Portable Assisted Study Sequence

ALGEBRA IIA

SCOPE

This course is divided into two semesters of study (A & B) comprised of five units each. Each unit teaches concepts and strategies recommended for intermediate algebra students. The first half of the course (A) addresses linear equations and functions, systems of linear equations and inequalities, quadratic functions, polynomial functions and their graphs, and power functions and inverses.

SEQUENCE

UNIT 1 – Linear Equations and Functions

1. Perform operations with real numbers
2. Simplify and evaluate algebraic expressions.
3. Use linear equations to solve problems
4. Rewrite equations and formulas to solve for a given variable
5. Apply formulas in problem solving
6. Analyze problems and write equations to solve them
7. Determine when a relation is a function
8. Graph and evaluate linear functions
9. Find the slope of a line given its graph or two points on the line
10. Classify pairs of lines as parallel, perpendicular, or neither
11. Understand slope as a rate of change
12. Graph an equation using slope-intercept form
13. Graph an equation that is in standard form
14. Write an equation of a line given its slope and *y*-intercept, the slope and a point on the line, or two points on the line
15. Use an algebraic model to make a prediction given a set of data
16. Graph piecewise functions
17. Solve absolute value equations
18. Graph absolute value functions

SEQUENCE

UNIT 2 – Systems of Linear Equations and Inequalities

1. Solve linear inequalities
2. Solve absolute value inequalities in one variable
3. Graph linear inequalities
4. Write linear inequalities
5. Solve a linear system graphically
6. Determine whether a system has zero, one, or many solutions by observing the graph
7. Use the linear combination method
8. Use the substitution method
9. Determine algebraically whether a system has zero, one, or many solutions
10. Apply linear systems to realistic situations
11. Graph a system of two inequalities in two variables
12. Graph a system of three inequalities in two variables
13. Describe the difference between bounded and unbounded regions
14. Find minimum and maximum values of an objective function
15. Use linear programming to solve problems in realistic situations
16. Identify the octant in which an ordered triple is located
17. Locate an ordered triple in three-dimensional space
18. Write the ordered triple that corresponds to a given point in three-dimensional space
19. Use the linear combination method to solve a system in three variables
20. Determine whether a system has zero, one, or many solutions
21. Apply systems in three variables to realistic situations
22. State the dimensions of a given matrix and name its entries
23. Identify row, column, square, and zero matrices
24. Add and subtract matrices
25. Multiply a matrix by a scalar
26. Use matrices to represent realistic situations
27. Recognize when it is possible to multiply two matrices
28. Multiply two matrices
29. Verify the properties of matrix multiplication
30. Use matrix multiplication in realistic situations
31. Evaluate determinants of 2 x 3 and 3 x 3 matrices
32. Use the determinant of a matrix to find the area of a triangle on the coordinate plane
33. Convert a system of linear equations in two variables into a matrix equation
34. Solve a system of linear equations in two variable using a graphing calculator
35. Apply matrices to solve systems in two variables in realistic situations using a graphing calculator
36. Convert a system of linear equations in three or more variable into a matrix equation
37. Solve a system of linear equations in three of more variables using a graphing calculator
38. Apply matrices to solve systems in three or more variables in realistic situations using a graphing calculator

