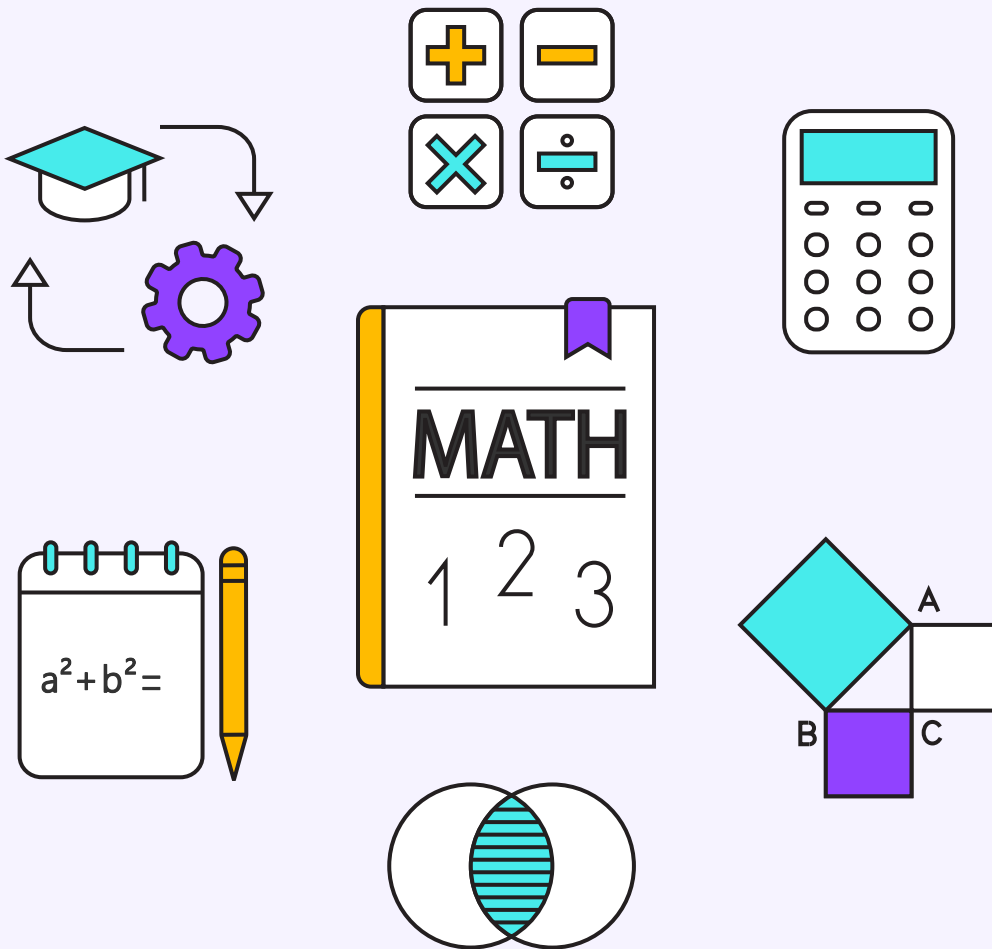


Grade 10

Math Excellence Program



Grade 10

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

Students learn about **ratios**, **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 where proportion is scaled down.

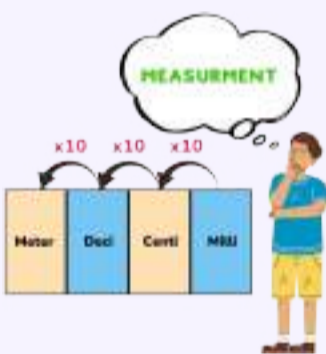
Proportions

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

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

$$48 = 48$$

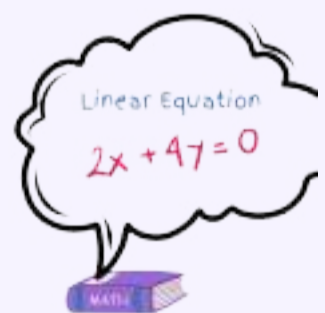
Numbers - Measurement: 6-8 Classes



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 - Single-Variable Linear Inequalities: 5-7 Classes

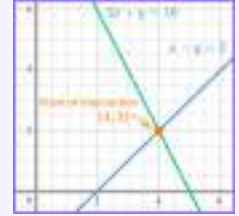


Students learn how to represent linear inequalities on the number line and graphs. Students understand how to graph and **solve one-step and two-step linear inequalities**, and how to solve **compound inequalities** involving multiple conditions.

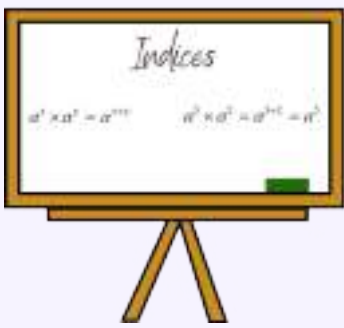
Grade 10

Algebra - System of Linear Equations: 7-10 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 - 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.

