

Chapter 1: Numbers [Prerequisite Chapter] (17 topics)

1. *Integers (3 topics)*
 - a. Calculating with integers
 - b. Integers
 - c. Division of integers
2. *Negative numbers (1 topic)*
 - a. Absolute value
3. *Fractions (7 topics)*
 - a. Fractions
 - b. Equivalent fractions
 - c. Simplifying fractions
 - d. Addition and subtraction of fractions
 - e. Multiplication and division of fractions
 - f. Integer powers of fractions
 - g. Decimal numbers
4. *Powers and roots (6 topics)*
 - a. Exponents
 - b. Calculating with powers
 - c. Roots of integers
 - d. Roots of fractions
 - e. Standard notation of higher roots
 - f. Order of operations for powers and roots

Chapter 2: Algebra [Prerequisite Chapter] (28 topics)

1. *Variables (6 topics)*
 - a. Variables
 - b. Sum and product of variables
 - c. Substitution
 - d. Simplification of multiplications
 - e. Simplification of additions and subtractions
 - f. Simplification with algebraic rules
2. *Calculating with exponents and roots (7 topics)*
 - a. Integer powers
 - b. Rules for calculating with integer exponents
 - c. Square roots
 - d. Rules for calculating with square roots
 - e. Higher degree roots
 - f. Calculating with fractional exponents
 - g. Order of operations
3. *Expanding brackets (2 topics)*
 - a. Expanding single brackets
 - b. Expanding double brackets

4. *Factorization (2 topics)*
 - a. Factorization
 - b. Product sum method
5. *Notable products (2 topics)*
 - a. The square sum of a sum or a difference
 - b. The difference of two squares
6. *Adding and subtracting fractions (9 topics)*
 - a. Fractions with variables
 - b. Similar fractions
 - c. Simplifying fractions
 - d. Addition and subtraction of like fractions
 - e. Making fractions similar
 - f. Addition and subtraction of fractions
 - g. Multiplication of fractions
 - h. Division of fractions
 - i. Fraction decomposition

Chapter 3: Linear formulas and equations [Prerequisite Chapter] (17 topics)

1. *Formulas (3 topics)*
 - a. Formulas
 - b. Dependent and independent variables
 - c. Graph of a formula
2. *Linear functions (6 topics)*
 - a. Linear formulas
 - b. Slope
 - c. Determining the slope from two points
 - d. Intercept
 - e. Composing a linear formula
 - f. Parallel and intersecting linear formulas
3. *Linear equations and inequalities (8 topics)*
 - a. Linear equations
 - b. Equivalent linear equations
 - c. The general solution of a linear equation (rules of reduction)
 - d. Intersection points of linear formulas with the axes
 - e. Intersection point of two linear formulas
 - f. Linear inequalities
 - g. Equivalent inequalities
 - h. General solution of a linear inequality

Chapter 4: System of linear equations [Prerequisite Chapter] (10 topics)

1. *An equation of a line (4 topics)*
 - a. A linear equation with two unknowns

- b. Solution of linear equations with two unknowns (rules of reduction)
- c. The equation of a line
- d. Composing the equation of a line
- 2. *Two equations with two unknowns (6 topics)*
 - a. Systems of linear equations
 - b. Solving systems of linear equations by substitution
 - c. Solving systems of equations by elimination
 - d. Consistent systems of linear equations
 - e. Inconsistent systems of linear equations
 - f. Dependent systems of linear equations

Chapter 5: Quadratic equations (21 topics)

