Portable Assisted Study Sequence

ALGEBRA IIB

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 second half of the course (B) addresses exponential and logarithmic functions, rational functions and their graphs, quadratic relations and conic sections, fundamentals of trigonometry, and probability and statistics.

SEQUENCE

UNIT 1 – Exponential and Logarithmic Functions

1. Investigate and compare the graphs of exponential functions
2. Learn the definitions of "exponential function" and "asymptote"
3. Graph exponential functions
4. State the domain and range of an exponential function
5. Differentiate between a "percent increase" and a "growth factor"
6. Write an equation that models an exponential function
7. Graph a model of an exponential function
8. Make predictions involving exponential functions
9. Understand compound interest and find the balance of an account at a given time
10. Differentiate between an exponential growth function and an exponential decay function
11. Graph exponential decay functions
12. Understand the meaning of "decay factor"
13. Use exponential decay functions in realistic situations
14. Discover the value of e
15. Simplify expressions involving e
16. Use a calculator to evaluate expressions involving e
17. Graph functions involving the number e.
18. State the domain and range of a function involving e.
19. Use the equations $A = Pe^{rt}$ and $A = P\left(1+\frac{r}{n}\right)^{nt}$ in realistic situations
20. Examine the difference between common logarithms and natural logarithms
21. Evaluate common and natural logarithms
22. Write an exponential equation in logarithmic form
23. Write a logarithmic equation in exponential form
24. Graph a logarithmic function
25. Investigate the effect of changing the b, h, or k in a function of the form $y = \log_b (x - h) + k$
26. Use logarithms in a realistic situation
27. Discover the properties of logarithms through investigations
28. Use the product, quotient, and power properties of logarithms
29. Expand or condense a logarithmic expression
30. Evaluate a logarithmic expression using the change-of-base formula
31. Solve an exponential equation by equating exponents
32. Solve an exponential equation by taking the logarithm of each side
33. Solve a logarithmic equation by rewriting it as an exponential equation
34. Solve a logarithmic equation involving logarithms with the same base
35. Solve a logarithmic equation with extraneous solutions
36. Write the equation of an exponential function whose graph passes through two given points
37. Decide whether an exponential function is a good model for a given set of data
38. Use exponential regression on a graphing calculator
39. Use power regression on a graphing calculator
40. Write the equation of a power function whose graph passes through two given points
41. Decide whether a power function is a good model for a given set of data
42. Recognize situations for which a logistic growth function is a good model
43. Use a graphing calculator to graph logistic growth functions and describe their shape
44. Evaluate a logistic growth function for a given value
45. Sketch the graph of a logistic growth function by using the asymptotes, the y-intercept, and the point of maximum growth
46. Solve a logistic growth equation
47. Examine the graph of a logistic growth function and describe what it reveals about the situation modeled by the graph
48. Use logistic regression on a graphing calculator to formulate a logistic growth model

SEQUENCE

UNIT 2 – Rational Functions and Their Graphs

1. Classify an equation as having direct variation, inverse variation, or neither
2. Write an inverse variation equation
3. Write an algebraic model of inverse variation to solve problems in realistic situations
4. Write a joint variation equation
5. Write a combined variation equation
6. Write an algebraic model of joint variation to solve problems in realistic situations
7. State the domain and range of a rational function
8. Graph a rational function
9. Investigate the effect of changing the numerator or denominator of a rational function
10. Write an algebraic model of a rational function to solve problems in realistic situations
11. State the domain and range of a given function
12. Graph a given function
13. Find a local minimum to solve problems in realistic situations
14. Simplify a rational expression
15. Multiply a rational expression containing monomials
16. Multiply a rational expression containing polynomials
17. Multiply a rational expression and a polynomial
18. Write a rational expression to solve problems in realistic situations
19. Divide rational expressions
20. Divide a rational expression by a polynomial
21. Combine multiplication and division to simplify rational expressions
22. Write a rational expression to solve problems in realistic situations
23. Verify numerically the results of rational expressions using a table (graphing calculator)
24. Verify graphically the results of rational expressions (graphing calculator)
25. Add rational expressions with like denominators
26. Add rational expressions with unlike denominators
27. Use addition of rational expressions to solve problems in realistic situations
28. Subtract rational expressions with like denominators
29. Subtract rational expressions with unlike denominators
30. Use subtraction of rational expressions to solve problems in realistic situations
31. Simplify a complex fraction
32. Write an equation involving complex fractions to solve problems in realistic situations
33. Determine whether a given value is a solution of a rational equation
34. Simplify and solve rational equations
35. Simplify and solve rational equations with two solutions.
36. Verify a solution of a rational equation.
37. Identify an extraneous solution.
38. Use the graph of a rational expression to determine if a solution is extraneous.
39. Solve a rational equation by cross multiplying
40. Solve a rational equation by using the least common denominator or by cross multiplying
41. Prove the results are solutions to a given rational equation
42. Identify extraneous solutions
43. Write an algebraic model of a rational expression
44. Use an algebraic model of a rational expression to solve problems in realistic situations

