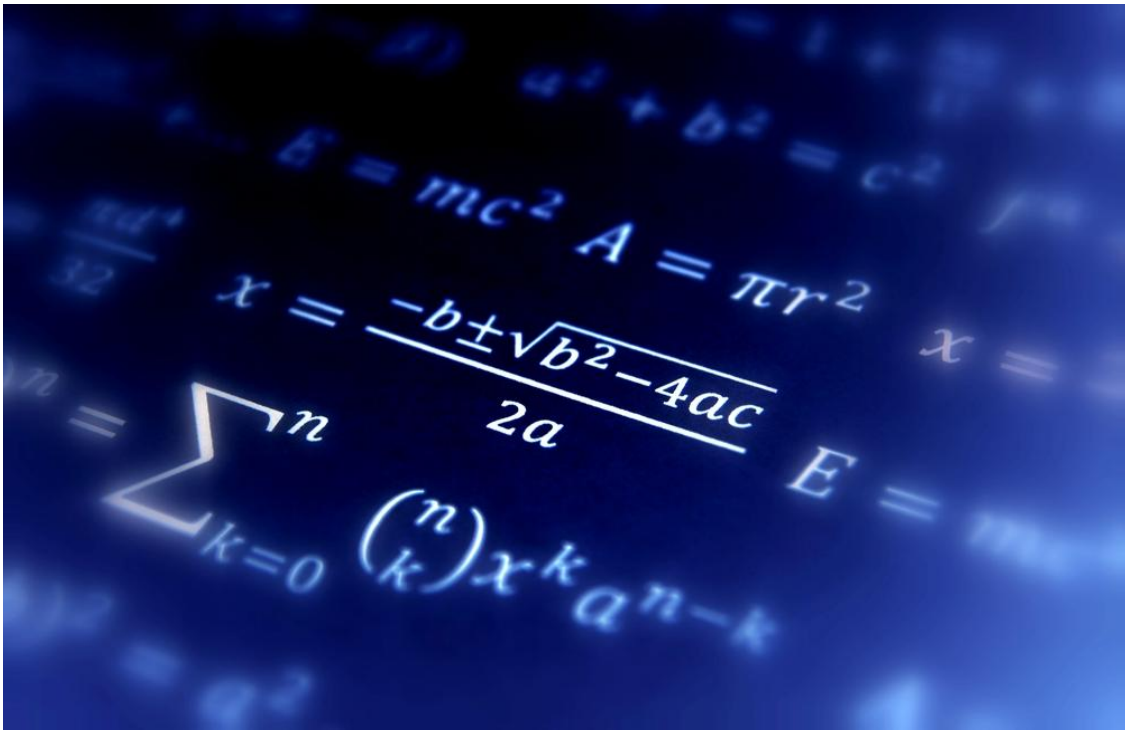
SANGAM SCHOOL OF EXCELLENCE

COURSE OUTLINE OF MATHEMATICS HIGHER LEVEL

BATCH 2014-16



MR. SHIV KHATOR

IBDP MATHEMATICS EDUCATOR

Course description:

The course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way. This is achieved by means of a carefully balanced approach. Students are encouraged to apply their mathematical knowledge to solve problems set in a variety of meaningful contexts. Development of each topic should feature justification and proof of results. Students embarking on this course should expect to develop insight into mathematical form and structure, and should be intellectually equipped to appreciate the links between concepts in different topic areas. They should also be encouraged to develop the skills needed to continue their mathematical growth in other learning environments.

The internally assessed component, the exploration, offers students the opportunity for developing independence in their mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas.

This course is a demanding one, requiring students to study a broad range of mathematical topics through a number of different approaches and to varying degrees of depth. Students wishing to study mathematics in a less rigorous environment should therefore opt for one of the standard level courses, mathematics SL or mathematical studies SL. Students who wish to study an even more rigorous and demanding course should

SANGAM SCHOOL OF EXCELLENCE

PURPOSE

Mathematics HL is designed for students with competence and a strong background in Mathematics and who enjoy mathematical challenges. Some elect this course to prepare for a mathematics course at university or related courses such as Physics, Engineering or Technology. Topics include: Algebra, Permutations and Combinations, Functions, Trigonometry, Complex Numbers, Vectors, Matrices, Probability and Statistics, Calculus and the study of a detailed option.