- 1. *Parabola (3 topics)*
 - a. Quadratics
 - b. Parabola
 - c. Plotting the graph of the quadratic
- 2. *Solving quadratic equations (7 topics)*
 - a. Quadratic equations with two solutions
 - b. Quadratic equations with one solution
 - c. Quadratic equations with no solutions
 - d. Solving quadratic equations by factorization
 - e. Solving quadratic equations by completing the square
 - f. The quadratic formula and the discriminant
 - g. Solving quadratic equations using the quadratic formula
- 3. *Drawing parabolas (7 topics)*
 - a. Intersection of parabolas with the axes
 - b. Vertex of a parabola
 - c. Determining the vertex by completing the square
 - d. Determining the vertex by substitution
 - e. Drawing of parabolas
 - f. Transformations of parabolas
 - g. Multiple transformations of parabolas
- 4. *Intersection points of parabolas (2 topics)*
 - a. Intersection points of a parabola with a line
 - b. Intersection points of parabolas
- 5. *Quadratic inequalities (2 topics)*
 - a. Quadratic inequalities
 - b. Solving a quadratic inequality

Chapter 6: Functions (40 topics)

- 1. *Domain and range (6 topics)*
 - a. Function and formula

- b. Function rule
 - c. Intervals
 - d. Domain
 - e. Limited domain
 - f. Range
2. *Power functions (4 topics)*
- a. Power functions
 - b. Transformations of power functions
 - c. Multiple transformations of power functions
 - d. Equations with power functions
3. *Higher degree polynomials (7 topics)*
- a. Polynomials
 - b. The leading coefficient
 - c. Equations with polynomials
 - d. Solving higher degree polynomials by factoring out
 - e. Solving higher degree polynomials with factorization
 - f. Solving higher degree polynomials with the quadratic equation
 - g. Higher degree inequalities
4. *Root functions (7 topics)*
- a. Root functions
 - b. Transformations of root functions (upwards, to the right, and relative to the x-axis)
 - c. Multiple transformations of root functions
 - d. Root equations
 - e. Solving root equations with substitution
 - f. Inverse functions
 - g. Determining the inverse function
5. *Fractional functions (11 topics)*
- a. Asymptotes and hyperbolas
 - b. Power functions with negative exponents
 - c. Transformations of power functions with negative exponents (upwards, to the right, and relative to the x-axis)
 - d. Linear fractional functions
 - e. Determining asymptotes of a linear fractional function
 - f. Linear fractional equations
 - g. Solving linear fractional equations by cross multiplication
 - h. Inverse of linear fractional functions
 - i. Isolating a variable when determining the inverse
 - j. Quotient functions
 - k. Perforation
6. *Limits and asymptotes (5 topics)*
- a. The concept of a limit
 - b. Limits in connection with asymptotes
 - c. Horizontal asymptotes

- d. Vertical asymptotes
- e. Diagonal asymptotes

Chapter 7: Exponential functions and logarithms (14 topics)

1. *Exponential functions (3 topics)*
 - a. The exponential function
 - b. Exponential equations
 - c. Transformations of the exponential function (upwards, to the right, and relative to the y-axis)
2. *Logarithmic functions (11 topics)*
 - a. The logarithmic function
 - b. Logarithmic equations
 - c. Exponential equations
 - d. Isolating variables
 - e. Rules for solving logarithms
 - f. Solving logarithmic equations with calculation rules and the quadratic formula
 - g. Change of base
 - h. Solving logarithmic equations using substitution
 - i. Solving exponential equations using substitution
 - j. Graph of logarithmic functions
 - k. Transformations of the logarithmic function (upwards, to the right, and relative to the x-axis)

Chapter 8: Differentiation (34 topics)

1. *The derivative (6 topics)*
 - a. The difference quotient
 - b. The difference quotient at a point
 - c. The difference quotient on an interval of length h
 - d. The tangent line
 - e. Finding the slope using the difference quotient
 - f. Calculating the derivative of a function
2. *The derivative of power functions (4 topics)*
 - a. The derivative of power functions
 - b. The power rule
 - c. The derivative of the root
 - d. The power rule with a constant
3. *Sum and product rule (4 topics)*
 - a. The constant rule
 - b. The sum rule
 - c. The product rule
 - d. The derivative of a product
4. *Chain rule (2 topics)*
 - a. Composite functions

