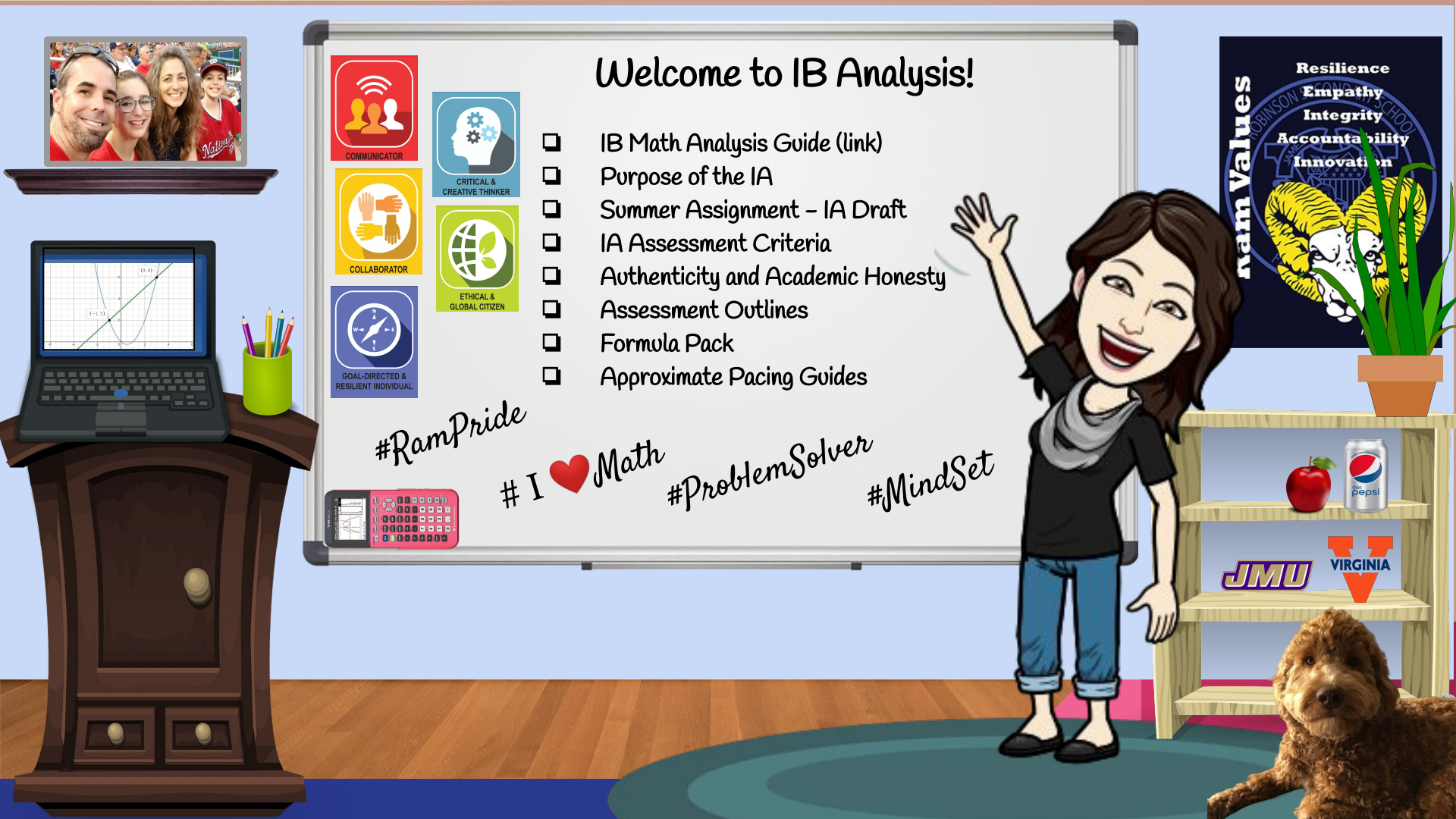
Welcome to IB Analysis!
COMMUNICATOR
CRITICAL & CREATIVE THINKER
COLLABORATOR
ETHICAL & GLOBAL CITIZEN
GOAL-DIRECTED & RESILIENT INDIVIDUAL
IB Math Analysis Guide (link)
Purpose of the IA
Summer Assignment – IA Draft
IA Assessment Criteria
Authenticity and Academic Honesty
Assessment Outlines
Formula Pack
Approximate Pacing Guides
#RamPride
I ❤ Math
#ProblemSolver
#MindSet
Resilience
Empathy
Integrity
Accountability
Innovation
JMU
VIRGINIA