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.



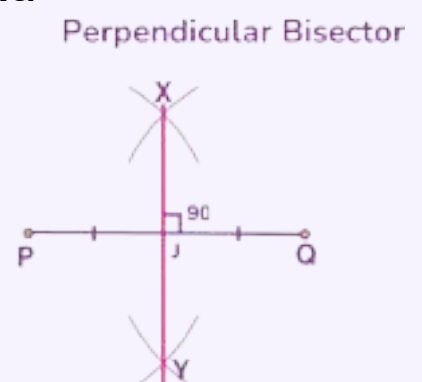
Logic: 4-6 Classes

Negation Truth Table	
P	~P
T	F
F	T

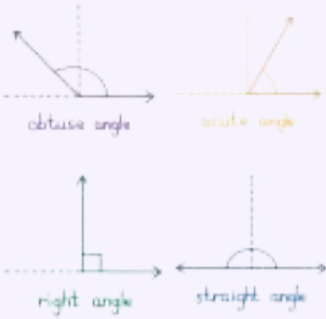
Students learn how to **reason** for identifying hypotheses and making conclusions. They construct **truth tables** and use them for reasoning. Students learn how to apply **conditionals** for logical conclusions.

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.



Grade 10



Geometry - Angles: 5-7 Classes

Students learn to define and identify **complementary, supplementary, vertical, adjacent, and congruent angles**, and find their measures. They study **angle bisectors**, how to **construct an angle bisector** and how to construct a **congruent angle**. They solve proofs involving angles

Geometry - Parallel And Perpendicular Lines: 5-7 Classes

They define and identify **parallel and perpendicular lines**, They define and construct **transversals**, and find **angle measures**.

Parallel Lines



Perpendicular Lines

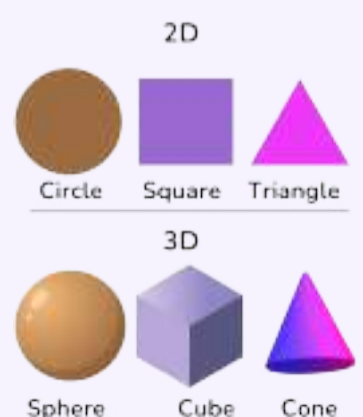


Geometry - Triangles: 10-14 Classes

Students define and classify **types of triangles**, and understand the **Triangle Angle-Sum Theorem**. They solve find the angle problems, using the **Exterior Angle Theorem** and **Exterior Angle Inequality**. Students study **midsegments, bisectors, medians, altitudes, angle bisectors, and perpendicular bisectors**. They construct the **circumcenter or incenter** of a triangle and the **centroid or orthocenter** of a triangle. They solve proofs involving triangles.

Geometry - 2-Dimensional And 3-Dimensional Figures: 6-8 Classes

Students construct an **equilateral triangle, a regular hexagon, and a square**. They study parts of **3-dimensional figures**, and the **shapes of their bases**. Students identify 3D figures, their **front, side and top view**, they study **base plans, nets and drawings and cross sections** of 3-dimensional figures, and also **solids of revolution**.



Grade 10

Geometry - Introduction To Congruent

Congruence

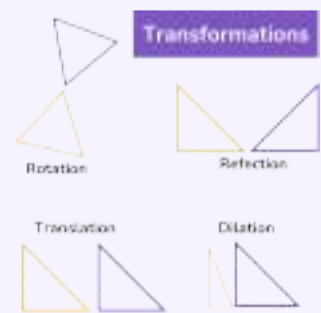


Figures: 9-12 Classes

Students study **congruence statements and corresponding parts**, and solve problems involving corresponding parts. They identify congruent figures, define **SSS, SAS, ASA and AAS** theorems and prove triangles congruent. Students learn the **Hypotenuse-Leg theorem**, and find angles to make triangles congruent.

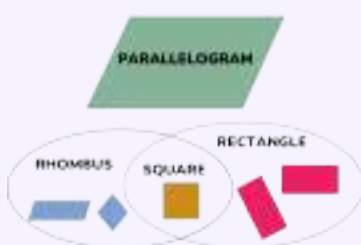
Geometry - Transformations: 10-12 Classes

Students learn **translations, reflections, rotations, dilations** and learn to **graph the image, find the coordinates, and write the rule**. They classify **congruence transformations**, and **rotate polygons** about a point. Students learn **glide reflections** and apply **multiple transformations** in sequence, students solve **transformations** that carry a polygon onto itself. They find **length, perimeter, and area, and the scale factor, and center of the dilation**.



