-sub".
- Solve equations that are reducible to quadratic form such as $\sqrt{x+a} = c$
- Solve fractional equations using rational expressions.

10.5 Quadratic Inequalities and Rational Inequalities

- Solve quadratic and rational inequalities.
- Graph the solution.
- Write the solution set.

10.6 Applications of Quadratic Equations

- Solve application problems.

11.1 Properties of Quadratic Functions

- Find the vertex of a parabola using $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$.
- Graph a quadratic function.
- Find the minimum or maximum of a quadratic function.
- Solve application problems.