AIMS

The aims of HL course is to enable students to:

- develop an understanding of importance of the subject and its principles.
- develop interest, thinking ability and patience to the solve the problems.
- develop interest, thinking ability and patience to the solve the problems.
- develop to use technology to solve different types of problem, to know various types of solutions and tricks.
- develop to use skills for future developments.
- make them multicultural and historical perspectives of HL course.
- take deep interest in Mathematics and they must know about the usefulness, power and elegance of Mathematics
- develop creativity, skills and ability to solve problems

OBJECTIVES

A students must be able to:

- Understand and Solve a given problem using appropriate mathematical formula/method
- Arrange information and data in tabular, diagrammatic and/or graphical forms
- know and use notation and terminology
- Mathematical argument in to formula and communicate it clearly
- Understand and Solve a given problem using appropriate mathematical formula/method
- Arrange information and data in tabular, diagrammatic and/or graphical forms
- know and use notation and terminology
- Formulate the Mathematical argument.
- use the proper strategies and techniques
- demonstrate significance and the reasonableness of results
- understand the pattern and level of the mathematical problems.
- Identify and demonstrate an understanding of the practical applications of mathematics
- use appropriate technology as mathematical tools
- demonstrate an understanding of and the appropriate use of mathematical modelling.

Command terms with definitions

Students should be familiar with the following key terms and phrases used in examination questions, which are to be understood as described below. Although these terms will be used in examination questions, other terms may be used to direct students to present an argument in a specific way.

Calculate- Obtain a numerical answer showing the relevant stages in the working.

Comment- Give a judgment based on a given statement or result of a calculation.

Compare- Give an account of the similarities between two (or more) items or situations,referring to both (all) of them throughout.

Compare and Contrast-Give an account of the similarities and differences between two (or more) items orsituations, referring to both (all) of them throughout.

Construct -Display information in a diagrammatic or logical form.

Contrast- Give an account of the differences between two (or more) items or situations,referring to both (all) of them throughout.

SANGAM SCHOOL OF EXCELLENCE

Deduce- Reach a conclusion from the information given.
Demonstrate- Make clear by reasoning or evidence, illustrating with examples or practical application.
Describe- Give a detailed account.
Determine- Obtain the only possible answer.
Differentiate -Obtain the derivative of a function.
Distinguish- Make clear the differences between two or more concepts or items.**Draw-** Represent by means of a labelled, accurate diagram or graph, using a pencil. Aruler (straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted (if appropriate) and joined in a straight line or smooth curve.
Estimate- Obtain an approximate value.
Explain- Give a detailed account, including reasons or causes.
Find- Obtain an answer, showing relevant stages in the working.
Hence- Use the preceding work to obtain the required result.
Hence or otherwise- It is suggested that the preceding work is used, but other methods could also receive credit.
Identify- Provide an answer from a number of possibilities.
Integrate- Obtain the integral of a function.
Interpret -Use knowledge and understanding to recognize trends and draw conclusions from given information.
Investigate- Observe, study, or make a detailed and systematic examination, in order to establish facts and reach new conclusions.
Justify -Give valid reasons or evidence to support an answer or conclusion.
Label -Add labels to a diagram.
List -Give a sequence of brief answers with no explanation.
Plot- Mark the position of points on a diagram.
Predict -Give an expected result.
Prove -Use a sequence of logical steps to obtain the required result in a formal way.
Show -Give the steps in a calculation or derivation.
Show that- Obtain the required result (possibly using information given) without the formality of proof. "Show that" questions do not generally require the use of a calculator.
Sketch- Represent by means of a diagram or graph (labelled as appropriate). The sketch should give a general idea of the required shape or relationship, and should include relevant features.
Solve -Obtain the answer(s) using algebraic and/or numerical and/or graphical methods.
State -Give a specific name, value or other brief answer without explanation or calculation.
Suggest- Propose a solution, hypothesis or other possible answer.
Verify- Provide evidence that validates the result.
Write down -Obtain the answer(s), usually by extracting information. Little or no calculation isrequired. Working does not need to be shown.

Topics:

In narrative or outline form, list what you will cover in your course to meet the IB syllabus requirements. In addition, if IB courses are going to be combined with Advanced Placement or other curriculums, outlines should address additional non-IB topics to be covered.

