MATH-0955: BEGINNING ALGEBRA

Cuyahoga Community College

Viewing: MATH-0955 : Beginning Algebra

Board of Trustees:

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Academic Term:

Fall 2024

Subject Code

MATH - Mathematics

Course Number:

0955

Title:

Beginning Algebra

Catalog Description:

First of two developmental mathematics courses. Topics include simplifying basic algebraic expressions in one variable, solving one variable linear equations, literal equations, linear inequalities in one variable, graphing linear inequalities in one variable, compound inequalities, graphing compound inequalities, determining relation, domain, range of functions graphically and algebraically, performing operations on functions, introducing the rectangular coordinate system, determining equations of lines, graphing lines and two variable inequalities, solving systems of two variable equations and inequalities, performing algebraic operations and simplifying of polynomials involving rules of exponents, and scientific notation. Includes applications and activities to build skills in problem solving.

Credit Hour(s):

6

Lecture Hour(s):

6

Requisites

Prerequisite and Corequisite

MATH-0915 Basic Arithmetic and Pre-Algebra, or sufficient score on math placement test, or departmental approval.

Outcomes

Course Outcome(s):

Simplify basic algebraic expressions in one variable.

Objective(s):

1. Define and identify variables.
2. Define and identify terms.
3. Define and identify algebraic expressions.
4. Define and identify like terms.
5. Add and subtract like terms.
6. Define and apply the properties of real numbers to algebraic expressions.
7. Use the Order of Operations to evaluate basic algebraic expressions.
8. Simplify basic algebraic expressions.

Course Outcome(s):

Solve linear equations and linear inequalities in one variable.

Objective(s):

1. Define and use the Addition Property of Equality and the Multiplication Property of Equality to solve linear equations in one variable.

2. Verify solutions to equations.

3. Use the Order of Operations to solve equations.
4. Solve equations that include fractional or decimal coefficients.
5. Solve equations that may have no solution or infinitely many solutions.
6. Translate phrases into algebraic expressions and equations.
7. Solve application problems involving consecutive integers, geometry, percents, and uniform motion with one unknown.
8. Identify and define rates, ratios, and proportions.
9. Solve equations involving proportions.
10. Solve application problems involving rates, ratios, and proportions.
11. Define and solve literal equations.
12. Define and use the Addition Property of Inequality and the Multiplication Property of Inequality to solve linear inequalities in one variable.
13. Write the solution of inequalities using the appropriate inequality symbol, in set builder notation and in interval notation.
14. Graph solutions of linear inequalities on the number line.
15. Determine the intersection and union of two sets.
16. Solve compound inequalities involving "and" and "or" and express solutions as inequalities, in interval notation, in set-builder notation and by graphically on a number line.
17. Solve inequalities in one variable with infinite solutions and no solutions.
18. Translate phrases into algebraic inequalities.
19. Solve application problems involving inequalities.
20. Solve application problems involving compound inequalities in one variable.
21. Identify and define linear equations.

Course Outcome(s):

Define, evaluate and perform operations on polynomial functions.

Objective(s):

1. Define a relation, domain, range, and function.
2. Identify the domain and range of relations and determine whether or not a relation is a function.
3. Evaluate functions algebraically and graphically.
4. Identify the domain and range of functions graphically and algebraically.
5. Use the vertical line test to identify functions.
6. Solve application problems involving functions.

Course Outcome(s):

Identify components of the rectangular coordinate system, determine the equations of lines, and graph lines and inequalities.

Objective(s):

1. Draw the rectangular coordinate system and identify and label the horizontal axis, vertical axis, origin, and quadrants.
2. Read and write the coordinates of points plotted on the rectangular coordinate system.
3. Plot ordered pairs of points in the rectangular coordinate system.
4. Calculate the slope of lines.
5. Describe the meaning of the slope of lines as a rate of change.
6. Identify and determine x and y-intercepts algebraically and graphically.
7. Determine equations of lines using the slope-intercept form of an equation.
8. Write equations of lines using function notation.
9. Write equations of lines using the point-slope form of an equation of a line.
10. Write linear equations in standard form.
11. Identify the slope of vertical lines as undefined and determine the equation of vertical lines.
12. Identify the slope of horizontal lines as zero and determine the equation of horizontal lines.
13. Determine the domain and range of vertical linear relations and functions, including horizontal functions.
14. Solve applications involving linear equations and linear function.
15. Graph linear equations using a table.
16. Graph linear equations using the y-intercept and the slope of the line.
17. Graph linear equations using the x- and y-intercepts of the line.
18. Determine the equation of a line parallel to a given line and through a given point.
19. Determine the equation of a line perpendicular to a given line and through a given point.
20. Solve applications involving real-world linear equations and linear functions.
21. Graph linear inequalities in two variables.
22. Solve applications involving linear inequalities by graphing

Course Outcome(s):

Solve systems of linear equations and inequalities in two variables.