IB Mathematics Analysis and Approaches

Link to Course Guide:

https://drive.google.com/file/d/1g4F_DygOayv88uq0VQ6UireCQH-e3qRf/view?usp=sharing

The following slides contain excerpts from the Guide

The specific purposes of the exploration (IA) are to:

- develop students' personal insight into the nature of mathematics and to develop their ability to ask their own questions about mathematics
- provide opportunities for students to complete a piece of mathematical work over an extended period of time
- enable students to experience the satisfaction of applying mathematical processes independently
- provide students with the opportunity to experience for themselves the beauty, power and usefulness of mathematics
- encourage students, where appropriate, to discover, use and appreciate the power of technology as a mathematical tool
- enable students to develop the qualities of patience and persistence, and to reflect on the significance of their work
- provide opportunities for students to show, with confidence, how they have developed mathematically.

"Internal assessment is an integral part of the course and is compulsory for both SL and HL students. It enables students to demonstrate the application of their skills and knowledge and to pursue their personal interests without the time limitations and other constraints that are associated with written examinations."

IB Math Analysis Summer Assignment 2020

- Objective: <u>All</u> SL/HL students will develop individual IA drafts
- This is the <u>only</u> draft you will be allowed to submit
- Expectations for the IA draft (worth 40 points on 1st quarter)
  - The student will turn in the draft via Blackboard/SafeAssign by the end of the 2nd week of the 2020-2021 school year (8 points)
  - The student will include at least 900 words (8 points)
  - The student will include the aim, rationale, and develop the exploration based on the aim/rationale. If exploration is not finished, work should be coherent and include plan explaining how the paper will develop (8 points)
  - The student will use appropriate mathematical terminology and vocabulary. The student will NOT use calculator notation, like ^ or *. The student will NOT use math slang, like 'plug in' or abbreviations (8 points)
  - The student will include a bibliography and citations throughout paper (8 points)
- Support
  - I check email daily and I'm happy to help you! Please email me: aksmall@fcps.edu
  - Join the Analysis Google Classroom: (code tbd)

Final IA due November 2020

- Do your best now, you'll be thankful later when you're busy with:
  - IAs for other classes, SATs, ACTs, Junior or Senior year activities and responsibilities, college applications and essays, class assignments and assessments
- Your final IA should be approximately 12-20 pages with double line spacing,
  - That includes diagrams, tables, graphs, and computations, but excludes the bibliography
  - Quality of writing is more important than quantity. Aim for precision, logic, and clarity.
  - Introduction, exploration, conclusion, bibliography
- Use graphing software to generate and label graphs and diagrams
- Express your results to an appropriate degree of accuracy (3 sig figs)
- When writing an approximation, use ' ≈ ' and not ' = '
- Cover page of the exploration should have title of the exploration and number of pages
- Use the rubric with criteria descriptors (A, B, C, D, E) to guide you

- Title
  - From IB: If the exploration is based on a stimulus, it is recommended that the title not just be the stimulus. Rather, the title should give a better indication of where the stimulus has taken the student. For example rather than have the title “Number patterns”, the title could be “Number patterns - exploring patterns in final digits of prime numbers”.

