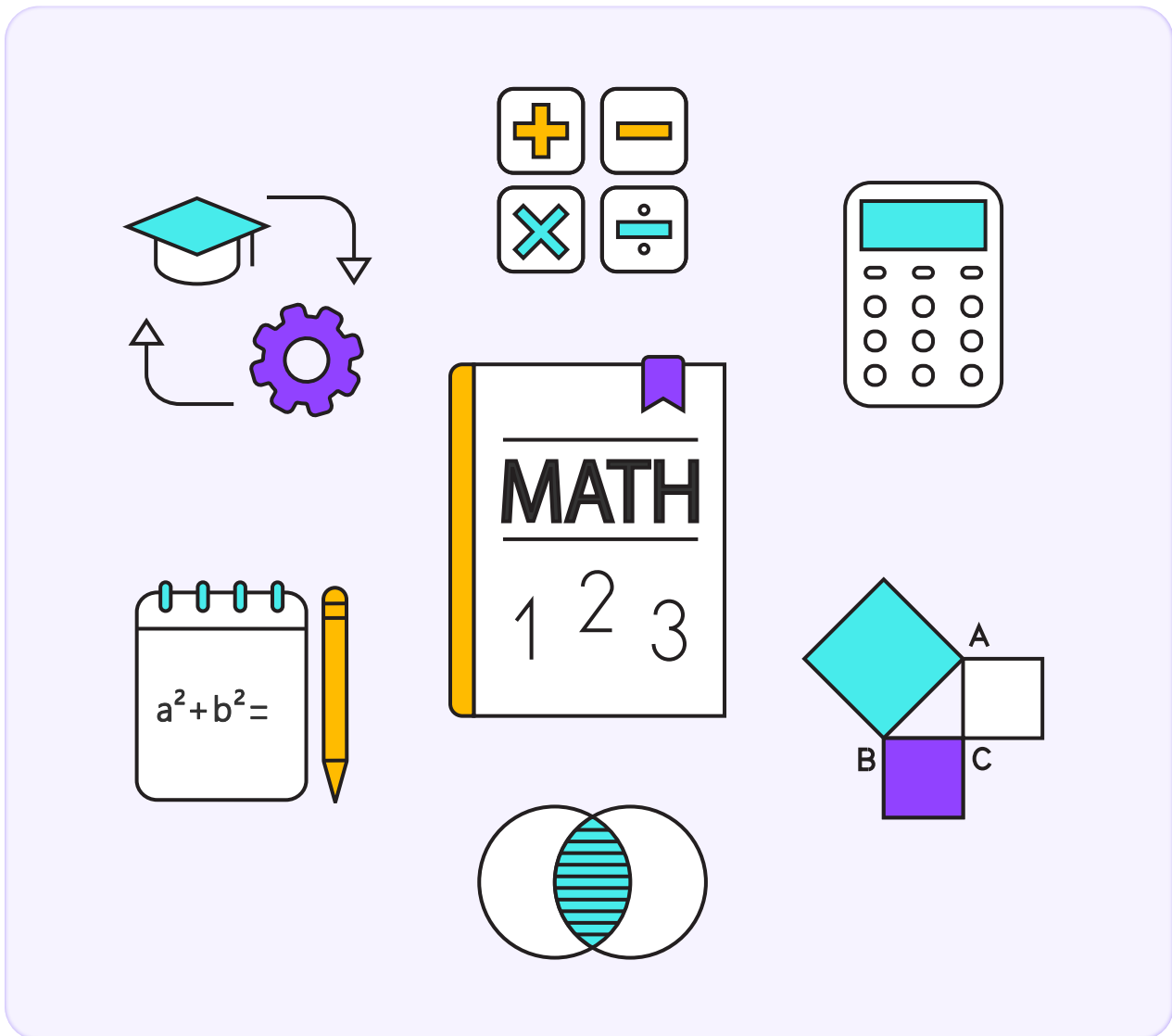


Grade 10

Math Excellence Program



Grade 10

Numbers - Number Theory: 8- 10 Classes

Students review natural numbers, whole numbers, integers, prime and composite numbers and prime factorization. They review and solve problems on **HCF and LCM**. Students review irrational and rational numbers, their decimal expansions, and properties. Students explore **real numbers**, and perform arithmetic operations on them. They review the **number line** for representing numbers, and practise plotting rational numbers on the number line. Students find **square roots** and **cube roots** of numbers, and learn how to estimate these roots.