Name of Topic	Teaching hours
Topic 1- Core: Algebra.	30 hours
1.1 Arithmetic sequences and series; sum of finite arithmetic series; geometric sequences and series; sum of finite and infinite geometric series. Sigma notation. Application	4
1.2 Exponents and logarithms. Laws of exponents; laws of logarithms. Change of base.	4
1.3 Counting principles, including permutations and combinations. The binomial theorem: expansion of $(a+b)^n$, $n \in N$.	4
1.4 Proof by mathematical induction.	3
1.5 Complex numbers: the number $i = \sqrt{-1}$; the terms real part, imaginary part, conjugate, modulus and argument. Cartesian form $z=a+ ib$.Sums, products and quotients of complex numbers.	3
1.6 Modulus–argument (polar) form $z=r(\cos\theta+i \sin\theta)=r\text{cis}\theta=re^{i\theta}$. The complex plane.	3
1.7 Powers of complex numbers: de Moivre's theorem. nth roots of a complex number.	3
1.8 Conjugate roots of polynomial equations with real coefficients.	3
1.9 Solutions of systems of linear equations (a maximum of three equations in three unknowns), including cases where there is a unique solution, an infinity of solutions or no solution.	3
Topic 2- Core: Functions & Equations.	**22** hours
2.1 Concept of function $f: x \to f(x)$: domain, range; image (value). Odd and even functions. Composite functions $f \circ g$. Identity function. One-to-one and many-to-one functions. Inverse function f^{-1} , including domain restriction. Self-inverse functions.	3

2.2 The graph of a function; its equation y= f(x). Investigation of key features of graphs, such as maximum and minimum values, intercepts, horizontal and vertical asymptotes and symmetry, and consideration of domain and range. The graphs of the functions y= f(x) and y= f(x).	4
2.3 Transformations of graphs: translations; stretches; reflections in the axes. The graph of the inverse function as a reflection in y=x.	3
2.4 The rational function $x \to (ax+b)/(cx+d)$ and its graph The function $x \to ax$, $a > 0$, and its graph. The function $\log_a x \to x$, $x > 0$, and its graphs	2
2.5 Polynomial functions and their graphs.The factor and remainder theorems.The fundamental theorem of algebra.	3
2.6 Solving quadratic equations using the quadratic formula.Use of the discriminant $\Delta = b2 - 4ac$ to determine the nature of the roots.Solving polynomial equations both graphically and algebraically. Sum and product of the roots of polynomial equations. Solution of ax =b using logarithms. Use of technology to solve a variety of equations, including those where there is no appropriate analytic approach.	4
2.7 Solutions of $g(x) \geq f(x)$. Graphical or algebraic methods, for simple polynomials up to degree 3.Use of technology for these and other functions.	3
Topic 3- Core: Circular Functions & Trigonometry.	**22** hours
3.1 The circle: radian measure of angles. Length of an arc; area of a sector.	2
3.2 Definition of $\cos\theta$, $\sin\theta$ and $\tan\theta$ in terms of the unit circle. Exact values of sin, cos and tan of 0, $\pi/6$, $\pi/4$, $\pi/3$, $\pi/2$ Definition of the reciprocal trigonometric ratios $\sec\theta$, $\csc\theta$ and $\cot\theta$. Pythagorean identities: $\cos2\theta+\sin2\theta=1$;$1+\tan2\theta=\sec2\theta$; $1+\cot2\theta=\csc2\theta$.	4
3.3 Compound angle identities.Double angle identities.	3
3.4 Composite functions of the form $f(x)=a\sin(b(x+c))+d$. Applications.	3
3.5 The inverse functions $x \to \arcsin x$, $x \to \arccos x$, $x \to \arctan x$; their domains and ranges; their graphs.	3
3.6 Algebraic and graphical methods of solving trigonometric equations in a finite interval, including the use of trigonometric identities and factorization.	3
3.7 The cosine rule The sine rule including the ambiguous case. Area of a triangle as ½ ab sinC. Applications.	4
Topic 4- Core: Vectors	**24** hours