- Introduction
  - State the clear aim of your exploration
  - Share your rationale (purpose for choosing topic)
  - Thesis statement, if applicable

- Logically developed exploration

  - Express ideas clearly so your work is easy for your peers to follow.
  - Focus on the aim, avoid irrelevance. Avoid being repetitive. Do not add information “just because”.
  - Structure your ideas in a logical manner.
  - State appropriate definitions and explanations of concepts.
  - Define variables, use technology to create diagrams that are clear and well-labeled.
  - Use precise notation, applicable graphs, and math computations.
  - If the reader has to pause to figure out what you’re saying or look back a few pages to “get the idea”, you have a fault in your communication.
  - Include graphs, tables, diagrams, and computations in appropriate places.
  - Use an Appendix for data/tables that exceed a full page.
  - Cite references and direct quotes (select and use a standard method, like MLA).

- Conclusion
  - Tie up all of the major ideas of your paper
  - Personal engagement - this is NOT a section of the paper - this IS demonstrated throughout and (probably) in your conclusion, too
  - Not how much you “enjoy” the topic. Rather, “How much of the investigation did you make your own?”
  - Discuss the results, but more importantly, how reasonable your results and conclusions appear
  - Think/write about how to apply what you learned through this investigation
  - Think/write about if there were any improvements which could be made to your study
  - To enhance communication, comment on and interpret results (and their validity) at the point at which results are used and summarize in conclusion.
- Bibliography - pick and follow a standard method, like MLA

Internal assessment criteria—SL and HL

The exploration is internally assessed by the teacher and externally moderated by the IB using assessment criteria that relate to the objectives for mathematics.

Each exploration is assessed against the following five criteria. The final mark for each exploration is the sum of the scores for each criterion. The maximum possible final mark is 20.

Students will not receive a grade for their mathematics course if they have not submitted an exploration.

Criterion A	Presentation
Criterion B	Mathematical communication
Criterion C	Personal engagement
Criterion D	Reflection
Criterion E	Use of mathematics

Criterion A: Presentation

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	The exploration has some coherence or some organization.
2	The exploration has some coherence and shows some organization.
3	The exploration is coherent and well organized.
4	The exploration is coherent, well organized, and concise.

Criterion A: Presentation

The "presentation" criterion assesses the organization and coherence of the exploration.

A **coherent** exploration is logically developed, easy to follow and meets its aim. This refers to the overall structure or framework, including introduction, body, conclusion and how well the different parts link to each other.

A **well-organized** exploration includes an introduction, describes the aim of the exploration and has a conclusion. Relevant graphs, tables and diagrams should accompany the work in the appropriate place and not be attached as appendices to the document. Appendices should be used to include information on large data sets, additional graphs, diagrams and tables.

A **concise** exploration does not show irrelevant or unnecessary repetitive calculations, graphs or descriptions.

The use of technology is not required but encouraged where appropriate. However, the use of analytic approaches rather than technological ones does not necessarily mean lack of conciseness, and should not be penalized. This does not mean that repetitive calculations are condoned.

Criterion A: Presentation

Presentation

- Express ideas clearly
- Identify a clear aim for the exploration
- Focus on the aim and avoiding irrelevance
- Structure ideas in a logical manner
- Include graphs, tables and diagrams at appropriate places
- Edit the exploration so that it is easy to follow
- Cite references where appropriate

Criterion B: Mathematical communication

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	The exploration contains some relevant mathematical communication which is partially appropriate.
2	The exploration contains some relevant appropriate mathematical communication.
3	The mathematical communication is relevant, appropriate and is mostly consistent.
4	The mathematical communication is relevant, appropriate and consistent throughout.

Criterion B: Mathematical communication

The "mathematical communication" criterion assesses to what extent the student has:

- used appropriate mathematical language (**notation, symbols, terminology**). Calculator and computer notation is acceptable only if it is software generated. Otherwise it is expected that students use appropriate mathematical notation in their work
- defined **key terms** and variables, where required
- used **multiple forms of mathematical representation**, such as formulae, diagrams, tables, charts, graphs and models, where appropriate
- used a **deductive method** and set out proofs logically where appropriate

Examples of level 1 can include graphs not being labelled, consistent use of computer notation with no other forms of correct mathematical communication.