Numbers - Ratios, Rates and Proportions: 6-10 Classes

Proportions

$$\frac{4}{3} = \frac{16}{12}$$

$$4 \times 12 = 3 \times 16$$

$$48 = 48$$

Students are introduced to **ratios**. They learn about **equivalent ratios** and solve problems on ratio. They explore **rates** and **unit prices** and solve problems involving these. Students solve direct application problems and word problems on **proportions**. Students solve word problems on **scale drawings**. Students **estimate population size** using proportions and solve word problems involving proportions where proportion is scaled down.

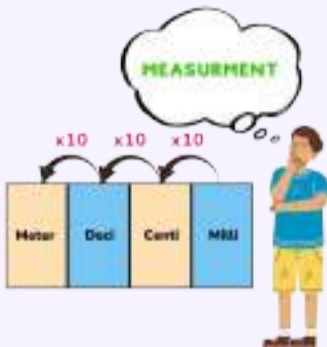
Numbers - Percent: 5-8 Classes

Students learn percent, representing a percent, and **conversion between percents, fractions and decimals**. They learn how to solve percent equations, and multi-step problems with percents. They **compute percent of increase, percent of decrease and solve percent of change word problems**. Students understand how to **relate percent to taxes, tips, discounts and mark-ups**, and apply percent to compute these.



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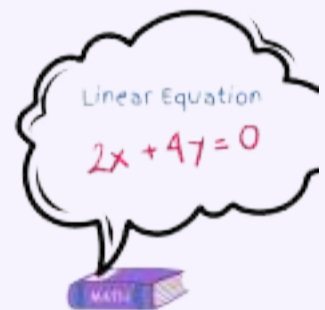
Numbers - Measurement: 6-8 Classes



Students learn about the metric and imperial systems of measurement, and how to convert from one to another. They learn to find the unit price and perform unit conversions of different quantities, and conversions involving squares and cubes when finding area and volume. They determine which measurement is the most precise, and learn about the greatest possible error. They find the minimum and maximum possible area and volume of objects taking percent error into account.

Algebra - Linear Equations And Linear Functions: 18-20 Classes

Students review how to write variable expressions, how to simplify, work with and solve variable expressions in one variable. They explore linear equations, graph linear equations in 2 variables, identify and solve them. They find the slope of a graph, and learn about the slope intercept, point-slope and standard forms of a linear equation, and graph an equation in these forms. Students write the equations of horizontal and vertical lines, and graph them. They learn the distance, section and midpoint formulae, and solve problems based on these formulae, such as finding area of triangle and co-ordinates of a centroid.



Algebra - Problem Solving: 6-8 Classes

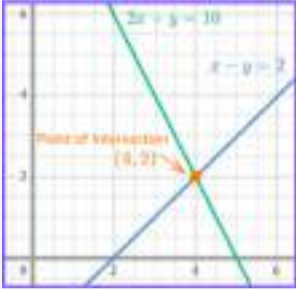
Students learn how to solve word problems about money, consecutive integers, distance, speed, weighted averages, and exponential growth and decay.

Algebra - Single-Variable Linear Inequalities: 5-7 Classes

Students learn how to represent linear inequalities on the number line and graphs. Students understand how to graph and solve one-step and two-step linear inequalities, and how to solve compound inequalities involving multiple conditions.



