

A Grades 1-8 Math Curriculum Overview

— First Grade —

Quality of numbers.
Counting forward and backward up until 100.
Number dictations.
Rhythmical counting.
Estimating.
The four processes – introduction.
Learning the “easy” addition facts.

— Second Grade —

Addition and subtraction facts (up until 24).
Times/division tables (up until the 12’s table).
The four processes. Keep in the horizontal!
Place value.
Estimating.
Time orientation (days of the week and months).

— Third Grade —

Measurement (distance, weight, and volume).
Learning all of the arithmetic facts by heart!!
The four processes. Mostly in the horizontal!
Intro to carrying and borrowing.
Intro to vertical (long) multiplication.

— Fourth Grade —

Factors, multiples, prime numbers, etc.
The arithmetic facts. Frequent review and practice.
Practice carrying, borrowing, and long multiplication.
Introduction to long division.
Fractions. The foundation, but not too much!
Measurement. Further practice and conversions.

— Fifth Grade —

Practice four processes – vertically.
Arithmetic facts. Review and practice still important.
Fractions. Regular practice is needed.
Decimal fractions – introduction.
Measurement. Review and intro to the metric system.
Freehand geometric drawing.
The Wonder of Number.
Puzzle problems.

— Sixth Grade —

Practice four processes – vertically.
Repeating decimals; Decimal/fraction conversions.
Mental math & math tricks (Casting out nines).
Exponents; Divisibility; Prime factorization.
Business math, including an introduction to percents, (statistical) graphs, and formulas.
Currency exchange rates.
Geometric drawing (with compass & straight edge).
Basic geometric constructions.
Measurement review & introduction to area.
Ratios – brief introduction.
Puzzle problems.

— Seventh Grade —

Mental math & math tricks.
Exponents & square roots.
Percents, including percent increase and decrease.
Ratios. Whole number and decimal form; similar figures; ratio in a square; ratio in a circle (π).
Algebra. Keep it simple! Negative numbers; simplifying expressions; solving equations.
Area. Rectangles, parallelograms, non-right triangles; the shear and stretch; (further) geometric drawing & construction.
The pentagon & the golden ratio.
The Pythagorean Theorem, and angle theorems.
Rates. Distance, time, speed problems.
Puzzle problems.

— Eighth Grade —

Number Bases.
Square root algorithm.
Pythagorean Theorem with calculations.
Percents & Growth.
Dimensional analysis (converting metric \leftrightarrow U.S.)
Proportions and ratios.
Algebra. Order of operations; distributive property.
Mensuration. Area and volume.
Stereometry. Platonic & Archimedean solids.
Loci. Drawing conic sections; Cassini Curves.
Puzzle problems.

A High School Math Curriculum Overview

9th Grade

Main Lessons

1. Permutations, Combinations & Probability
2. Descriptive Geometry

Track Classes

Review middle school algebra
Laws of exponents
Arithmetic with polynomials
Solving systems of equations
Factoring
Solving quadratic equations
Word problems

Simplifying square roots
The quadratic formula & al-Khwarizmi's work
Rational expressions and equations
Negative and fractional exponents
Introduction to logarithms
Review of percents, unit conversions, proportions
Permutations, Combinations, Probability practice

10th Grade

Main Lessons

1. Greek Geometry (Pythagoras, Euclid, and Archimedes)
2. Sequences and Series or Intro to Trigonometry (& Surveying)

Track Classes

Constructions & theorems (from 6th and 7th gr.)
Area transformation problems
Circle geometry
The Geometry of the Triangle
Writing proofs
The works of Archimedes (sphere and π)
Laws of proportionality (Euclid, Book V)
Mensuration (incl. volume & scale factors)

Proof of Heron's formula for triangle's area
Thorough review of 9th grade algebra
Intro to Trigonometry (up to Law of Sines)
Vectors (might be done in the physics lesson)
Sequences and Series (if not done in main lesson)
Logarithms (building from 9th grade)
Exponential growth, including the number e
The Math of Music

11th Grade

Main Lessons

1. The Philosophy and Geometry of René Descartes
2. Projective Geometry

Track Classes

Introduction to functions
Perm, Comb & Probability review and deepen
Problem solving in depth
Cartesian Geometry

- Graphing linear equations
- Graphing conic sections
- Graphing polynomial equations
- Graphing systems of equations

Logarithms (building from 10th grade)
Trigonometry

- The Six Trig Functions
- Law of Cosines; Law of Tangents
- The unit trig circle and radian measure

Imaginary & Complex Numbers

- The complex number plane
- De Moivre's Theorem

12th Grade

Main Lesson: Introduction to Calculus

Track Classes

Pre-Calculus Topics

- Analytical trig (identities & equations)
- Graphing trig functions
- Graphing exp. & logarithmic functions
- Graphing rational functions (asymptotes)

Calculus Topics

- Review and furthering of ML material
- Chain rule and Implicit differentiation
- Related rate & max/min problems

Other Possible Topics

- Business math topics (e.g., mortgage formula)
- Topics from economics
- Statistics in the media
- Introduction to Statistics
- Spherical trigonometry
- 3-D coordinate geometry
- Chaos theory & fractals
- Philosophy of math & Gödel's proof