

# GCSE Mathematics Topics

## 1. Number

- **Basic Arithmetic:** Addition, subtraction, multiplication, division.
- **Order of Operations:** BIDMAS/BODMAS (Brackets, Indices, Division/Multiplication, Addition/Subtraction).
- **Fractions, Decimals, and Percentages:**
  - Converting between them.
  - Calculating percentages of amounts.
  - Percentage increase/decrease.
- **Factors, Multiples, and Primes:**
  - Prime factorization.
  - Highest Common Factor (HCF).
  - Lowest Common Multiple (LCM).
- **Standard Form:**
  - Writing numbers in standard form.
  - Calculating with standard form.
- **Surds:**
  - Simplifying surds.
  - Rationalizing the denominator.
- **Estimation:**
  - Rounding numbers to significant figures or decimal places.
  - Using approximations in calculations.
- **Recurring Decimals:**
  - Converting recurring decimals to fractions.

## 2. Algebra

- **Basic Algebraic Manipulation:**
  - Simplifying expressions.
  - Expanding and factoring.
- **Equations and Inequalities:**
  - Solving linear equations.
  - Solving quadratic equations (factoring, completing the square, quadratic formula).
  - Solving simultaneous equations (linear/linear or linear/quadratic).
  - Solving inequalities and representing them on number lines.
- **Graphs and Coordinates:**
  - Plotting linear, quadratic, and cubic graphs.
  - Understanding gradients and intercepts of linear graphs.
  - Identifying roots, turning points, and symmetry of quadratic graphs.
- **Sequences:**
  - Finding  $n$ th terms of linear and quadratic sequences.
  - Arithmetic and geometric sequences.
- **Functions:**
  - Basic function notation (e.g.,  $f(x)f(x)f(x)$ ).

- Composite functions.

### 3. Ratio, Proportion, and Rates of Change

- **Ratios and Proportions:**
  - Simplifying ratios.
  - Sharing amounts in a given ratio.
  - Direct and inverse proportion.
- **Speed, Distance, and Time:**
  - Using formulas for speed and rates of change.
- **Scale Factors:**
  - Enlargement of shapes using scale factors.
  - Maps and scales.
- **Gradients and Rates:**
  - Understanding gradients as rates of change.

### 4. Geometry and Measures

- **Basic Geometry:**
  - Angles in polygons.
  - Parallel and perpendicular lines.
  - Properties of triangles and quadrilaterals.
- **Transformations:**
  - Translations, rotations, reflections, and enlargements.
- **Circle Theorems:**
  - Angles in a circle.
  - Tangents and chords.
- **Pythagoras' Theorem:**
  - Applying to right-angled triangles.
  - Using in 3D problems.
- **Trigonometry:**
  - Sine, cosine, and tangent ratios.
  - Calculating angles and sides in right-angled triangles.
  - Solving problems in 2D and 3D.
- **Mensuration:**
  - Area and perimeter of 2D shapes.
  - Surface area and volume of 3D solids (e.g., spheres, cylinders, cones, pyramids).
- **Vectors:**
  - Adding and subtracting vectors.
  - Representing vectors graphically and algebraically.
- **Constructions and Loci:**
  - Constructing bisectors and loci using a compass and ruler.

### 5. Probability

- **Basic Probability:**
  - Probability scales (0 to 1).
  - Single-event probability.

- **Combined Events:**
  - Tree diagrams.
  - Independent and dependent events.
  - Mutually exclusive events.
- **Expected Outcomes:**
  - Using probabilities to predict outcomes over multiple trials.

## 6. Statistics

- **Data Collection:**
  - Primary and secondary data.
  - Sampling methods (random, stratified).
- **Data Representation:**
  - Bar charts, pie charts, and histograms.
  - Scatter graphs (correlation).
  - Cumulative frequency graphs.
- **Measures of Central Tendency:**
  - Mean, median, mode.
  - Range and interquartile range (IQR).
- **Probability Distributions:**
  - Understanding distributions and trends.