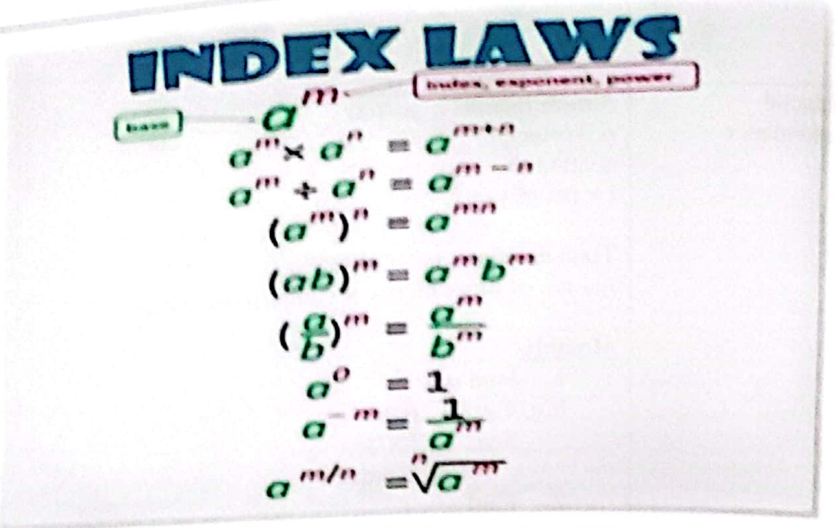
Formulae for Mathematics

Financial Mathematics	Simple interest = prt/100 p = principal r = rate (%) t = no. of years Total amount = p(1 + r/100)^n n = no. of times money is compounded (years) Monthly 1. Find new n E.g. 1 yr - 12 mths 3 yrs – 12 X 3 = 36 mths 2. Find new r e.g. 12 mths – 2% 1 mth – 1/6 % 3. Calculate the total amount Half-yearly 1. Find new n E.g. 1 yr – 6 mths 3 yrs – 6 X 3 = 18 mths 2. Find new r e.g. 12 mths – 2% 6 mths – 1% 3. Calculate the total amount Quarterly 1. Find new n E.g. 1 yr – 4 mths 3 yrs – 4 X 3 = 12 mths 2. Find new r e.g. 12 mths – 2% 3 mth – 1/2 % 3. Calculate the total amount
Sketching of Quadratic Functions	In the form y = +/- (x-h)(x-k) 1. +ve/-ve graph 2. Find x-intercepts (when y = 0, …) 3. Find x-coordinate of line of symmetry (x1 + x2/2) 4. Find minimum point. Substitute x =? into the equation In the form y = +/- ~~(x-h)(x-k)~~ $(x-p)^2+q$ 1. +ve/-ve graph 2. Find minimum point e.g. (x - 2)^2+1 coordinates: (2,1) -(x - 2)^2-1 coordinates: (-2,-1) 3. Find x-coordinate of line of symmetry 4. Find y-intercept (when x = 0, …)

Laws of Indices	 INDEX LAWS a^m $a^m \times a^n = a^{m+n}$ $a^m \div a^n = a^{m-n}$ $(a^m)^n = a^{mn}$ $(ab)^m = a^m b^m$ $(\frac{a}{b})^m = \frac{a^m}{b^m}$ $a^0 = 1$ $a^{-m} = \frac{1}{a^m}$ $a^{m/n} = \sqrt[n]{a^m}$
Trigonometry	Explain why XYZ is a right angle (e.g. if longest side is 17cm and others are 8cm and 15cm) 1. By Pythagoras theorem, 17^2 = 15^2 + 8^2 17^2 = 289 2. By the converse of Pythagoras Theorem, triangle XYZ is a right-angle triangle. Angle XYZ is opposite to XZ, which is the hypotenuse of the right-angle triangle, thus XYZ =90 Trigonometry Ratios Of Obtuse Angles sin(180 – θ) = sin θ cos(180-θ) = -cosθ Area of triangle: 1/2absinC sine rule: sin A/a = sin B/b = sin C/c cosine rule: a^2 = b^2 + c^2 – 2bccos A Angle of elevation/depression = angle between line of sight and horizontal Bearing = angle measured clockwise from the direction of the north
Coordinate Geometry	Gradient of a straight line: m = (y2 - y1)/(x2 - x1) Length of a straight line: AB = √(x2 - x1) + (y2 – y1) Gradient-intercept form of a straight line: y = mx + c m = gradient c= y-intercept Equation of a straight line • Given m and c: Substitute m and c into y = mx +c directly • Given m and a point (x1,y1): Substitute x = x1, y = y1, into y = mx + c to find c Substitute the values of m and c into y = mx + c • Given two points (x1,y1) and (x2,y2) Find m using (y2 - y1)/(x2 - x1) Substitute x = x1, y = y1, (or x = x2, y = y2) into y = mx + c to find c Substitute the values of m and c into y = mx + c
Congruence and Similarity tests	Note: When two triangles are congruent, all corresponding sides and angles are equal Conditions/Tests for Congruent Triangles 1. Side-side-side congruence test 2. Side-angle-side congruence test

	3. 4. Angle-angle-side congruence test 5. Right Angle Hypotenuse test Note: 1. The vertices of congruent triangles MUST be written in a corresponding order 2. The order or sequence of the parts is important (e.g. for side-angle-side congruence test, the angle in the triangle **must be included** between the two sides) Note: When two triangles are similar, all corresponding sides are proportional and all corresponding angles are equal Conditions/Tests for ~~Congruent~~ Similar Triangles 1. 2 pairs of corr. <s are equal (angle-angle similarity test) 2. Ratios of 3 pairs of corr.s sides are equal (side-side-side similarity test) 3. Ratios of 2 corr. Sides are included and <s are equal (side-angle-side similarity test)
Area & Volume of Similar Figures and Solids	For two similar **figures**, if the ratio of their corresponding sides is L1:L2, then the ratio of their areas is L1^2:L2^2 Ratio of areas of two triangles with the same height = ratio of their corresponding bases (e.g. area of triangle ABC/area of triangle XYZ = (1/2 x BC x h)/(1/2 x YZ x h) = BC / YZ) For two similar **solids**, if the ratio of their corresponding sides is L1:L2, then the ratio of their areas is L1^3:L2^3 For two similar **solids**, if the ratio of their corresponding sides is L1:L2, then the ratio of their areas is L1^2:L2^2
Arc Length, Area of Sector and Radian Measure	Arc Length = (x/360) x 2πr Area of sector = (x/360) x πr^2 Area of segment = [(x/360) x πr^2] – [(1/2) x r^2 x sin X) Conversion between Radians and Degrees π rad = 180 Therefore: 180 = π rad 1 = (π/180) x rad And π rad = 180 1 rad = (180/π) / (360/2π) Arc length = r θ Area of sector = 1/2 x r^2 x θ

Properties of Polygons	n = no. of sides of a polygon sum of interior angles of polygon – (n – 2) x 180 each interior < angle of an n –sided **regular** polygon = [(n – 2) x 180] / n sum of the exterior angles of any polygon = 360

	an exterior < of an n-sided **regular** polygon = 360/n ext < and int < are supplementary (add up to 180)