# MATHS LEARNING JOURNEY

## Y7

ALGEBRAIC NOTATION & SUBSTITUTION, SEQUENCES (DIAGRAMS & NUMBERS

SOLVE ONE STEP EQUATIONS & SIMPLIFYING, PLACE VALUE

ORDERING INTEGERS, DECIMALS & FRACTIONS, POWERS OF 10, USING NUMBER SKILLS

FRACTIONS & PERCENTAGES OF AMOUNTS, DIRECTED NUMBER

CALCULTING WITH FRACTIONS & MIXED NUMBERS, CONSTRUCTING

USING ANGLE FACTS, SETS & VENN DIAGRAMS

PROBABILTY, TYPES OF NUMBERS, CONJECTURES

## Y8

RATIO & SCALE, PROPORTION, MULTIPLY & DIVIDE FRACTIONS

STRAIGHT LINE GRAPHS, SCATTER GRAPHS, FRACTIONS & PERCENTAGES

PROBABILTY, EXPAND & FACTORISE, SOLVE EQUATIONS, NTH TERM

INDICES, STANDARD FORM, ANGLE PROBLEMS

NUMBER SENSE, AREA OF TRAPEZIUM AND CIRCLES

DATA, SYMMETRY, MEASURES OF LOACTION & COMPARISONS

## Y9

EQUATIONS, CONJECTURES, STRAIGHT LINE GRAPHS

3D SHAPES, NUMBER PROBLEMS, CONSTRUCTIONS & CONGRUENCE

PERCENTAGES, DEDUCTION, MATHS & MONEY

ROTATIONS & TRANSLATIONS, PYTHAGORAS' THEOREM

RATIO & PROPORTION, ENLARGEMENTS & SIMILARITY

RATES, PROBABILTY, ALGEBRAIC REPRESENTATION

## Y10

NON-CALCULATOR METHODS, INDICES & ROOTS, CIRCLES

EQUATIONS, INEQUALITIES, DATA, EXPAND & FACTORISE

ANGLES & BEARINGS, TRANSFORMATIONS, PERCENTAGES

CONGRUENCY, SIMILARITY & ENLARGEMENT, RATIO & FRACTIONS

PROBABILITY, REARRANGING FORMULAE

TRIGONOMETRY, MULTIPLICATIVE RELATIONSHIPS

## Y11

COLLECTING AND USING DATA LOCI

USING DATA, CONSTRUCTIONS, SEQUENCES, LINEAR GRAPHS

EXPRESSIONS, TRIGONOMETRY, SIMULTANEOUS EQUATIONS

VECTORS, NON-LINEAR GBRAPHS, FUNCTIONS, USING GRAPHS

REVISION AND EXAM PREPARATION

# YEAR 7 MATHS LEARNING JOURNEY

Y7

ALGEBRAIC NOTATION

SUBSTITUTION INTO EXPRESSIONS

SEQUENCES WITH DIAGRAMS

SEQUENCES WITH NUMBERS

SOLVING ONE STEP EQUATIONS

SIMPLIFYING ALGEBRAIC EXPRESSIONS

PLACE VALUE

ORDERING INTEGERS AND DECIMALS

POWERS OF 10: MULTIPLY AND DIVIDE

ORDER FRACTIONS & DECIMALS

PROBLEM SOLVING: ADDITION & SUBTRACTION

PROBLEM SOLVING: MULTIPLICATION & DIVISION

FRACTIONS & PERCENTAGES OF A QUANTITY

CALCULTING WITH DIRECTED NUMBERS

CALCULATING WITH FRACTIONS & MIXED NUMBERS

MEASURING AND CONSTRUCTING