Level 4 can be achieved by using only one form of mathematical representation as long as this is appropriate to the topic being explored. For level 4, any *minor* errors that do not impair clear communication should not be penalizsed.

Criterion B: Mathematical communication

Mathematical communication

- Use appropriate mathematical language and representation
- Define key terms and variables, where required
- Select appropriate mathematical tools (including information and communication technology)
- Set out any proofs in a logical way
- Express results to an appropriate degree of accuracy

Criterion C: Personal engagement

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	There is evidence of some personal engagement.
2	There is evidence of significant personal engagement.
3	There is evidence of outstanding personal engagement.

Criterion C: Personal engagement

The "personal engagement" criterion assesses the extent to which the student engages with the topic by exploring the mathematics and making it their own. It is not a measure of effort.

Personal engagement may be recognized in different ways. These include thinking independently or creatively, presenting mathematical ideas in their own way, exploring the topic from different perspectives, making and testing predictions. Further (but not exhaustive) examples of personal engagement at different levels are given in the teacher support material (TSM).

There must be evidence of personal engagement demonstrated in the student's work. It is not sufficient that a teacher comments that a student was highly engaged.

Textbook style explorations or reproduction of readily available mathematics without the candidate's own perspective are unlikely to achieve the higher levels.

Significant: The student demonstrates authentic personal engagement in the exploration on a few occasions and it is evident that these drive the exploration forward and help the reader to better understand the writer's intentions.

Outstanding: The student demonstrates authentic personal engagement in the exploration in numerous instances and they are of a high quality. It is evident that these drive the exploration forward in a creative way. It leaves the impression that the student has developed, through their approach, a complete understanding of the context of the exploration topic and the reader better understands the writer's intentions.

Criterion C: Personal engagement

Personal engagement

- Ask questions, make conjectures and investigate mathematical ideas
- Read about mathematics and research areas of interest
- Look for and create mathematical models for real-world situations
- Consider historical and global perspectives
- Explore unfamiliar mathematics

Criterion D: Reflection

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	There is evidence of limited reflection.
2	There is evidence of meaningful reflection.
3	There is substantial evidence of critical reflection.

Criterion D: Reflection

The "reflection" criterion assesses how the student reviews, analyses and evaluates the exploration. Although reflection may be seen in the conclusion to the exploration, it may also be found throughout the exploration.

Simply describing results represents **limited reflection**. Further consideration is required to achieve the higher levels.

Some ways of showing **meaningful reflection** are: linking to the aims of the exploration, commenting on what they have learned, considering some limitation or comparing different mathematical approaches.

Critical reflection is reflection that is crucial, deciding or deeply insightful. It will often develop the exploration by addressing the mathematical results and their impact on the student's understanding of the topic. Some ways of showing critical reflection are: considering what next, discussing implications of results, discussing strengths and weaknesses of approaches, and considering different perspectives.

Substantial evidence means that the critical reflection is present throughout the exploration. If it appears at the end of the exploration it must be of high quality and demonstrate how it developed the exploration in order to achieve a level 3.

Criterion D: Reflection

Reflection

- Discuss the implications of results
- Consider the significance of the exploration
- Look at possible limitations and/or extensions
- Make links to different fields and/or areas of mathematics
- Consider "what next?"

Criterion E: Use of mathematics—SL

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	Some relevant mathematics is used.
2	Some relevant mathematics is used. Limited understanding is demonstrated.
3	Relevant mathematics commensurate with the level of the course is used. Limited understanding is demonstrated.
4	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is partially correct. Some knowledge and understanding are demonstrated.
5	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is mostly correct. Good knowledge and understanding are demonstrated.
6	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct. Thorough knowledge and understanding are demonstrated.