Grade 10

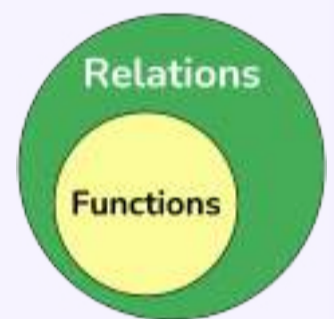


Algebra - Simultaneous Equations: 5-8 Classes

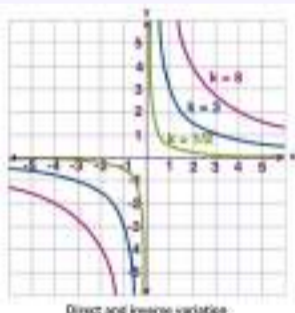
Students explore a pair of linear equations in 2 variables. They learn to frame pairs of equations from given word problems and solve these equations using the methods of : **Graphing, Substitution, Elimination, and Cross Multiplication.**

Algebra - Relations And Functions: 9-12 Classes

Students define **relations**, and **convert between tables, graphs, mappings, and lists of points**. They understand the **domain and range** of relations. Students **define functions**, identify **independent and dependent variables** in functions, and identify functions using **vertical line test**. They interpret **function graphs and tables**. Students add, subtract and multiply functions, interpret the **rate of change** in tables and graphs, and solve word problems.



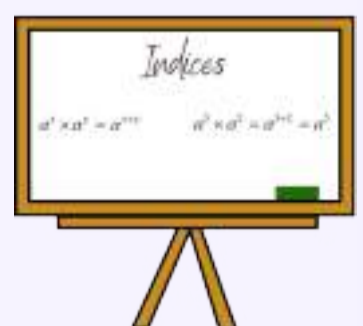
Algebra - Direct And Inverse Variation: 6-8 Classes



Students are introduced to **Direct and Inverse Proportions**. They learn how to identify proportional relationships from tables, graphs and equations, how to complete a table and graph a proportional relationship. Students interpret tables and graphs to find the **constant of proportionality**, and write equations for proportional relationships.

Algebra - Indices: 6-8 Classes

Students explore **indices** and solve equations with variable indices. They evaluate **indices which are powers of ten, indices with decimal and fractional bases, and negative indices**. Students perform the operations of **multiplication and division with indices**, according to the **power rule**. They learn how to evaluate expressions using **properties of indices**, and identify equivalent expressions involving indices.



Grade 10

Algebra - Sequences: 8-10 Classes



Students learn about the **arithmetic and geometric sequences**. Students learn how to find **the general term** in these sequences, and how to calculate the **sum of an arithmetic series** and the **sum of a geometric series**. Students understand what is an **infinite geometric series**, and learn how to find its sum, using sigma notation. They learn how to find the **arithmetic and geometric means**, and sequences of squares and cubes. They also learn about Fibonacci-type sequences.

Algebra - Standard Form And Exponential Functions: 6-8 Classes

Students learn to represent numbers in standard form, and convert between ordinary numbers and standard form. Students understand how to define **Exponential functions**, how to **evaluate** and **graph** exponential functions. Students also review compound interest, and solve word problems



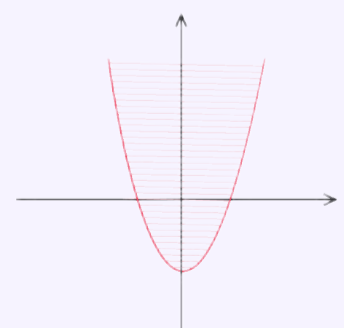
Algebra - Polynomials: 7-10 Classes



Students learn the characteristics of polynomials. They learn how to determine the **degree of a polynomial**, how to **add, subtract, multiply, and divide polynomials** using various methods and techniques. They **factor polynomials** using different methods. Students learn how polynomials are used in various real-world applications, such as in **calculating areas and volumes**, and in **modeling and analyzing data**.

Algebra - Quadratic Equations: 8-10 Classes

Students explore quadratic equations and solve them by using various methods, such as **factoring, completing the square, and the quadratic formula**. Students learn how to find the **nature of the roots** of a quadratic equation.