KNOW AND USE ANGLE FACTS

USE KNOWN FACTS TO DERVIVE OTHER FACTS

SETS AND VENN DIAGRAMS

PROBABILTY AND SAMPLE SPACES

IDENTIFY DIFFERENT TYPES OF NUMBERS

MAKE AND USE CONJECTURES

# YEAR 8 MATHS LEARNING JOURNEY

Y8

RATIO

MULTIPLICATIVE RELATIONSHIPS

DIRECT PROPORTION

MULTIPLYING FRACTIONS

DIVIDING FRACTIONS

LINEAR GRAPHS

EQUATION OF A LINE

SCATTER GRAPHS

FREQUENCY TABLES

FRACTIONS AND PERCENTAGES

TABLES AND PROBABILTY

EXPANDING AND FACTORISING

FORM AND SOLVE EQUATIONS

SEQUENCES AND NTH TERM

INDICES

STANDARD FORM

ANGLES AND PARALLEL LINES

ANGLES IN POLYGONS

NUMBER SENSE

AREA OF A TRAPEZIUM & CIRCLES

HANDLING DATA

SYMMETRY

MEASURES OF LOCATION

COMPARING DISTRIBUTIONS

# YEAR 9 MATHS LEARNING JOURNEY

Y9

ONE AND TWO STEP EQUATIONS

ONE AND TWO STEP INEQUALITIES

TESTING CONJECTURES

STRIAGHT LINE GRAPHS

NETS, PLANS AND ELEVATIONS

SURFACE AREA & VOLUME

PROBLEM SOLVING: INTEGERS AND DECIMALS

CALCULATING WITH FRACTIONS

LOCI & CONSTRUCTIONS

CONGRUENT SHAPES

PERCENTAGES PROBLEMS

DEDUCTION

MATHS AND MONEY

ROTATION

TRANSLATION

PYTHAGORAS' THEOREM

RATIO

PROPORTION

ENLARGEMENT

SIMILARITY

RATES

PROBABILTY: EXPECTED OUTCOME

INDEPENDENT PROBABILITY

ALGEBRAIC REASONING

# YEAR 10 MATHS LEARNING JOURNEY

Y10

NON CALCULATOR METHODS

ACCURACY

INDICES AND ROOTS

WORKING WITH CIRCLES

FORM AND SOLVE EQUATIONS

FORM AND SOLVE INEQUALITIES

CALCULATING AVERAGES

EXPANDING EXPRESSIONS

FACTORISING EXPRESSIONS

CALCULATING ANGLES

WORKING WITH BEARINGS

SYMMETRY AND TRANSLATIONS

ENLARGEMENT

CALCULTING PERCENTAGES

PERCENTAGE PROBLEMS

USING RATIOS AND FRACTIONS

INDEPENDENT PROBABILTY

DEPENDENT PROBABILITY

CHANGING THE SUBJECT

TRIGONOMETRY

DIRECT PROPORTION

INVERSE PROPORTION

REPRESENTING DATA

INTERPRETING DATA

CONSTRUCTIONS

LOCI

# YEAR 11 MATHS LEARNING JOURNEY

Y11

REPRESENTING DATA

INTERPRETING DATA

CONSTRUCTIONS

LOCI

ARITHMETIC SEQUENCES

OTHER SEQUENCES

LINEAR GRAPHS

EQUATION OF A STRAIGHT LINE

ALGEBRAIC EXPRESSIONS

PYTHAGORAS AND TRIGONOMTERY

SIMULTABEOUS EQUATIONS (GRAPHICALLY)

SIMULTANEOUS EQUATIONS (ALGEBRAICALLY)

