Course Title: Math 90

Department: Mathematics

Course #:   2475

Grade Level/s: 12

Course Length: 1 Year

Prerequisite/s: Successful completion of and Algebra 1 or equivalent

UC/CSU (A-G) Req: N/A

Brief Course Description: Students will solve linear equations, systems of linear equations, equations involving algebraic fractions, and quadratic equations by factoring and utilizing the Quadratic Formula. These skills will be applied to set up and solve application problems. Other topics include how to graph lines, perform arithmetic with both polynomial and rational expressions, and how to factor polynomials.

As the first course in the algebra sequence, Math 90 prepares the student for Math 96. Students will solve equations, graph lines, and work with polynomials.

I. GOALS

Upon the completion of the course the student will be able to do the following:
A. Evaluate algebraic expressions where the variables represent rational numbers and translate verbal expressions into algebraic ones

B. Simplify algebraic expressions, rational expressions that contain variables in the denominator, and expressions containing exponents

C. Produce solutions to quadratic equations by factoring and by utilizing the Quadratic Formula, to linear equations, and to rational equations

D. Solve applications

E. Produce the factored form of a polynomial of the type $ax^2 + bx + c$ where $a > 1$

F. Solve a system of two equations in two variables utilizing the substitution and elimination methods

G. Plot ordered pairs of numbers

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    H. Construct the graphs of lines by plotting x- and y-intercepts and utilizing the slope-intercept form

    I. Construct the $y = mx + b$ equation of a line given a point and the slope

    J. Produce the second root of a number in simplified form

II. OUTLINE OF CONTENT FOR THE MAJOR AREA OF STUDY

A. Evaluate algebraic expressions
1. Evaluate a variable expression for given replacement values
2. Utilize the order of operations

B. Simplify Algebraic Expressions
1. Utilize the commutative and associative properties of addition to combine like terms
2. Multiply a monomial to a polynomial by utilizing the distributive property
3. Multiply a binomial to a polynomial by utilizing the distributive property

C. Linear Equations (in one variable)
1. Solve equations with one operation
2. Solve equations with two operations
3. Solve equations with variables on both sides
4. Solve equations that contain parentheses
5. Verify the solution to a linear equation
6. Translate and solve

D. Solve Linear Inequalities (in one variable)

E. Solve applications
1. Solve geometry problems
2. Solve mixture problems
3. Solve "d = rt" problems
4. Solve investment problems

F. Factor using the following techniques
1. Greatest common monomial factor
2. Difference of two squares
3. Perfect-square trinomial
4. Trinomial with leading coefficient = 1
5. Trinomial with leading coefficient ≠ 1
6. Factor by grouping
7. Factor completely by using combinations of the above techniques.

G. Simplify expressions containing exponents
1. Utilize the product rule: $a^m \cdot a^n = a^{m+n}$
2. Utilize the quotient rule: $a^m / a^n = a^{m-n}$ (as long as $a \neq 0$)
3. Utilize the zero power rule: $a^0 = 1$ (as long as $a \neq 0$)
4. Utilize the power to a power rule: $(a^m)^n = a^{mn}$
5. Utilize the negative exponent rule: $a^{-m} = 1/a^m$ (as long as $a \neq 0$)

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    H. Simplify radicals with index 2
        1. Reduce by breaking up the radical into factors of perfect squares
        2. Reduce fractions with numerators that contain a sum with a radical

    I. Solve quadratic equations
        1. Solve by factoring using the zero product property
        2. Solve by using the Quadratic Formula

    J. Simplify rational expressions
        1. Reduce rational expressions into simplest form
        2. Add or subtract two or more algebraic fractions
        3. Multiply or divide two or more algebraic fractions

    K. Solve rational equations
        1. Solve proportions
        2. Solve fractional equations with more than one term

    L. Solve systems of equations
        1. Use the substitution method
        2. Use the elimination method
        3. Solve applications

    M. Graphing
        1. Plot points
        2. Graph a linear equation in two variables via:
            a. generating ordered pairs
            b. plotting the x- and y-intercepts
            c. plotting the y-intercept and utilizing the slope
        3. Identify the slope of a line given its graph

    N. Write the equation of a line in $y = mx + b$ form
        1. Write the equation of a line given the y-intercept and the slope
        2. Write the equation of a line given the slope and a point
        3. Write the equation of a line given two points

III. ACCOUNTABILITY DETERMINANTS

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following: Students will be asked to read a section in the text and solve the problems at the end of that section. A typical assignment could be, read Chapter 13 section 2, and solve problems 1 – 25 odds. Students may also be required to work in groups to solve problems related to the day's lecture or previously covered material. Student could be asked to explain the process used in order to solve a problem.

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IV. INSTRUCTIONAL MATERIALS AND METHODOLOGIES

A. Required Textbook(s)
1. Aufmann, Barker and Lockwood (2004). Beginning Algebra with Applications, 6th Ed. Houghton Mifflin Company. ISBN: 0618306056
2. Wright (2009). Introductory Algebra Hawkes Learning Systems. ISBN: 9781932628326)

B. Instructional and Assessment Methodologies
1. A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:
2. Method: Class Participation Integration: Students will be required during class to explain the process they used in solving application problems. This will allow the instructor to assess if the student has a solid understanding of how to solve the problem. (no more than 10% of grade)
3. Method: Assignments Integration: To help students develop the skills necessary to construct the graph of a line given its equation (Homework and quizzes can be no more than 15% of the grade).
4. Method: Projects Integration: Application of the concepts and techniques learned to solve systems of equations. Optional, but may not replace the final exam (no more than 5% of the grade).
5. Method: Quizzes Integration: Periodic short objective written tests on how to factor polynomials (Homework and quizzes can be no more than 15% of the grade).
6. Method: Exams/Tests Integration: Exams: At least three written exams - a combination of objective questions of important concepts to evaluate the students' ability to solve a variety of equations. Exams shall cover the material previously discussed in class and in assignments (may account for 40%-80% of the class grade).
7. Method: Final Exam Integration: A comprehensive written final exam that evaluates a student's ability to generate the equation of a line given a point and the slope