SEQUENCE

UNIT 3 – Quadratic Relations and Conic Sections

1. Use the distance formula to find the distance between two points
2. Use the distance formula to classify a triangle as scalene, isosceles, or equilateral
3. Find the midpoint of a line segment
4. Apply the midpoint formula to write an equation for the line that is a perpendicular bisector of a given line segment
5. Use the distance formula in a realistic situation
6. Graph a parabola
7. Identify the focus and directrix of a parabola
8. Write an equation for a parabola that opens up or down
9. Use parabolas in realistic situations
10. Write an equation of a circle in standard form given the center and radius
11. Identify the center and radius of a circle
12. Graph an equation of a circle
13. Write an equation of a circle in standard form given a point on the circle and the center
14. Write an equation of the line that is tangent to a circle at a given point
15. Use circles in realistic situations
16. Identify the vertices, co-vertices, and foci of an ellipse
17. Graph an equation of an ellipse
18. Write an equation of an ellipse in standard form given the center, vertex, and co-vertex
19. Write an equation of an ellipse in standard form given the center, vertex, and focus
20. Use ellipses in realistic situations
21. Graph an equation of a hyperbola
22. Write an equation of a hyperbola
23. Use a hyperbola in a realistic situation
24. Write an equation of a translated parabola, circle, ellipse, or hyperbola
25. Classify a conic section as a circle, parabola, ellipse, or hyperbola, given its equation
26. Graph a conic section
27. Solve a quadratic system by substitution
28. Solve a quadratic system by linear combination
29. Solve a system of quadratic models

SEQUENCE

UNIT 4 – Fundamentals of Trigonometry

1. Write the ratios of trigonometric functions
2. Evaluate trigonometric functions
3. Use trigonometry to find the length of a side of a right triangle
4. Use trigonometric functions to solve problems in realistic situations
5. Draw angles in standard position
6. Identify the quadrant in which the terminal side of an angle lies
7. Find coterminal angles
8. Convert between radian and degree measure
9. Find the arc length and area of a given sector
10. Evaluate a trigonometric function, given a point on the terminal side of an angle
11. Find a reference angle for a given angle
12. Evaluate trigonometric functions using reference angles
13. Evaluate the inverse of a trigonometric function
14. Use a trigonometric inverse to find the measure of an angle in a right triangle
15. Write and solve a trigonometric equation
16. Use inverse trigonometric functions to solve problems in realistic situations
17. Write and solve an equation using the law of sines to find the measure of a side or an angle in a triangle
18. Use the sine function to find the area of a triangle
19. Apply the sine function to solve problems in realistic situations
20. Write and solve an equation using the law of cosines to find the measure of a side or an angle in a triangle
21. Use Heron's formula to find the area of a triangle
22. Apply the law of cosines to solve problems in realistic situations
23. Graph parametric equations
24. State the domain for parametric equations
25. Write parametric equations to solve projectile problems in realistic situations
26. Identify the period and amplitude of sine and cosine functions
27. Identify the intercepts, maximum, and minimum of sine and cosine functions
28. Graph sine functions
29. Graph cosine functions
30. Identify the intercepts, asymptotes, and halfway points of tangent functions
31. Graph tangent functions
32. Graph translations of sine, cosine, and tangent functions
33. Graph reflections of sine, cosine, and tangent functions
34. Use a combination of a translation and a reflection to graph a sine, cosine, or tangent function
35. Find values of trigonometric functions using trigonometric identities
36. Simplify trigonometric expressions using trigonometric identities
37. Verify trigonometric identities
38. Solve a trigonometric equation in a given interval
39. Apply factoring to solve a trigonometric equation
40. Use the quadratic formula to solve trigonometric equations
41. Identify an extraneous solution of a trigonometric equation
42. Write a trigonometric function for a sinusoid
43. Use given data to graph a sinusoid
44. Apply sinusoidal regression to graph a model of data on a graphing calculator
45. Use the sum or difference of angles to simplify trigonometric expressions
46. Use the sum or difference of angles to evaluate trigonometric expressions
47. Use the double- and half-angle formulas to evaluate trigonometric expressions
48. Use the double- and half-angle formulas to simplify trigonometric expressions
49. Use the double- and half-angle formulas to verify a trigonometric identity
50. Use the double- and half-angle formulas to solve a trigonometric equation

SEQUENCE

UNIT 5 – Probability and Statistics

1. Use measures of central tendency and measures of variance to describe data sets
2. Use box-and-whisker plots and histograms to represent data graphically
3. Use the graphing calculator to find measures of central tendency
4. Use the graphing calculator to draw a histogram or box-and-whisker plot
5. Use the fundamental counting principle to count the number of ways an event can occur
6. Use permutations to count the number of ways an event can occur
7. Use combinations to count the number of ways an event can occur
8. Solve realistic problems using combinations
9. Find the theoretical probability that an event will occur
10. Use permutations or combinations to find the probability that an event will occur
11. Find the experimental probability of an event occurring
12. Use geometric probabilities to find the probability that a length, area, or volume could occur in a given situation
13. Find the probability of mutually exclusive events
14. Find the probability of compound events
15. Use the intersection of two sets to find the probability of an event
16. Use complements to find the probability of an event
17. Use complements in realistic situations
18. Find the probability of two or three independent events
19. Compare dependent and independent events
20. Find the probability of dependent events
21. Use a tree diagram to find conditional probabilities
22. Identify probability experiments that are binomial experiments
23. Find the binomial probability of an event
24. Construct a histogram, given a binomial distribution
25. Given a normal distribution, calculate the probability that an event will occur
26. Use a normal distribution to solve a realistic situation
27. Interpret the histogram of a binomial distribution