

# M|P|W

## Birmingham

### AS and A2 Level Course Outlines

#### Mathematics

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This course is split into three parts. The first part covers the following topics that are common to all specifications but students should check carefully that sessions are relevant to their own particular studies:

**Topic 1 (AS) – Core Mathematics:** Indices and Surds, Quadratic functions, Equations and Inequalities, Factor and Remainder Theorems, Coordinate Geometry of the Line and Circle, Curve Sketching, Transformations of Graphs.

**Topic 2 (AS) – Core Mathematics:** Arithmetic and Geometric sequences and series, the Binomial Expansion, Exponentials and Logarithms, Trigonometry.

**Topic 3 (AS) – Core Mathematics:** Differentiation including tangents, normals, stationary points, increasing and decreasing functions; Integration including interpretation as an area under a curve and the Trapezium rule.

**Topic 4 (A2) – Core Mathematics:** Algebraic fractions and division, Partial fractions, the Binomial Expansion, Iterative Methods, Exponentials and Logarithms, Differentiation including the chain, product and quotient rules, Implicit and Parametric differentiation.

**Topic 5 (A2) – Core Mathematics:** Trigonometry including the Pythagorean Identities, the Addition formulae and the Double Angle formulae; Functions including domain and range, composite, inverse and modulus functions.

**Topic 6 (A2) – Core Mathematics:** Integration including methods by substitution, by partial fractions, by parts, by use of trigonometric identities, application to differential equations; Vectors including lines and scalar products.

These next topics have been selected to match the Edexcel specification only:

**Topic 7 (AS) – Edexcel Mechanics:** Motion in a Straight Line with constant acceleration using the equations of motion. Velocity-time graphs, the use of Vectors in Mechanics, Moments, Impulse and Momentum.

**Topic 8 (AS) – Edexcel Mechanics:** Statics of a particle, Equilibrium of a particle under the action of forces such as weight, normal reaction, tension and friction, coefficient of friction, Newtons laws of motion, Dynamics of a particle including motion of two connected particles

**Topic 9 (AS) – Edexcel Statistics:** Representation of data including histograms, box plots and stem and leaf diagrams; Measures of central location including mean, median and mode; Measures of dispersion including variance, standard deviation and ranges, skewness and outliers; Correlation and Regression.

**Topic 10 (AS) – Edexcel Statistics:** Probability including sum and products laws, conditional probabilities, independent and mutually exclusive events, Venn and tree diagrams; Discrete random variables, the Normal distribution

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The following topics have been selected to match the AQA specification only:

**Topic 11 (AS) – AQA Mechanics:** Motion in a Straight Line with constant acceleration using the equations of motion. Velocity-time graphs, the use of Vectors in Mechanics, Resultant velocity and vector triangles, Projectiles, Momentum.

**Topic 12 (AS) – AQA Mechanics:** Statics of a particle, Equilibrium of a particle under the action of forces such as weight, normal reaction, tension and friction, the coefficient of friction, Newtons laws of motion, Dynamics of a particle including motion of two connected particles.

**Topic 13 (AS) – AQA Statistics:** Measures of central location including mean, median and mode; Measures of dispersion including variance, standard deviation and ranges, Correlation and Regression, the Binomial Distribution.

**Topic 14 (AS) – AQA Statistics:** Probability including sum and products laws, conditional probabilities, independent and mutually exclusive events, Venn and tree diagrams, the Normal distribution, the Sampling Distribution of the Mean including the Central Limit Theorem, Confidence Intervals.

Other topics areas can be catered for – please contact us for details.