MATHEMATICS

Basic Mathematics (A-Level)

Part 01 – Pure Mathematics
01. Algebra (Part-1)
1. Background Algebra
2. Linear Equations
3. Changing the Subject of a Formula
4. Quadratic Equations
5. Solving Quadratic Equations
6. Equations That Cannot be Factorized
7. The Graph of Quadratic Functions
8. The Quadratic Formula
9. Simultaneous Equations
10. Inequalities
02. Algebra (Part-2)
1. Operations with Polynomials
2. Solution of Polynomial Equations
3. The Modulus Function
03. Further Algebra (Part-3)
1. The General Binomial Expansion
2. Review of Algebraic Functions
3. Partial Functions
4. Using Partial Fractions with The Binomial Expansion
04. Co-Ordinate Geometry (Part-1)
1. Co-Ordinates
2. Plotting, Sketching and Drawing
3. The Gradient of a Line
4. The Distance Between Two Points
5. The Mid-Point of a Line Joining Two Points
6. The Equations of a Straight Line
7. Finding The Equations of a Line
8. The Intersection of Two Lines
9. Drawing Curves
10. The Intersection of a Line and a Curve
05. Sequences and Series (Part-1)
1. Definitions and Notation
2. Arithmetic Progressions
3. Geometric Progressions
4. Binomial Expansions
06. Functions (Part-1)
1. The Language of Functions
2. Composite Functions
3. Inverse Functions
07. Differentiation (Part-1)
1. The gradient of a Curve
2. Finding the Gradient of a Curve
3. Finding the Gradient From First Principles
4. Differentiation By Using Standard Results
5. Using Differentiation
6. Tangents and normal
7. Maximum and Minimum Points
8. Increasing and Decreasing Functions
9. Points of Inflection
10. The Second Derivative
11. Applications
12. The Chain Rule
08. Differentiation (Part-2)
1. The Product Rule
2. The Quotient Rule
3. Differentiating Natural Logarithms And Exponentials
4. Differentiating Trigonometrical Functions
5. Differentiating Functions Defined Implicitly
6. Parametric Equations
7. Parametric Differentiation

09. Differential Equations (Part-3)
1. Forming Differential Equations From Rates of Change
2. Solving Differential Equations
10. Integration (Part-1)
1. Reversing Differentiation
2. Finding The Area Under a Curve
3. Area as the Limit of a Sum
4. Areas Below the X Axis
5. The Area Between Two Curves
6. The Area Between A Curve and The Y Axis
7. The Reverse Chain Rule
8. Improper Integrals
9. Finding Volumes By Integration
11. Integration (Part-2)
1. Integrals Involving The Exponential Function
2. Integrals Involving The natural Logarithm Function
3. Integrals Involving Trigonometrical Function
4. Numerical Integration
12. Further Integration (Part-3)
1. Integration By Substitution
2. Integrals Involving Exponentials And Natural Logarithms
3. Integrals Involving Trigonometrical Functions
4. The Use of Partial Fractions in Integration
5. Integration By Parts
6. General Integration
13. Trigonometry (Part-1)
1. Trigonometry Background
2. Trigonometrical Functions
3. Trigonometrical Functions for Angles of Any Size
4. The Sine and Cosine Graphs
5. The Tangent Graph
6. Solving Equations Using Graphs of Trigonometrical Functions
7. Circular Measure
8. The Length of An Art of A Circle
9. The Area of A Sector of A Circle
10. Other Trigonometrical Function
14. Trigonometry (Part-2)
1. Reciprocal Trigonometrical Functions
2. Compound-Angle Formulae
3. Double-Angle Formulae
4. The Forms - r cos(), r sin()
5. The General Solutions of Trigonometrical Equations
15. Vector (Part-1)
1. Vectors in Tow Dimensions
2. Vectors in Three Dimensions
3. Vector Calculations
4. The Angle Between Two Vectors
16. Vectors (Part-2)
1. The Vector Equation of a Line
2. The Intersection of Two Lines
3. The Angle Between Two Lines
4. The Perpendicular Distance From A Point to A Line
5. The Vector Equation of A Plane
6. The Intersection of A Line and A Plane
7. The Distance of A Point From A Plane
8. The Angle Between A Line and A Plane
9. The Intersection of Two Planes
17. Logarithms And Exponentials (Part-2)
1. Logarithms
2. Exponential Functions
3. Modeling Curves
4. The Natural Logarithm Function
5. The Exponential Function
18. Numerical Solution of Equations (Part-2)
1. Interval Estimation – Change-of-sign Methods
2. Fixed-Point Iteration
19. Complex Numbers (Part-3)

1. The Growth of The Number System
2. Working with Complex Numbers
3. Representing Complex Numbers Geometrically
4. Sets of Points in An Argand Diagram
5. The Modulus-Argument Form of Complex Numbers
6. Sets of Points Using The Polar Form
7. Working with Complex Numbers in Polar Form
8. Complex Exponents
9. Complex Numbers and Equations

Part 02 – Statistics 1

01. Exploring Data

1. Looking at The Data
2. Stem-and –Leaf Diagrams
3. Categorical or Qualitative Data
4. Numerical or Quantitative Data
5. Measures of Central Tendency
6. Frequency Distributions
7. Grouped Data
8. Measures of Spread (Variation)
9. Working with An Assumed Mean

02. Representing and Interpreting Data

1. Histograms
2. Measures of Central Tendency and of Spread Using Quartiles
3. Cumulative Frequency Curves

03. Probability

1. Measuring Probability
2. Estimating Probability
4. Expectation
5. The Probability of Either One Event or Another
6. Independent and Dependent Events
7. Conditional Probability

04. Discrete Random Variables

1. Discrete Random Variables
2. Expectation and Variance

05. Permutations and Combinations

1. Factorials
2. Permutations
3. Combinations
4. The Binomial Coefficients
5. Using Binomial Coefficients to Calculate Probabilities

06. The Binomial Distribution

1. The Binomial Distribution
2. The Expectation and Variance of B(n, p)
3. Using The Binomial Distribution

07. The Normal Distribution

1. Using Normal Distribution Tables
2. The Normal Curve
4. Modelling Discrete Situations
5. Using The Normal Distribution As An Approximation for The Binomial Distribution

Part 17 – Statistic 2

08. Hypothesis Testing Using The Binomial Distribution

1. Defining Terms
2. Hypothesis Testing Checklist
3. Choosing The Significance Level
4. Critical Values and Critical (Rejection) Regions
5. One-Tail And Tow-Tail Tests
6. Type 1 and Type 2 Errors

09. The Poisson Distribution

1. The Poisson Distribution
2. Modelling with A Poisson Distribution
3. The Sum of Two or More Poisson Distributions
4. The Poisson Approximation to The Binomial Distribution
5. Using The Normal Distribution As An Approximation for The Poisson Distribution

10. Continuous Random Variables
1. Probability Density Function
2. Mean And Variance
3. The Median
4. The Mode
5. The Uniform (rectangular) Distribution
11. Linear Combinations of Random Variables
1. The Expectation (Mean) of A Function of X E(g[X])
2. Expectation: Algebraic Results
3. The Sums and Differences of Independent Random Variables
4. More Than Two Independent Random Variables
12. Sampling
1. Terms and Notation
2. Sampling
3. Sampling Techniques
13. Hypothesis Testing And Confidence Intervals Using The Normal Distribution
1. Interpreting Sample Data Using The Normal Distribution
2. The Central Limit Theorem
3. Confidence Intervals
4. Confidence Intervals
5. How Large A Sample Do You Need
6. Confidence Intervals For A Proportion