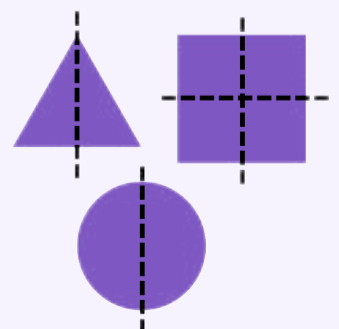
Geometry - Quadrilaterals: 10-14 Classes

Students study the properties of **trapezoids and parallelograms**. They write proofs to show that a quadrilateral is a parallelogram. Students define **rhombus**, and study the properties of rhombuses, squares, rectangles, and kites. They **graph quadrilaterals** from the given vertices, review the properties of quadrilaterals, and classify shapes on the coordinate plane. They construct proofs involving triangles and quadrilaterals.



Geometry - Symmetry: 4-6 Classes

Students understand what are **lines of symmetry** of triangles and quadrilaterals, and other polygons. They learn how to identify lines of symmetry for various figures. Students learn about **rotational symmetry**, and learn how to identify figures with rotational symmetry. They also learn to **count lines of symmetry, and draw lines of symmetry**.

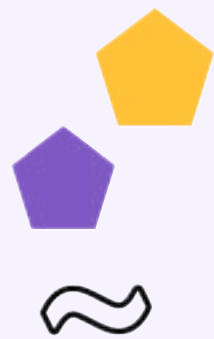


Grade 10

Geometry - Similarity: 7-10 Classes

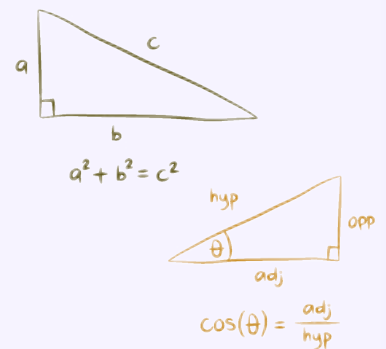
Students learn the definition of similarity of figures. They understand the conditions that need to apply for 2 figures to be called similar. Students learn how to **find side lengths and angle measures** in similar figures. Similarity of triangles is explored in this section. The **criterion for similarity 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.

Similarity



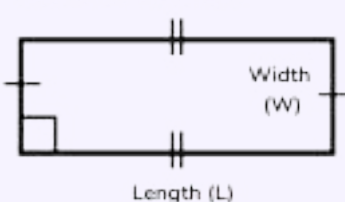
Geometry - Pythagorean Theorem And Trigonometry: 15-20 Classes

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**. Students find **sine and cosine of complementary angles**, learn the laws of sines and cosines and solve problems based on these, such as finding the **area of a triangle** using law of sines.



Geometry - Area And Perimeter: 9-14 Classes

Rectangle Area and Perimeter



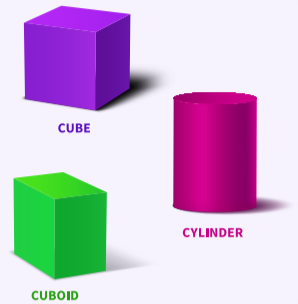
Perimeter = $(2W + 2L)$ units
Area = WL units²

Students study various shapes, such as **triangles, squares, rectangles, trapezoids, parallelograms, circles, and polygons**, and learn how to calculate their **area and perimeter**. Students learn how to apply their knowledge of area and perimeter to **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. Finding area of **compound figures** is also understood. Students learn about finding area of triangles using **Heron's formula**.

Grade 10

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, inscribed angles and circles, segments, and how to find their measures. They construct tangents to a circle, an equilateral triangle, and a regular hexagon inscribed in a circle, the **inscribed or circumscribed circle of a triangle**, and a **square inscribed in a circle**.

Probability: 12-16 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**.



Vectors: 5-8 Classes



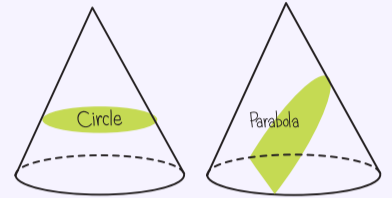
Students learn about **vectors**. They find the **magnitude** and the **component form** of a vector, given its magnitude and **direction angle**. Students graph a **resultant vector** using the **triangle**,and the **parallelogram methods**. They **add and subtract vectors**.

Grade 10

Circles And Parabolas In The Coordinate

Plane: 9-12 Classes

Students determine if a point lies on a circle and write **equations of circles** in **standard form** from graphs, using properties, They **convert equations of circles** from general to standard form, They find properties of circles from equations in general form. and graph circle. Students define **parabola**, find the **vertex**, the **focus** and the **axis of symmetry** of a parabola. They write **equations of parabolas** in vertex form from graphs, using the focus and directrix, and in vertex form using properties, They **graph parabolas** from given equations.



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