4.1 Concept of a vector. Representation of vectors using directed line segments. Unit vectors; base vectors i, j, k. Algebraic and geometric approaches to the following: • the sum and difference of two vectors; • the zero vector 0 , the vector −v ; • multiplication by a scalar, kv ; • magnitude of a vector, ıvı ; • position vectors $\overrightarrow{OA}$ =a	4
4.2 The definition of the scalar product of two vectors. Properties of the scalar product: v·w=w·v; u·(v+w)=u·v+u·w; (kv)·w=k(v·w); v·v = ıvı . The angle between two vectors.Perpendicular vectors; parallel vectors.	4
4.3 Vector equation of a line in two and three dimensions: r = a +λb . Simple applications to kinematics. The angle between two lines.	3
4.4 Coincident, parallel, intersecting and skew lines; distinguishing between these cases. Points of intersection.	3
4.5 The definition of the vector product of two vectors. Properties of the vector product: V x w= −w×v; u×(v+w)=u×v+u×w; (kv)×w=k(v×w); v×v= 0 . Geometric interpretation of ıv×wı .	4
4.6 Vector equation of a plane r=a+λb+μc. Use of normal vector to obtain the form r·n=a·n. Cartesian equation of a plane ax+by+cz =d .	3
4.7 Intersections of: a line with a plane; two planes; three planes. Angle between: a line and a plane; two planes.	3
Topic 5 – Core: Statistics & Probability	**36** hours
5.1 Concepts of population, sample, random sample and frequency distribution of discrete and continuous data. Grouped data: mid-interval values, interval width, upper and lower interval boundaries. Mean, variance, standard deviation.	5
5.2 Concepts of trial, outcome, equally likely Outcomes, sample space (U) and event. The probability of an event A as P(A)=n(A)/n(U). The complementary events A and A′ (not A). Use of Venn diagrams, tree diagrams, counting principles and tables of outcomes to solve Problems.	4
5.3 Combined events; the formula for P(A∪B) . Mutually exclusive events.	4
5.4 Conditional probability; the definition: P(A|B) = P(A∩B)/P(B). Independent events; the definition: P(A|B) = P(A) = P(A|B'). Use of Bayes' theorem for two events.	5
5.5 Concept of discrete and continuous random variables and their probability distributions. Definition and use of probability density functions. Expected value (mean), mode, median, variance and standard deviation. Applications.	6

5.6 Binomial distribution, its mean and variance. Poisson distribution, its mean and variance.	6
5.7 Normal distribution. Properties of the normal distribution. Standardization of normal variables.	6
Topic 6- Core: Calculus	**48** hours
6.1 Informal ideas of limit, continuity and convergence. Definition of derivative from first principles The derivative interpreted as a gradient function and as a rate of change. Finding equations of tangents and normals.Identifying increasing and decreasing functions. The second derivative. Higher derivatives.	7
6.2 Derivatives of xn , sin x , cos x , tan x , ex and ln x . Differentiation of sums and multiples of functions. The product and quotient rules. The chain rule for composite functions. Related rates of change. Implicit differentiation. Derivatives of sec x , csc x , cot x , ax , loga x , arcsin x , arccos x and arctan x .	7
6.3 Local maximum and minimum values. Optimization problems. Points of inflexion with zero and non-zero gradients. Graphical behavior of functions, including the relationship between the graphs of f , f′ and f″ .	7
6.4 Indefinite integration as anti-differentiation. Indefinite integral of xn , sin x , cos x and ex .Other indefinite integrals using the results from 6.2. The composites of any of these with a linear Function.	8
6.5 Anti-differentiation with a boundary condition to determine the constant of integration. Definite integrals. Area of the region enclosed by a curve and the x-axis or y-axis in a given interval; areas of regions enclosed by curves. Volumes of revolution about the x-axis or y-axis.	7
6.6 Kinematic problems involving displacement s, velocity v and acceleration a Total distance travelled.	6
6.7 Integration by substitution Integration by parts.	6
Option-8 Sets, relations and groups	**48** hours
8.1 Finite and infinite sets. Subsets. Operations on sets: union; intersection; complement; set difference; symmetric difference. De Morgan's laws: distributive, associative and commutative laws (for union and intersection).	5
8.2 Ordered pairs: the Cartesian product of two sets. Relations: equivalence relations; equivalence Classes.	4

