

令和5年度 神奈川県立横浜国際高等学校 指導計画（予定）

教科・科目	Mathematics: analysis and approaches (HL)	学年	2, 3	教科書	Haese Mathematics Core Topics HL
		単位数	5, 5	副教材	Haese Mathematics Analysis and Approaches HL

学習目標	Aims of Mathematics SL course are to: 1. enjoy mathematics, and develop an appreciation of the elegance and power of mathematics. 2. develop an understanding of the principles and nature of mathematics. 3. communicate clearly and confidently in a variety of contexts. 4. develop logical, critical and creative thinking, and patience and persistence in problem solving. 5. employ and refine their powers of abstraction and generalization. 6. apply and transfer skills to alternative situations, to other areas of knowledge and to future developments. 7. appreciate how developments in technology and mathematics have influenced each other. 8. appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics. 9. appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives. 10. appreciate the contribution of mathematics to other disciplines, and as a particular “area of knowledge” in the TOK course.
学習方法	The internally assessed 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.

内容のまとめり	時 期	単元(題材)	評価方法
Unit 1: Number and algebra	Grade 1	1.1 Operations with numbers 1.2 Arithmetic sequences and series 1.3 Geometric sequences and series 1.4. Financial applications of geometric sequences and series 1.5 Laws of exponents with integer exponents 1.6 Simple deductive proof, numerical and algebraic 1.7 Laws of exponents with rational exponents 1.8 Sum of infinite convergent geometric sequences 1.9 The binomial theorem 1.10 Counting principles, including permutations and combinations 1.11 Partial fractions 1.12 Complex numbers 1.13 Modulus–argument (polar) form 1.14 Complex conjugate roots of quadratic and polynomial equations 1.15 Proof by mathematical induction 1.16 Solutions of systems of linear equations	Problem solving and graphing of real world problems in the activities. Graphing vectors and identifying special properties through computation.
Unit 2: Functions	Grade 2 first semester	2.1 The different forms of the equation of a straight line; gradient; intercepts 2.2 Concept of a function, domain, range and graph 2.3 The graph of a function 2.4 Determine key features of graphs 2.5 Composite functions 2.6 The quadratic function 2.7 Solution of quadratic equations and inequalities 2.8 The reciprocal function 2.9 Exponential functions and their graphs 2.10 Solving equations, both graphically and analytically 2.11 Transformations of graphs; translations 2.12 Polynomial functions, their graphs and equations 2.13 Rational functions 2.14 Odd and even functions 2.15 Solutions of $g(x)^3 = f(x)$, both graphically and analytically 2.16 The graphs of the functions	

Unit 3: Geometry and trigonometry	Grade 2 second semester	<p>3.1 The distance between two points in three-dimensional space, and their midpoint</p> <p>3.2 Use of sine, cosine and tangent ratios to find the sides and angles of right-angled triangles</p> <p>3.3 Applications of right and non-right angled trigonometry</p> <p>3.4 The circle</p> <p>3.5 Definition of \cos, \sin in terms of the unit circle</p> <p>3.6 Double angle identities for sine and cosine</p> <p>3.7 The circular functions $\sin x$, $\cos x$ and $\tan x$</p> <p>3.8 Solving trigonometric equations in a finite interval</p> <p>3.9 Pythagorean identities</p> <p>3.10 Compound angle identities</p> <p>3.11 Relationships between trigonometric functions and the symmetry properties</p> <p>3.12 Concept of a vector; position vectors</p> <p>3.13 The definition of the scalar product of two vectors</p> <p>3.14 Vector equation of a line in two and three dimensions</p> <p>3.15 Coincident, parallel, intersecting and skew lines, distinguishing between these cases</p> <p>3.16 The definition of the vector product of two vectors; properties of the vector product</p> <p>3.17 Vector equations of a plane</p> <p>3.18 Intersections of: a line with a plane, two planes, three planes</p>		
Unit 4: Probability and statistics	Grade 3 first semester	<p>4.1 Concepts of population, sample, random sample, discrete and continuous data</p> <p>4.2 Presentation of data (discrete and continuous); frequency histograms with equal class intervals</p> <p>4.3 Measures of central tendency</p> <p>4.4 Linear correlation of bivariate data</p> <p>4.5 Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event</p> <p>4.6 Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities</p> <p>4.7 Concept of discrete random variables and their probability distributions</p> <p>4.8 Binomial distribution</p> <p>4.9 The normal distribution and curve</p> <p>4.10 Equation of the regression line of x on y</p> <p>4.11 Formal definition and use of the formulae</p> <p>4.12 Standardization of normal variables</p> <p>4.13 Use of Bayes' theorem for a maximum of three events</p> <p>4.14 Variance of a discrete random variable</p>		
Unit 5: Calculus	Grade 3 second semester	<p>5.1 Introduction to the concept of a limit</p> <p>5.2 Increasing and decreasing functions</p> <p>5.3 Derivative of functions</p> <p>5.4 Tangents and normals at a given point, and their equations</p> <p>5.5 Introduction to integration as anti-differentiation of functions</p> <p>5.6 Derivative of variety of functions</p> <p>5.7 The second derivative</p> <p>5.8 Local maximum and minimum points</p> <p>5.9 Kinematic problems involving displacement s, velocity v, acceleration a and total distance travelled.</p> <p>5.10 Indefinite integral of variety of functions</p> <p>5.11 Definite integrals, including analytical approach</p> <p>5.12 Informal understanding of continuity and differentiability of a function at a point</p> <p>5.13 The evaluation of limits of the form</p> <p>5.14 Implicit differentiation</p> <p>5.15 Derivatives of $\tan x$, $\sec x$, $\operatorname{cosec} x$, $\cot x$ etc.</p> <p>5.16 Integration by substitution</p> <p>5.17 Area of the region enclosed by a curve and the y-axis in a given interval</p> <p>5.18 First order differential equations</p> <p>5.19 Maclaurin series to obtain expansions</p>	Problem solving and graphing of real world problems in the activities. Graphing vectors and identifying special properties through computation.	
Trial Examination				
最終試験 評価項目	外部評価 (EA)	Paper 1	ペーパーテスト	30%
		Paper 2	ペーパーテスト	30%
		Paper 3	ペーパーテスト	20%
	内部評価 (IA)		「数学探究」	20%