Objective(s):

1. Determine whether or not given ordered pairs are solutions to linear systems of equations.
2. Solve systems of linear equations by the Method of Graphing .
3. Use graphing to identify lines as parallel and the system as inconsistent with no solution.
4. Use graphing to identify systems of equations as dependent with infinite solutions.
5. Use graphing to identify systems as independent with a unique ordered pair as a solution.
6. Solve systems of linear equations by the Method of Substitution.
7. Use the Method of Substitution to identify lines as parallel and the system of equations as inconsistent with no solution.
8. Use the Method of Substitution to identify systems of equations as dependent with infinite solutions.
9. Use the Method of Substitution to identify systems of equations as independent with a unique ordered pair as a solution.
10. Solve systems of linear equations by the Method of Addition including equations with fractional and decimal coefficients.
11. Use the Method of Addition to identify lines as parallel and the system of equations as inconsistent with no solution.
12. Use the Method of Addition to identify systems of equations as dependent with infinite solutions.
13. Use the Method of Addition to identify systems as independent with a unique ordered pair as a solution.
14. Determine the most efficient method for solving linear systems.
15. Solve systems of linear inequalities in two variables by graphing.
16. Solve application problems involving linear systems using the Methods of Graphing, Substitution, and Addition including mixture and simple interest problems.
17. Solve application problems involving systems of linear inequalities in two variables using the graphing method.

Course Outcome(s):

Simplify, evaluate, and perform operations on polynomials and expressions involving exponents.

Objective(s):

1. Solve application problems using scientific notation.
2. Define polynomial, standard form, degree, coefficient, monomial, binomial, trinomial, and degree of polynomial in one variable.
3. Evaluate polynomials in several variables given values for each variable.
4. Perform addition and subtraction with polynomials in one or more variables.
5. Multiply monomial expressions.
6. Identify and use the product rule for exponents.
7. Identify and use the power-to-power rule for exponents.
8. Identify and use the products-to-powers rule for exponents.
9. Multiply monomials and polynomials.
10. Multiply two polynomials with neither being a monomial.
11. Determine the product of two general binomials.
12. Determine the product of conjugate binomials.
13. Determine the square of a binomial sum.
14. Determine the square of a binomial difference.
15. Multiply general binomials or use the special-product formulas with multiple variables.
16. Divide monomial expressions.
17. Identify and use the quotient rule for exponents.
18. Identify and use the quotients-to-powers rule.
19. Identify and use the zero-exponent rule.
20. Identify and use the negative exponent rule.
21. Divide polynomials by a monomial.
22. Simplify expressions with exponents involving multiple properties of exponents.
23. Solve applications involving polynomials.
24. Define and identify scientific notation of numbers.
25. Define and identify expanded form of numbers.
26. Perform conversions from scientific notation to decimal notation.
27. Perform conversions from decimal notation to scientific notation.
28. Use properties of exponents to perform computations with numbers in scientific notation.

Methods of Evaluation:

A. Exams

B. Quizzes

C. Homework

D. Projects

E. In class collaborative work
F. Comprehensive final exam
G. Online coursework
H. Class participation

Course Content Outline:
1. Algebraic expressions in one variable
    a. Definition of variable
    b. Definition of a term.
    c. Definition of algebraic expression
    d. Definition of like terms
    e. Addition and subtraction of like terms
    f. Properties of real numbers and expressions
    g. Order of Operations to evaluate expressions
    h. Simplify expressions.
2. Linear equations and linear inequalities
    a. Definition of linear equations
    b. Addition and Multiplication Properties of Equality
    c. Verification of solutions
    d. Order of Operations in equations
    e. Equations with fractional or decimal coefficients
    f. Equations with no solution or infinite solutions
    g. Translate phrases to equations
    h. Applications including consecutive Integer, geometry, percent and uniform motion
    i. Definition of rates, ratios, and proportions
    j. Solve proportions
    k. Applications with rates, ratios, and proportions
    l. Literal equations
    m. Addition and Multiplication Properties of Inequalities
    n. Solutions as inequality statements, set builder notation and interval notation
    o. Graph inequalities
    p. Intersection and union
    q. Compound inequalities
    r. Inequalities with infinite solutions or no solution
    s. Inequality applications
    t. Compound inequality applications
    u. Translate phrases to inequalities
3. Functions
    a. Define relation, domain, range, function
    b. Domain and range of relation and determine relation or function
    c. Evaluate algebraically and graphically
    d. Domain and range of functions
    e. Vertical line test
    f. Applications
4. Rectangular Coordinate System, equations of lines, graph lines and inequalities
    a. Rectangular Coordinate System
    b. Coordinates of points
    c. Plot ordered pairs
    d. Calculate slope
    e. Slope as a rate of change
    f. Slope-intercept form of an equation
    g. Linear functions
    h. Point-slope form of an equation
    i. Standard form of an equation
    j. Slope and equations of vertical lines
    k. Slope and equation of horizontal lines
    l. Domain and range of vertical linear relations and functions, include horizontal functions

    m. Applications of linear equations and functions
    n. Tables to graph lines
    o. Y-intercept and slope to graph lines
    p. X and y-intercepts to graph lines
    q. Parallel lines
    r. Perpendicular lines
    s. Real-world applications of linear equations and functions
    t. Graph linear inequalities
    u. Applications of linear inequalities

5. Systems of linear equations and inequalities
    a. Order pairs as solutions
    b. Solve by graphing method
    c. Graphing to identify parallel lines as inconsistent systems with no solution
    d. Graphing to identify as dependent systems with infinite solutions
    e. Graphing to identify as independent systems with unique solution
    f. Solve by substitution method
    g. Substitution Method to identify parallel lines as inconsistent systems with no solution
    h. Substitution Method to identify as dependent systems with infinite solutions
    i. Substitution Method to identify as independent systems with unique solution
    j. Solve by Addition Method include fractional and decimal coefficients
    k. Addition Method to identify parallel lines as inconsistent systems with no solution
    l. Addition Method to identify as dependent systems with infinite solutions
    m. Addition Method to identify as independent systems with unique solution
    n. Efficient methods for solving systems
    o. Systems of inequalities
    p. Applications of systems including mixture and simple interest
    q. Application of systems of inequalities

6. Simply, evaluate and operations on polynomials and expressions with exponents
    a. Define polynomials and descriptive terminology
    b. Evaluate multi-variable polynomials
    c. Addition and subtraction of polynomials
    d. Multiply monomials
    e. Exponent product rule
    f. Exponent power-to-power rule
    g. Exponents products-to-power rule
    h. Multiply monomial and polynomials
    i. Multiply polynomials, neither monomial
    j. General binomial products
    k. Product of conjugates
    l. Square of binomial sum
    m. Square of binomial difference
    n. General binomial and special-product formulas with multiple variables
    o. Divide monomials
    p. Exponent quotient rule
    q. Exponent quotient-to-power rule
    r. Zero exponent rule
    s. Negative exponents
    t. Divide polynomial by monomial
    u. Multiple properties of exponents within a problem
    v. Applications of polynomials
    w. Definition of scientific notation
    x. Definition of expanded form
    y. Scientific notation to decimal
    z. Decimal to scientific notation
    aa. Computation with scientific notation
    bb. Application of scientific notation

The Course Schedule is subject to change due to pedagogical needs, instructor discretion, parts of term, and unexpected events.

Resources for the Instructor

Blitzer, Robert. *Introductory and Intermediate Algebra for College Students*. 5th ed. Boston, MA: Pearson Education, 2017.

Rockswold, Gary and Terry Kreiger. *Beginning and Intermediate Algebra with Applications and Visualizations*. 4th ed. Boston, MA: Pearson Education, 2017.

Tussy, Alan R. and David Gustafson. *Elementary and Intermediate Algebra.* 5th ed. Belmont, CA: Cengage, 2013.

Messersmith, Sherri and Robert S. Feldman. *Beginning & Intermediate Algebra with POWER Learning.* 4th ed. New York City: McGraw-Hill Education, 2016.

Additional Resources for the Instructor
1. Software provided through publisher corresponding to textbook
2. Software and E-book

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