8.3 Functions: injections; surjections; bijections. Composition of functions and inverse functions.	4
8.4 Binary operations. Operation tables (Cayley tables).	3
8.5 Binary operations: associative, distributive and commutative properties.	3
8.6 The identity element e. The inverse a−1 of an element a. Proof that left-cancellation and right cancellation by an element a hold, provided that a has an inverse. Proofs of the uniqueness of the identity and inverse elements.	5
8.7 The definition of a group {G,∗}. The operation table of a group is a Latin square, but the converse is false. Abelian groups.	4
8.8 Examples of groups: •R, Q, Z and C addition; • integers under addition modulo n; • non-zero integers under multiplication, modulo p, where p is prime; symmetries of plane figures, including equilateral triangles and rectangles; invertible functions under composition of functions.	4
8.9 The order of a group. The order of a group element. Cyclic groups.Generators. Proof that all cyclic groups are Abelian.	4
8.10 Permutations under composition of permutations. Cycle notation for permutations.Result that every permutation can be written as a composition of disjoint cycles. The order of a combination of cycles.	4
8.11 Subgroups, proper subgroups. Use and proof of subgroup tests. Definition and examples of left and right cosets of a subgroup of a group. Lagrange's th eorem. Use and proof of the result that the order of a finite group is divisible by the order of any element. (Corollary to Lagrange's theorem.)	4
8.12 Definition of a group homomorphism. Definition of the kernel of a homomorphism. Proof that the kernel and range of a homomorphism are subgroups. Proof of homomorphism properties for identities and inverses. Isomorphism of groups. The order of an element is unchanged by an isomorphism.	4
Total Teaching Hours	230 hours
Internal Assessment-Exploration	10 hours
Grand Total	240 hours

Connection to IM

The students enrolled in IB Math HL will explore mathematics in a global context. They will look at the historical and cultural contributions to the field of mathematics. This will be accomplished by looking at:

- The history of mathematicians as well as time-line facts.
- The invention and use of the various tools and instruments of mathematics.
- The various number systems of the world.
- Mathematical linguistics.
- The universal approach to mathematical symbolism.

Connections to TOK

Proof: Axioms, rules of inference; mathematical deduction (and induction); is there more to math. than manipulation of symbols according to given rules; if not, then why is math. interesting? What is intelligence? Can a machine think? Alan Turing's test.
Logic: Limitations of logic.
Truth: universal truths; is math discovered or invented; could God make 2+4=5?
Nature of infinity: irrational numbers and Euclid's proof; one-one mappings and counting; Cantor's diagonal arguments.
Beauty and creativity: What makes a proof beautiful? Is the result or the proof more interesting? Ways of proving Pythagoras' Theorem.
Computers: Can we use computers to see things which were not otherwise possible eg fractals? Influences of computers and calculating devices on the development of math.
History: The story of mathematics; important turning points and significant mathematicians.

Map of mathematics: Who is doing math today? Where are the main centres? What are the main research areas? Who funds mathematics?.

IB Learner Profile Attributes in Mathematics

The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world.

LP Attributes	**IB Learner Profile**	**IB learner profile attributes connected to Mathematics with examples**
Inquirer	They develop their natural curiosity. They acquire the skills necessary to conduct inquiry and research and show independence in learning. They actively enjoy learning and this love of learning will be sustained throughout their lives	Inquirers look for patterns. Inquirers write proofs to illuminate the patterns they have discovered. Inquirers discover mathematical patterns and relationships to deepen their understanding and ownership of the ideas and concepts being studied.
Knowledgeable	They explore concepts, ideas and issues that have local and global significance. In so doing, they acquire in-depth knowledge and develop	Math is the global and multi-disciplinary language. For example, science expresses itself through math. Our understanding of math continues to evolve and deepen as our ability to