- b. The chain rule
- 5. *The derivative of standard functions (8 topics)*
 - a. The derivative of sine
 - b. The derivative of cosine
 - c. The derivative of tangent
 - d. The base e
 - e. The natural logarithm
 - f. The derivative of exponential functions
 - g. The derivative of logarithms
 - h. The derivative of the natural logarithm
- 6. *The quotient rule (1 topic)*
 - a. The quotient rule
- 7. *Applications of derivatives (9 topics)*
 - a. Determining the interval at which a function increases/decreases
 - b. Extreme values: local maxima and minima
 - c. Extreme values on a restricted domain
 - d. Global maxima and minima
 - e. Calculating extreme values
 - f. The second derivative
 - g. Types of increasing and decreasing
 - h. Inflection points
 - i. Higher order derivatives

Chapter 9: Trigonometry (27 topics)

- 1. *Angles with sine, cosine, and tangent (16 topics)*
 - a. Angles
 - b. Right-angled triangles
 - c. The sum of the three angles of a triangle
 - d. Pythagorean theorem
 - e. Sine in a right-angled triangle
 - f. Cosine in a right-angled triangle
 - g. Tangent in a right-angled triangle
 - h. The unit circle
 - i. Angles in radians
 - j. Large and negative angles
 - k. Symmetry in the unit circle
 - l. Special values of trigonometric functions
 - m. Addition formulas for trigonometric functions
 - n. Double-angle formulas
 - o. Law of sines
 - p. Law of cosines
- 2. *Trigonometric functions (11 topics)*
 - a. The sine function

- b. The cosine function
- c. The tangent function
- d. Equilibrium, period and amplitude
- e. Transformations of trigonometric functions (upwards, to the right, and relative to the x-axis)
- f. Inverse function of sine
- g. Inverse function of cosine
- h. Inverse function of tangent
- i. Properties of the arcsin
- j. Properties of the arccos
- k. Properties of the arctan

Chapter 10: Geometry (20 topics)

- 1. *Lines (4 topics)*
 - a. Different descriptions of a line
 - b. Angles between lines
 - c. Perpendicular lines
 - d. Distance point and line
- 2. *Circles (5 topics)*
 - a. Different descriptions of a circle
 - b. Intersections of a line and a circle
 - c. Tangent line to a circle
 - d. Intersection of circles
 - e. Distance to a circle
- 3. *Parametric Curves (6 topics)*
 - a. Parametric curves
 - b. Lissajous figures
 - c. Vectors
 - d. Length of vectors
 - e. Vectors and parametric equations
 - f. Derivatives of parametric curves
- 4. *More geometry (5 topics)*
 - a. Some notions on lines
 - b. Different descriptions of a circle
 - c. Calculations with circles
 - d. Some notions on triangles
 - e. Calculations with triangles

Chapter 11: Integration (23 topics)

- 1. *Antiderivatives (7 topics)*
 - a. The antiderivative of a function/the indefinite integral
 - b. The constant of integration

- c. The antiderivative of a power function
- d. Sum rule for finding antiderivatives
- e. Constant rule for finding antiderivatives
- f. Antiderivatives of known functions
- g. Antiderivatives and the chain rule

2. *The definite integral (8 topics)*

- a. The definite integral
- b. Area
- c. Calculating the area of an enclosed domain
- d. Calculating the area of a surface between curves
- e. Solid of revolution
- f. The volume of a solid of revolution
- g. The volume of a solid of revolution between two graphs
- h. The volume of a solid of revolution around the y-axis

3. *Integration techniques (8 topics)*

- a. Substitution method
- b. Trigonometric integrals
- c. Integration by parts
- d. Repeated integration by parts
- e. Repeated integration by parts using reduction
- f. Known antiderivatives of some quotient functions
- g. Long division with polynomials
- h. Finding the antiderivatives of quotient functions