SEQUENCE

UNIT 3 – Quadratic Functions

1. Recognize that the graph of a quadratic function is a parabola
2. Identify the vertex and the axis of symmetry for a parabola by observing its graph
3. Determine whether a quadratic function is written in standard form, vertex form, or intercept form
4. Graph a quadratic function in standard form, vertex form, or intercept form
5. Explore some realistic applications of quadratic functions
6. Identify monomials, binomials, and trinomials, and recognize that these are all polynomials
7. Factor a trinomial of the form $x^2 + bx + c$ or $ax^2 + bx + c$
8. Recognize and factor a difference of two squares or a perfect square trinomial
9. Check to see if the terms of a given polynomial have a common monomial factor
10. Solve quadratic equations by factoring
11. Solve realistic problems using quadratic equations
12. Recognize that solutions, zeros, *x*-intercepts, and roots are all related
13. Discover that the maximum or minimum value of a quadratic function is the average of its zeros
14. Find the zeros of a quadratic function by factoring and writing the function in intercept form
15. Find the zeros of a quadratic function using a graphing calculator
16. Understand and use the properties of square roots
17. Apply the properties of square roots to solving quadratic equations
18. Verify the solutions of a quadratic equation both algebraically and by using a graphing calculator
19. Use quadratic functions to model falling objects
20. Discover that some parabolas do not cross the *x*-axis and therefore have no real solutions
21. Understand the definitions of an imaginary number, complex number, and pure imaginary number
22. Solve quadratic equations with imaginary solutions
23. Add and subtract complex numbers
24. Multiply complex numbers
25. Recognize complex conjugates and discover that the product of complex numbers is always a real number
26. Divide complex numbers
27. Explore the powers of *i* and discover a pattern
28. Simulate the process of completing the square using algebra tiles or sketches
29. Complete a perfect square trinomial and write it as the square of a binomial
30. Solve quadratic equations by completing the square
31. Write the vertex form of a quadratic function by completing the square, given the standard form
32. Find the maximum value of a quadratic function by completing the square
33. Given a graph of a quadratic function, select an equation in vertex form that represents the graph
34. Determine whether a quadratic function has two real solutions, one real solution, or two imaginary solutions by examining its graph
35. Apply the quadratic formula to solve quadratic equations with two real solutions, one real solution, or two imaginary solutions
36. Identify the discriminant of a quadratic equation and use it to determine the number and nature of the functions' solutions
37. Choose the most appropriate method for solving a quadratic equation: factoring, square roots, quadratic formula, or graphing calculator
38. Apply quadratic equations to realistic solutions
39. Review graphs of linear inequalities
40. Given a quadratic inequality and its graph, choose several points inside and outside the parabola to determine which ones satisfy the inequality
41. Match a quadratic inequality with its graph
42. Graph a quadratic inequality
43. Explore realistic applications of quadratic inequalities
44. Graph a system of quadratic inequalities
45. Solve a quadratic inequality by graphing
46. Solve a quadratic inequality algebraically
47. Explore some more realistic applications of quadratic inequalities
48. Write a quadratic function in vertex form, intercept form, and standard form given information about its graph
49. Produce a quadratic function that models a given set of data
50. Find the best-fitting quadratic model for a set of data using a graphing calculator

SEQUENCE

UNIT 4 – Polynomial Functions and Their Graphs

1. Evaluate and simplify expressions with exponents
2. Apply scientific notation to solve realistic problems
3. Identify and evaluate polynomial functions
4. Use synthetic substitution
5. Graph a polynomial function
6. Determine the end behavior of a graph
7. Add and subtract polynomials vertically and horizontally
8. Multiply polynomials
9. Apply special product patterns
10. Factor polynomial expressions using the sum or difference of cubes
11. Factor polynomials by grouping
12. Apply factoring to solve polynomial equations
13. Solve polynomial equations in realistic situations
14. Divide polynomials using long division
15. Divide polynomials using synthetic division
16. Find rational zeros of polynomial functions
17. Find rational zeros of polynomial functions with the assistance of a graphing calculator
18. State the number of solutions or zeros of a polynomial function
19. Write polynomial functions using zeros
20. Solve realistic problems using polynomial models
21. Graph a polynomial function using *x*-intercepts
22. Analyze the graph of a polynomial function

SEQUENCE

UNIT 5 – Power Functions and Inverses

1. Identify the index of a given radical
2. Evaluate the n^{th} root of real numbers using radical notation
3. Identify the number of real roots of a given real number
4. Rewrite the n^{th} roots using rational exponential notation
5. Evaluate expressions with rational exponents
6. Solve and equation using an n^{th} root
7. Use n^{th} roots and rational exponents to solve realistic problems
8. Simplify expressions using the properties of rational exponents
9. Simplify expressions using the properties of radicals
10. Write radicals in simplest form
11. Add and subtract roots and radicals
12. Identify a power function
13. Graph a power function using both paper/pencil and the graphing calculator
14. Add and subtract two functions
15. Multiply and divide two functions
16. Use function operations in a realistic situation
17. Find the composition of two functions
18. Find the inverse of a linear function numerically and algebraically
19. Graph a linear function and its inverse
20. Find the inverse of a nonlinear function
21. Graph a nonlinear function and its inverse
22. Graph the inverse of a function using the graphing calculator
23. Determine if two functions are inverses using the graphing calculator
24. Graph a square root function
25. Investigate the effect of changing *a* in a function of the form $y = a\sqrt{x}$ using a graphing calculator
26. Graph a cube root function
27. Investigate the effect of changing *a* in a function $y = a\sqrt[3]{x}$ using a graphing calculator
28. Use a radical function in a realistic situation
29. Solve a simple radical equation
30. Solve an equation with rational exponents
31. Solve an equation with one radical
32. Solve an equation with two radicals
33. Solve an equation with extraneous solution(s)