

MATHS: APPLICATIONS & INTERPRETATIONS SL

Content overview

There are five topics in this mathematics class, which are:

1. Number and algebra
2. Functions
3. Geometry and trigonometry
4. Probability and statistics
5. Calculus

Assessment techniques:

External and internal assessment will be used in Math AI SL.

- External assessment (80%):
 - Paper 1 (40%): 1h30, compulsory short-response questions based on the syllabus (80 marks ; the marks allocated are indicated at the start of each question)
 - Paper 2 (40%): 1h30, compulsory extended-response questions based on the syllabus (80 marks ; the marks allocated are indicated at the start of each question)
- Internal assessment (20%):

The individual exploration is a report written by the student based on a topic chosen by him or her, and it should focus on the mathematics of that particular area. The emphasis is on mathematical communication with his or her own focus.

The exploration is intended to provide students with opportunities to increase their understanding of mathematical concepts and processes, and to develop a wider appreciation of mathematics.

- This assessment is internally assessed by the teacher and externally moderated by the IB
- Marked on 20 and assessed against five criteria

Assessments within the course :

- Formative assessments :
 - Class participation
 - Homework assignments
 - Quiz
 - Peer assessment
 - Exit tickets
- Summative assessments :
 - Unit tests
 - Mock exams (2 weeks per year)

Details :

Year 1: Rentrée – Compos Décembre (12 weeks)	
Content	Connections, resources, assessment
Number and algebra basics Law of exponents, logarithms, exponentials, rounding, % error	<u>Links to other subjects:</u> Physics (order of magnitude), Biology (microscopic measurements) – Sciences (uncertainty and precision of measurement) <u>TOK connections:</u> Is mathematics invented or discovered?
Sequences, compound interest Arithmetic and geometric sequences and series, compound interest, annuities, amortization	<u>CAS connection:</u> service – raise awareness about loans and interests paid (link with economics as well). <u>TOK connections:</u> How do mathematicians reconcile the fact that some conclusions seem to conflict with our intuitions? <i>Consider for instance that a finite area can be bounded by an infinite perimeter.</i>
Functions and models	<u>Links to other subjects:</u> Economics (exchange rates and price, conversions and cost functions, market equilibrium) ; Biology (population growth, spread of a virus) ;

<p>Linear and quadratic functions, cubic and exponential models</p>	<p><u>TOK Connections:</u> personal & shared knowledge – focus of math language. Can math be seen as a language? Does studying the graph of a function contain the same level of mathematical rigour as studying the function algebraically?</p> <p><u>CAS connection:</u> creativity – create displays about discrete and continuous quantities, math notation and terminology associated with each of these types of quantities, and their graphical representation.</p> <p><u>Learner profile:</u> Reflective – focus on how modelling reflects reality/how close a model is from a real-life situation</p>
<p>Year 1: Décembre – Compos mars (10 weeks)</p>	
<p>Content</p>	<p>Connections, resources, assessment</p>
<p>Statistics</p> <p>Collecting and organizing data, sampling techniques, diagrams</p>	<p><u>Links to other subjects:</u> descriptive statistics and random samples presentation of data (Biology, Environmental systems and societies, geography, economics);</p> <p><u>TOK connections:</u> Why have mathematics and statistics sometimes been treated as separate subjects? How easy is it to be misled by statistics? Is it ever justifiable to purposely use statistics to mislead others?</p> <p><u>Learner profile:</u> Communicators – transcribe the data analysis into an understandable conclusion. Make sure to select a non-biased sample. Principled - Focus on the ethics behind the misrepresentation of statistics</p>
<p>Correlation / Line of best fit</p> <p>Scatter diagrams, Pearson's and Spearman's coefficients, regression line</p>	<p><u>Links to other subjects:</u> Sciences (curves of best fit, correlation and causation); Geography (scatter graphs); fieldwork (Biology, environmental systems and societies)</p> <p><u>TOK connections:</u> What factors affect the reliability and validity of mathematical models in describing real-life phenomena? Does correlation imply causation ?</p>
<p>Probability</p> <p>Basic probability, tree diagrams, Venn diagrams</p>	<p><u>TOK connections:</u> To what extent are theoretical and experimental probabilities linked? Should mathematicians be held responsible for unethical applications of their work?</p> <p><u>Learner profile:</u> Communicators – focus on how to transcribe the math given/done into a clear conclusion understandable by everybody.</p>
<p>Year 1: mars – fin juin (11 weeks)</p>	
<p>Content</p>	<p>Connections, resources, assessment</p>
<p>Differential calculus</p> <p>Limits, derivatives, tangents, normals, optimization</p>	<p><u>Links to other subjects:</u> Economics (marginal costs, marginal revenue, marginal profit, market structures, price elasticity, allocative efficiency);</p> <p><u>TOK connections:</u> Is infinitesimal behaviour applicable to real life? In what ways has technology impacted how knowledge is produced and shared in mathematics?</p>
<p>Statistical tests</p> <p>χ^2, t-test</p>	<p><u>Links to other subjects:</u> Fieldwork (biology, environmental systems and societies, geography)</p> <p><u>TOK connections:</u> Is saying that a result is significant the same as saying it is true? How is the term “significant” used differently in different areas of knowledge?</p>

All material adapted from the IB subject guide

Year 2: Rentrée – Compos Décembre (12 weeks)	
Content	Connections, resources, assessment
<p>Probability distributions</p> <p>Binomial & normal distributions</p>	<p><u>Links to other subjects:</u> Normally distributed real-life measurements and descriptive statistics (Sciences, environmental systems and societies)</p> <p><u>TOK connections:</u> What do we mean by a “fair game” ? Is it fair that casinos should make a profit?</p>
<p>Trigonometry and volumes</p> <p>Trigonometric ratios, sine & cosine rules, 3D geometry, arc length and area of a sector</p>	<p><u>TOK connections:</u> Is it ethical that Pythagoras gave his name to a theorem that may not have been his own creation? What criteria might we use to make such a judgement?</p> <p>IA – 1st draft due</p>
Year 2: Décembre – Bac Blanc	
Content	Connections, resources, assessment
<p>Coordinate geometry</p> <p>Distances, midpoints, slopes, equations of lines, parallel and perpendicular lines, Voronoi diagrams</p>	<p><u>TOK connections:</u> Are axioms self-evident to everybody?</p>
<p>Integration</p> <p>Versus differentiation, areas</p>	<p><u>Links to other subjects:</u> Physics (velocity-time and acceleration-time graphs)</p> <p>IA – Final draft due</p>
<p>Trigonometric functions and models</p> <p>Periodic functions, sinusoidal models</p>	
Year 2: Post-Bac Blanc – End of April	
Content	Connections, resources, assessment
Revision	