	understanding across a broad and balanced range of disciplines	explore ideas of greater complexity continues to develop
Thinkers	They exercise initiative in applying thinking skills critically and creatively to recognize and approach complex problems, and make reasoned, ethical decisions.	Higher level mathematics is dedicated to complex multi-step problems. Students are required to think critically in order to evaluate their solutions and problem solving approaches
Communicators	They understand and express ideas and information confidently and creatively in more than one language and in a variety of modes of communication. They work effectively and willingly in collaboration with others	Students must use appropriate math language because math has its own language. Communicating in this language requires an understanding of it set of rules, symbols, notation, syntax etc. Math has multiple modes of communication (graphical, algebraic and examples) that need to be mutually reinforcing and consistent
Principled	They act with integrity and honesty, with a strong sense of fairness, justice and respect for the dignity of the individual, groups and communities. They take responsibility for their own actions and the consequences that accompany them.	Students are expected to take responsibility for their own work and problem solving. Math is very unforgiving – if a student tries to pretend to work at or understand the subject, their lack of knowledge will be found out by the independent assessments
Open-minded	They understand and appreciate their own cultures and personal histories, and are open to the perspectives, values and traditions of other individuals and communities. They are accustomed to seeking and evaluating a range of points of view, and are willing to grow from the experience	Students explore and discover multiple methods of solving problems. Students understand that there are different perspectives that can be equally effective in visualizing, setting up, or solving problems.
Caring	They show empathy, compassion and respect towards the needs and feelings of others. They have a personal commitment to service, and act to make a positive difference to the lives of others and to the environment	Better students learn better by teaching peers and owning their peers' progress. Attaching real world emotions and morals to math problems by relating the mathematical concept to problems that have real human impact increases a student's appreciation for the role that math can play in improving the world in which they live
Risk Takers	They approach unfamiliar situations and uncertainty with courage and forethought, and have the independence of spirit to explore new roles, ideas and strategies. They are brave and articulate in defending their beliefs	Risk takers speak in class despite the possibility of being incorrect. Risk takers attack unfamiliar problems because they know they are good at math when they can solve them

Balanced	They understand the importance of intellectual, physical and emotional balance to achieve personal well-being for themselves and others	Balanced students manage their time in and out of the class. One way of maintaining balance is through finding the quick, simple ways to solve problems. A good understanding of math and its elegance can streamline problem solving and make students more effective and efficient
Reflective	They give thoughtful consideration to their own learning and experience. They are able to assess and understand their strengths and limitations in order to support their learning and personal development	Reflecting involves considering where assumptions are made that can lead to truth or error. Being able to reflect on your own work and how you are approaching a problem and how to correct an inferior method can lead to penetrating insights

Assessment:

Knowledge of IBO-required assessments and descriptors should be evident. All parts of IB assessment should be addressed, both internal and external. In addition, examples of non-IB monitoring should be given, if they are part of the course.

Assessment			
Paper	**Detail**	**Duration**	**Weightage**
	External Assessment	**5hrs**	**80%**
1	In this paper sec A contains short response worth 60 marks and Sec B contains extended response questions worth 60 marks(total marks 120) GDC is not allowed	**2hrs**	**30%**
2	In this paper section consists of compulsory short-response questions based on the core of the syllabus. It is worth 60 marks. (total marks 120) GDC is allowed	**2hrs**	**30%**
3	This paper contains small number of compulsory extended-response questions based on the option chosen.(total marks 60) GDC is allowed	**1hr**	**20%**
Internal Assessment-Exploration	Internal assessment in mathematics HL is an individual exploration. This is a piece of written work that involves investigating an area of mathematics(Total Marks 20)		**20%**

INTERNAL ASSESSMENT CRITERION FOR MATHEMATICS HIGHER LEVEL					
PT	A.Communication	B. Mathematical presentation	CPersonal engagement	D. Reflection	E. Use of mathematics
0	The exploration does not reach the standard described by the descriptors below.	The exploration does not reach the standard described by the descriptors below.	The exploration does not reach the standard described by the descriptors below.	The exploration does not reach the standard described by the descriptors below	The exploration does not reach the standard described by the descriptors below.
1	The exploration has some coherence.	There is some appropriate mathematical presentation	There is evidence of limited or superficial personal engagement	There is evidence of limited or superficial reflection.	Some relevant mathematics is used. Limited understanding is demonstrated.
2	The exploration has some coherence and shows some	The mathematical presentation is mostly appropriate.	There is evidence of some personal engagement.	There is evidence of meaningful reflection	Some relevant mathematics is used. The mathematics explored is partially correct. Some knowledge and understanding are demonstrated.
3	The exploration is coherent and well organized.	The mathematical presentation is appropriate throughout.	There is evidence of significant personal engagement	There is substantial evidence of critical reflection	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct. Good knowledge and understanding are demonstrated.
4	The exploration is coherent, well organized, concise and complete.		There is abundant evidence of outstanding personal engagement.		Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct and reflects the sophistication expected. Good knowledge and understanding are demonstrated.
5					Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct and reflects the sophistication and rigour expected. Thorough knowledge and
6					Relevant mathematics commensurate with the level of the course is used. The mathematics explored is precise and reflects the sophistication and rigour expected. Thorough knowledge and