VECTORS

USING VECTORS

NON-LINEAR GRAPHS

FUNCTIONS

REAL LIFE GRAPHS

USING GRAPHS

EXAM PREPARATION

# A LEVEL MATHS LEARNING JOURNEY

## Y12

**Basic Algebra**
**Surds & Indices**
CLICK TO ADD SUB TOPIC INFO

**Polynomials & Graphs**
**Coordinate Geometry**
CLICK TO ADD SUB TOPIC INFO

**Data processing & interpretation**
**Kinematics: constant acceleration**
CLICK TO ADD SUB TOPIC INFO

**Binomial Expansion**
**Trigonometry**
CLICK TO ADD SUB TOPIC INFO

**Probability**
**Vectors in 2D**
CLICK TO ADD SUB TOPIC INFO

**Statistical distributions**
**Differentiation**
CLICK TO ADD SUB TOPIC INFO

**Integration**
**Forces & Newton's Laws**
CLICK TO ADD SUB TOPIC INFO

**Exponentials & Logarithms**
**Kinematics: variable acceleration**
CLICK TO ADD SUB TOPIC INFO

## Y13

**Algebraic & partial fractions**
**Proof**
CLICK TO ADD SUB TOPIC INFO

**Functions**
**More trigonometry**
CLICK TO ADD SUB TOPIC INFO

**Sampling & Hypothesis**
**Testing**
CLICK TO ADD SUB TOPIC INFO

**Regression & Hypothesis Testing**
**Forces & friction**
CLICK TO ADD SUB TOPIC INFO

**Sequences & series**
**More differentiation**
CLICK TO ADD SUB TOPIC INFO

**Binomial Expansion**
**Moments**
CLICK TO ADD SUB TOPIC INFO

**Probability**
**Parametric Equations**
CLICK TO ADD SUB TOPIC INFO

**More integration**
**Vectors in 3D**
CLICK TO ADD SUB TOPIC INFO

**Normal Distribution**
**Kinematics in 2D**
CLICK TO ADD SUB TOPIC INFO

**Differential Equations**
**Numerical methods**
CLICK TO ADD SUB TOPIC INFO

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# YEAR 12 MATHS LEARNING JOURNEY

Y12

## Basic Algebra
Quadratic and simultaneous equations. Inequalities.

## Surds & Indices
Rules for indices. Simplifying with surds. Rationalising.

## Polynomials & Graphs
Algebraic division. Factor theorem. Graphs of polynomials and transformations.

## Coordinate Geometry
Distances, midpoints, gradients, lines and circles.

## Data processing & interpretation
Statistical diagrams. Averages and measures of spread. Comparisons of data. Large data set.

## Kinematics: constant acceleration
Travel graphs, constant acceleration formulae and vertical motion under gravity.

## Binomial Expansion
Expansion of $(a+b)^n$ where n is a positive integer.

## Trigonometry
Common graphs. Equations. Sine and cosine rules. Identities and proof.

## Probability
Tree diagrams, Venn diagrams. Independent events. Mutually exclusive events.

## Vectors in 2D
Definitions. Magnitude and direction of vectors. Geometrical problems. Links to mechanics.

## Statistical Distributions
Discrete distributions and associated probabilities. The binomial distribution and conditions for its use.

## Differentiation
Basic definitions. 1st principles. Gradients on curves. Tangents, normals and stationary points. Rates of change.

## Exponentials & Logarithms
Definitions. Graphs of the form $y = a^x$. Logarithmic and exponential equations. Reduction to a linear form.

## Kinematics: variable acceleration
Use of differentiation and integration in displacement/ velocity/acceleration problems.

## Sampling & Hypothesis Testing
Sampling techniques and their strengths and weaknesses. Hypothesis testing with the binomial distribution.

## Integration
Introduction as reverse of differentiation. Areas under curves.

## Forces & Newton's Laws
Force diagrams. Resultant forces. Newton's laws of motion. Connected particles including lifts, pulleys and towing.

## AS revision
Full focus on revision for the summer exams.

## More Trigonometry
Radians. Sectors and arcs. Small angle approximations. Sec, cosec and cot functions. Addition and double angle formulae. Related problems.

## Functions
Domain, range, composite and inverse functions. Modulus functions. Combined transformations.

## Proof
Conjecture and counter-examples. Proof by deduction, exhaustion or contradiction.

ES 6TH FORM

## Algebraic & partial fractions
Proper and improper fractions. Separating into partial fractions.

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# YEAR 13 MATHS LEARNING JOURNEY

Y13

## Regression, Correlation & Hypothesis Testing

Linear and non-linear regression. Measuring correlation. Hypothesis testing for zero correlation.

## Forces & friction

Resolving forces. Forces on inclined planes. Friction. Applications.

## Sequences & series

Arithmetic and geometric series. Infinite series. Recurrence relations. Periodic sequences.

## More differentiation

Chain Rule, product and quotient rules. Trigonometric, exponential and log differentiation. Implicit functions. Inflection. Related rates of change.

## Probability

Set notation. Conditional probability. Use of standard formulae and/or Venn diagrams and two-way tables.

## Parametric Equations

Definitions. Cartesian and parametric forms. Geometrical problems. Differentiation.

## Binomial Expansion

Expansion of $(a+b)^n$ where n is rational or negative. Links with partial fractions.

## Moments

Definition as the turning effect of a force. Uniform or non-uniform beams. Ladders.

## More integration

Standard functions including trig, exponential and log integrals. Substitution, parts, inspection, partial fractions, parametric integration and the trapezium rule.

## Vectors in 3D

Extension of Yr12 work on 2D vectors. Geometrical problems.

## Normal Distribution

Definitions. Finding probabilities. Approximating binomial distributions. Hypothesis testing.