Grade 10

Algebra - Rational Functions/Expressions And Logic: 7-10 Classes

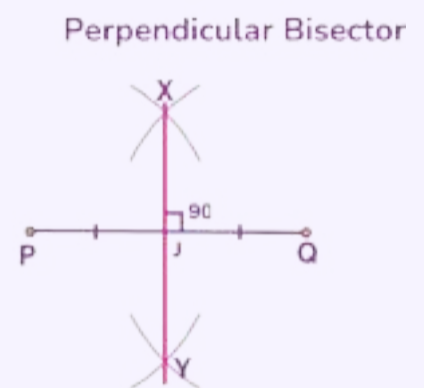
Negation Truth Table	
P	~P
T	F
F	T

Students learn about **rational functions, asymptotes and excluded values**. They simplify **complex fractions**, and rational expressions by performing arithmetic operations on them.

Students learn how to reason for identifying **hypotheses** and making conclusions. They construct **truth tables** and use them for **reasoning**. Students learn how to apply **conditionals** for logical conclusions.

Geometry - Points, Lines, Line Segments, And Planes: 5-7 Classes

Students review definitions and properties of **lines, line segments, rays, planes and points**. They learn about intersections in planes, additive property of length and midpoints. Students study the **perpendicular bisector theorem**, and perform **construction** of midpoints and perpendicular bisectors.



Parallel Lines



Intersecting Lines



Perpendicular Lines

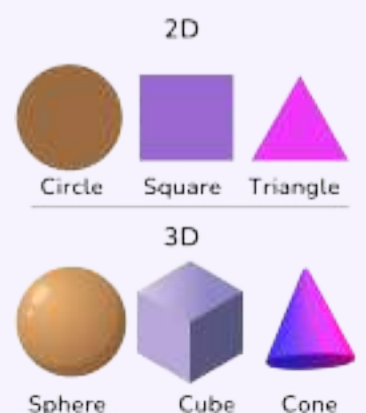


Geometry - Angles, Parallel And Perpendicular Lines: 7-10 Classes

Students learn what are **angle bisectors**, how to **construct an angle bisector** and how to construct a **congruent angle**. They define and identify **parallel, perpendicular, intersecting, and skew lines and planes**. They define and construct **transversals**, and find angle measures.

Geometry - 2-Dimensional And 3-Dimensional Figures: 5-7 Classes

Students learn about the **properties** of 2-dimensional figures such as triangles and quadrilaterals. They learn the **exterior angle theorem**, and find missing angles in 2-dimensional figures.. They understand **parts of three-dimensional** figures and the shapes of their bases. They study the **front, side and top views, base plans, nets and drawings** of 3-dimensional figures. They study **cross sections** of three-dimensional figures, and solids of revolution.



Grade 10

Congruence



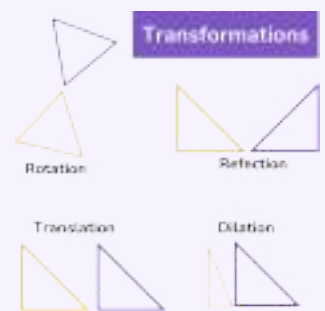
Geometry - Introduction To Congruent

Figures: 6-10 Classes

Students learn about **congruency of figures**. They understand the **conditions for congruency** that need to apply for 2 figures to be called congruent. Students learn how to **find side lengths and angle measures** in congruent figures.

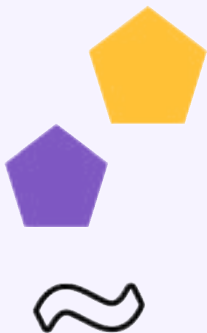
Geometry - Transformations: 10-12 Classes

Students learn about transformations such as **translations, reflections, rotations, and dilations**. They learn to **graph the image, find the coordinates, and write the rule**. They learn to find the **scale factor** of dilations.



Geometry - Similarity: 7-10 Classes

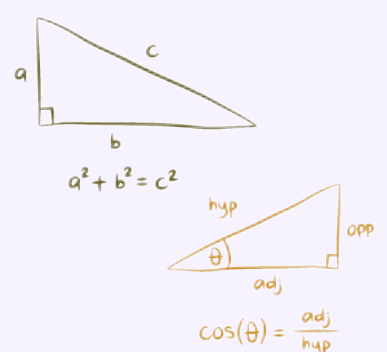
Similarity



Students learn the definition of similarity of figures. They understand the conditions that need to apply for 2 figures to be called similar. Students learn how to **find side lengths and angle measures** in similar figures. Similarity of triangles is explored in this section. The **criterion for similarity of 2 triangles** is explained. The **Triangle Proportionality theorem** is covered. Students learn the relationship between **areas of similar triangles**. They also learn how to **prove similarity of triangles** using the information given.