SANGAM SCHOOL OF EXCELLENCE

Subject:- MATHEMATICS HIGHER LEVEL

Syllabus Break up (IB DP 1st year) –2014-15

S#	Month	Contents	Teaching Hrs
1	July ,14	The unit circle and Radian measure, Non right angled triangle trigonometry	19.5
2	August,14	Quadratics and Exponential, Complex numbers & Polynomials	15
3	September,14	Sequences and Series , Counting and the binomial expansion	13
4	October,14	Logarithms, Mathematical Induction,	8
5	November,14	Mathematical Induction (Contd), Crash Rev of unit	12
6	December,14	Functions , Transforming Functions	18
7	January,15	Revision of Trigonometry. , Introduction of Trigonometric Functions, Introduction of IA	12.75
8	February,15	Trigonometric Functions Contd	6.75
9	March,15	Complex numbers	18
10	April,15	Review of Sequence and Series, Discussion on IA (Exploration)	18
11	June,15	Trigonometric equations and identities	10
		TOTAL	151

May remains the month of Final Examinations and remains a summer break for Students of 1st year. The school splits for a Summer break for teachers by 25th May and reopens on 16th June.

Syllabus Break up (IB DP 2nd year) –2015-16

S#	Month	Contents	Teaching Hrs
1	July ,15	Introduction to differential calculus, rules of differentiation	19
2	August,15	Properties of curves and application of differential calculus	16
3	September,15	Integration and Application of integration and solution of doubts in the whole chapter	16
4	October,15	Descriptive Statistics and Probability	13
5	November,15	Discrete random variables	9
6	December,15	Continuous random variables and option topic 8	16
7	January,16	Option topic 8	14
8	February,16	Crash Revision of unit 1	9
9	March,16	Crash Revision of Unit 2 to 4	15
10	April,16	Crash revision of unit 5 and 6	17
		TOTAL	144

Resources:

List the books and other resource materials and software that will be used in the course. Information should include what is currently available as well as what is being ordered.

SANGAM SCHOOL OF EXCELLENCE

Books Required:

Name	Publisher	Description	Author
Mathematics for the International Student HL Core	Haese and Harris Publications	IB Diploma Higher Level	David Martin Robert Haese Sandra Haese Michael Haese Mark Humphries
Mathematics Higher Level Core	IBID Press	IB Diploma Higher Level	Fabio Cirrito
Mathematics for the International Student HL Option Topic 8	Haese and Harris Publications	Higher Level Topic-8 Set, Relations and Groups	Catherine Quinn Chris Sangwin Robert Haese Michael Haese
Mathematics Higher Level Option Topic-8	IBID Press	IB Diploma Higher Level	Fabio Cirrito
Mathematics for the International Student HL Core-Exam Preparation	Haese and Harris Publications	IB Diploma Higher Level	David Martin Robert Haese Sandra Haese Michael Haese Mark Humphries

Other resources: i. Casio CG-20 or Casio fx 9860 G II ii. Graph software iii. Geogebra etc

IA DEADLINES

Month	Date	Description
Jan 15	21st jan	Orientation for Math HL
Aug 2015	17th Aug	Introduction of exploration for math HL
Sep 20165	30th Sep	First draft submission of exploration for math HL
Nov 2015	24th Nov	Second draft submission of exploration for math HL
Nov 2015	27th Nov	Final Draft Submission of Exploration for Math HL

For group 5 subjects:

- Does the course provide adequate training in analytical and critical thought?
- Have courses been sequenced to provide appropriate preparation for the various mathematics options and computer science?
- How will the international perspective of your students be enhanced by the methodology and resources used in the teaching of mathematics/computer science?
- Does the classroom and/or library contain a variety of modern mathematics textbooks, technical reference materials and other supplementary instructional materials to support the course(s) in IB mathematics?
- Does the classroom and/or library contain sufficient materials to support the computer science course?

Yes because students read the problem carefully then they think that how to solve the problem using different methods. Sometimes they solve their problems by healthy discussion.

Yes courses have been sequenced to develop intercultural and international mindedness in the students. This course provides appropriate preparation for the various mathematics options for all over development of the students. The

They will solve their problems using all the resources provided by IB online and other sites to develop international mindedness.

Yes the classroom and/or library contain a variety of modern mathematics textbooks, technical reference materials and other supplementary instructional materials to support the course(s) in IB mathematics. There are some study guides from IBDP Press and some from Cambridge University.