## Kinematics in 2D

Motion under constant acceleration using vectors. Projectile motion. Variable acceleration using calculus.

## Revision

Full focus on revision and past exam papers in preparation for A-level exams.

## Numerical Methods

Finding approximate answers to equations by numerical methods. Iteration. Newton-Raphson.

## Differential Equations

Forming and solving 1st order differential equations. Practical applications and modelling.

ES.6TH FORM

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# A LEVEL MATHS WITH FURTHER MATHS LEARNING JOURNEY

## Y12

Basic Algebra
Surds & Indices

Binomial Expansion
Coordinate Geometry

Data processing & interpretation
Polynomials & Graphs

Probability
Statistical Distributions

Vectors in 2D
Trigonometry

Sampling & Hypothesis Testing
Differentiation

Kinematics 1
Complex Numbers

Integration
Forces & Newton's Laws

Exponentials & Logarithms
Further Algebra & Functions

Matrices
Kinematics 2

Momentum & Impulse (1D)
Algorithms & Graph Theory

Work, Energy & Power
Algorithms on Graphs

Proof by Induction
Critical Path Analysis

Elastic Collisions (1D)
Further Vectors

Further Calculus
Linear Programming

Functions
Regression, Correlation & Hypothesis Testing

CLICK TO ADD SUB TOPIC INFO

CLICK TO ADD SUB TOPIC INFO

## Y13

Normal Distribution
Proof

Algebraic & Partial Fractions
More Differentiation

Probability
More Trigonometry

CLICK TO ADD SUB TOPIC INFO

CLICK TO ADD SUB TOPIC INFO

More Integration
Parametric Equations

Further Algebra
More Complex Numbers

Vectors in 3D
Sequences and Series

Polar Coordinates
Binomial Expansion

CLICK TO ADD SUB TOPIC INFO

CLICK TO ADD SUB TOPIC INFO

CLICK TO ADD SUB TOPIC INFO

Hyperbolic Functions
Momentum & Impulse (2D)

Kinematics in 2D
Differential Equations

Numerical Methods
Moments

Further Calculus
Forces and Friction

CLICK TO ADD SUB TOPIC INFO

CLICK TO ADD SUB TOPIC INFO

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Graphs and Networks
Travelling Salesperson

Elasticity
Further Differential Equations

Simplex Algorithm
Elastic Collisions (2D)

Critical Path Analysis

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# YEAR 12 MATHS WITH FURTHER MATHS LEARNING JOURNEY

## Y12

### Basic Algebra
Quadratic and simultaneous equations. Inequalities.

### Surds & Indices
Rules for indices. Simplifying with surds. Rationalising.

### Binomial Expansion
Expansion of $(a+b)^n$ where n is a positive integer.

### Coordinate Geometry
Distances, midpoints, gradients, lines and circles.

### Polynomials & Graphs
Algebraic division. Factor theorem. Graphs of polynomials and transformations.

### Trigonometry
Common graphs. Equations. Sine and cosine rules. Identities and proof.

### Vectors in 2D
Definitions. Direction and magnitude. Geometrical problems. Links to mechanics.

### Statistical distributions
Discrete distributions & probabilities. The binomial distribution and conditions for its use.

### Probability
Tree diagrams, Venn diagrams. Mutually exclusive and independent events.

### Data processing & interpretation
Statistical diagrams. Averages and measures of spread. Comparisons of data. Large data set

### Sampling & Hypothesis Testing
Sampling techniques and their strengths and weaknesses. Hypothesis testing with the binomial distribution.

### Differentiation
Basic definitions. 1st principles. Gradients on curves. Tangents, normals and stationary points.

### Kinematics 1
Travel graphs, constant acceleration and vertical motion under gravity.

### Complex Numbers
Definitions. Conjugate pairs. Argand diagrams.

### Integration
Introduction as reverse of differentiation. Areas under curves.

### Matrices
Introduction. 2x2 and 3x3. Transformations. Sim eq'ns.

### Further Algebra & Functions
Sums and products of roots of polynomial equations.

### Kinematics 2
Use of differentiation and integration in mechanics.

### Exponentials & Logarithms
Definitions. $y = a^x$ graph. Logarithmic and exponential equations. Reduction to linear form.