Geometry - Pythagorean Theorem And Trigonometry: 8-12 Classes

Students review and **prove the Pythagoras theorem**. They are introduced to Trigonometry and define the trigonometric ratios. Using these, students derive the basic trigonometric **identities**, and learn how to prove results based on these identities, Students learn about the **special right triangles** and the trigonometric ratios of the standard angles from 0 to 90 degrees. They study the inverses of trigonometric functions, and understand the practical applications of trigonometry such as computation of **heights and distances**.

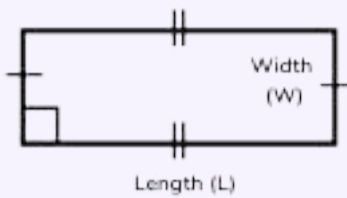


Grade 10

Geometry - Area And Perimeter: 9-14 Classes

Rectangle

Area and Perimeter



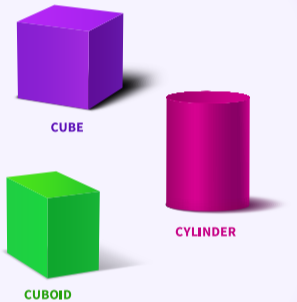
Perimeter = $(2W + 2L)$ units
 Area = WL units²

Students study various shapes, such as **triangles, squares, rectangles, trapezoids, parallelograms, circles, and polygons**, and calculate their area and perimeter.

Students solve **real-world problems**, such as calculating the **area of a room** to determine how much paint or carpet is needed, or determining the perimeter of a field for fencing or landscaping purposes. They find areas of **compound figures**, and areas of triangles using **Heron's formula**.

Geometry -Surface Area And Volume: 6-8 Classes

Students learn how to find the **surface area and volume** of solids such as **cylinders, pyramids, cones and spheres**, and **compound figures** that may be formed by combinations of these solids. Students also learn to find the new surface area, perimeter, area and volume for **changes in scale**.



Geometry -Circle: 6-8 Classes



Students learn about the parts of a **circle-center, radius, arc, sector, central angles and arc measures**. They learn the formulas for **finding arc length and sector area**. Students learn about **chords, tangents and inscribed angles and circles** and how to find their measures. **Construction of tangents** to a circle is also done

Probability: 5-8 Classes

Students learn the concepts of **theoretical probability** and **experimental probability**, and how to find the probability of different kinds of events such as **compound events, dependent and independent events**. Students find probabilities using **two-way frequency tables**, they define and find **conditional probabilities**.



Grade 10

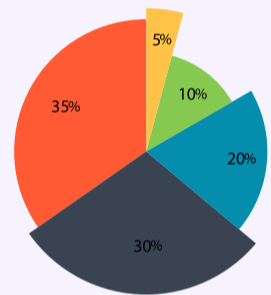
Statistics: 8-12 Classes



Students learn how to collect, organize, and display data using **tables, graphs, and charts**. Students find the measures of central tendency : **mean, median, and mode**. They learn about variability in data, including **range, interquartile range, and standard deviation**. Students create **scatter plots**, identify **outliers**, find trends and make predictions. They write an equation for the **line of best fit**, and identify **correlation and causation** in given scenarios.

Data And Graphs: 9-12 Classes

Students interpret and create tables, bar **graphs, line graphs, line plots, stem and leaf plots, frequency charts and pie charts**. They learn to analyse the data given and choose the best type pf graph to represent it.



Vectors: 5-8 Classes



Students learn about **vectors**. They find the **magnitude** and the **component form** of a vector, given its magnitude and **direction angle**. Students graph a **resultant vector** using the **triangle**, and the **parallelogram methods**. They **add and subtract vectors**.

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