### Forces & Newton's Laws
Force diagrams. Resultant forces. Newton's laws of motion. Connected particles.

### Algorithms & Graph Theory
Terminology. Sorting algorithms. Graph theory.

### Momentum & Impulse (1D)
Conservation of momentum for 2 spheres colliding directly.

### Algorithms on Graphs
Kruskal's, Prim's and Dijkstra's algorithms. Chinese Postman.

### Work, Energy & Power
Kinetic and potential energy. Conservation of energy. Power, including inclined planes.

### Critical Path Analysis
Activity networks, critical paths. Gantt charts..

### Further Calculus
Volumes of revolution.

### Further Vectors
Lines and planes. Scalar products. Intersections, angles and distances.

### Linear Programming
Graphs of inequalities. Forming inequalities. Optimisation.

### Elastic Collisions (1D)
Restitution. Successive direct impacts between spheres or a sphere and a surface.

### Proof by Induction
Including sum of series, divisibility and powers of matrices.

### Functions
Domain, range, composite and inverse functions. Modulus functions. Combined transformations.

### More Trigonometry
Radians. Sectors/arcs. Sec, cosec and cot. Addition and double angle formulae. Related problems.

### Regression, Correlation & Hypothesis Testing
Linear and non-linear regression. Measuring correlation. Hypothesis testing for zero correlation.

### Probability
Set notation. Conditional probability. Use of standard formulae and/or Venn diagrams and two-way tables.

## Y13

### Normal Distribution
Definitions. Probabilities. Approximating binomial distributions. Hypothesis testing

### Proof
Conjecture and counter-examples. Proof by deduction, exhaustion or contradiction.

### Algebraic & Partial Fractions
Proper and improper fractions. Separating into partial fractions.

### More Differentitation
Chain Rule, product and quotient rules. Trigonometric, exponential and log differentiation. Implicit functions. Inflection. Related rates of change.

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# YEAR 13 MATHS WITH FURTHER MATHS LEARNING JOURNEY

Y13

## More Integration

Standard functions including trig, exp and log integrals. Substitution, parts, inspection, partial fractions, parametric integration and the trapezium rule.

## Parametric Equations

Definitions. Cartesian and parametric forms. Geometrical problems. Differentiation.

## Further Algebra

Method of differences. Maclaurin series

## More Complex Numbers

Exponential form. De Moivre's theorem. Applications to trigonometric. Roots of unity.

## Vectors in 3-D

Extension of Yr12 work on 2D vectors. Geometrical problems

## Sequences and Series

Arithmetic and geometric series. Infinite series. Recurrence relations. Periodic sequences.

## Further Calculus

Improper integrals. Mean value. Using partial fractions. Inverse trigonometric integration. More volume of revolution.

## Binomial Expansion

Expansion of $(a+b)^n$ where n is rational or negative. Links with partial fractions.

## Polar Coordinates

Cartesian and polar conversion. Area enclosed by a polar curve.

## Forces and Friction

Resolving forces. Forces on inclined planes. Friction. Applications.

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## Numerical Methods

Finding approximate answers to equations by numerical methods. Iteration. Newton-Raphson.

## Moments

Definition as the turning effect of a force. Uniform or non-uniform beams. Ladders.

## Hyperbolic Functions

Definitions. Graphs. Logarithmic form. Calculus with hyperbolics.

## Differential Equations

Forming and solving 1st order differential equations. Practical applications and modelling.

## Kinematics in 2D

Motion under constant acceleration using vectors. Projectile motion. Variable acceleration using calculus.

## Momentum & Impulse (2D)

Using vectors for momentum and impulse problems.

## Graphs and Networks

Planarity algorithm. Route inspection with more than 4 odd nodes.

## Travelling Salesperson

Nearest neighbour algorithm. Upper and lower bounds.

## Simplex Algorithm

Formulating. Simplex method. Integer solution problems. Two-stage simplex method. Big-M.

## Further Differential Equations

1st and 2nd order differential equations. Applications to kinematics including harmonic motion. Coupled 1st order simultaneous equations.

## Elasticity

Hooke's law and elastic potential energy. Work-energy principle and problem-solving in context.

ES & 6TH FORM

## Elastic Collisions (2D)

Oblique impacts between spheres or between spheres and surfaces. Use of scalar products.

## Critical Path Analysis

Resource histograms. Scheduling diagrams.

## Revision

Full focus on revision and past exam papers in preparation for A-level exams.

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