Criterion E: Use of mathematics—SL

The "Use of mathematics" SL criterion assesses to what extent students use mathematics that is **relevant** to the exploration.

Relevant refers to mathematics that supports the development of the exploration towards the completion of its aim. Overly complicated mathematics where simple mathematics would suffice is not relevant.

Students are expected to produce work that is **commensurate with the level** of the course, which means it should not be completely based on mathematics listed in the prior learning. The mathematics explored should either be part of the syllabus, or at a similar level.

A key word in the descriptor is **demonstrated**. The command term demonstrate means "to make clear by reasoning or evidence, illustrating with examples or practical application". Obtaining the correct answer is not sufficient to demonstrate understanding (even some understanding) in order to achieve level 2 or higher.

For knowledge and understanding to be **thorough** it must be demonstrated throughout.

The mathematics can be regarded as **correct** even if there are occasional minor errors as long as they do not detract from the flow of the mathematics or lead to an unreasonable outcome.

Students are encouraged to use technology to obtain results where appropriate, but **understanding must be demonstrated** in order for the student to achieve higher than level 1, for example merely substituting values into a formula does not necessarily demonstrate understanding of the results.

The mathematics only needs to be what is required to support the development of the exploration. This could be a few small elements of mathematics or even a single topic (or sub-topic) from the syllabus. It is better to do a few things well than a lot of things not so well. If the mathematics used is relevant to the topic being explored, commensurate with the level of the course and understood by the student, then it can achieve a high level in this criterion.

Criterion E: Use of mathematics—HL

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	Some relevant mathematics is used. Limited understanding is demonstrated.
2	Some relevant mathematics is used. The mathematics explored is partially correct. Some knowledge and understanding is demonstrated.
3	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct. Some knowledge and understanding are demonstrated.
4	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct. Good knowledge and understanding are demonstrated.
5	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is correct and demonstrates sophistication or rigour. Thorough knowledge and understanding are demonstrated.
6	Relevant mathematics commensurate with the level of the course is used. The mathematics explored is precise and demonstrates sophistication and rigour. Thorough knowledge and understanding are demonstrated.

Criterion E: Use of mathematics—HL

The "Use of mathematics" HL criterion assesses to what extent students use **relevant** mathematics in the exploration.

Students are expected to produce work that is **commensurate with the level** of the course, which means it should not be completely based on mathematics listed in the prior learning. The mathematics explored should either be part of the syllabus, at a similar level or slightly beyond. However, mathematics of a level slightly beyond the syllabus is **not** required to achieve the highest levels.

A key word in the descriptor is **demonstrated**. The command term demonstrate means to make clear by reasoning or evidence, illustrating with examples or practical application. Obtaining the correct answer is not sufficient to demonstrate understanding (even some understanding) in order to achieve level 2 or higher.

For knowledge and understanding to be **thorough** it must be demonstrated throughout. Lines of reasoning must be shown to justify steps in the mathematical development of the exploration.

Relevant refers to mathematics that supports the development of the exploration towards the completion of its aim. Overly complicated mathematics where simple mathematics would suffice is not relevant.

The mathematics can be regarded as **correct** even if there are occasional minor errors as long as they do not detract from the flow of the mathematics or lead to an unreasonable outcome. **Precise** mathematics is error-free and uses an appropriate level of accuracy at all times.

Criterion E: Use of mathematics—HL

Sophistication: To be considered as sophisticated the mathematics used should be commensurate with the HL syllabus or, if contained in the SL syllabus, the mathematics has been used in a complex way that is beyond what could reasonably be expected of an SL student. Sophistication in mathematics may include understanding and using challenging mathematical concepts, looking at a problem from different perspectives and seeing underlying structures to link different areas of mathematics.

Rigour involves clarity of logic and language when making mathematical arguments and calculations. Mathematical claims relevant to the development of the exploration must be justified or proven.

Students are encouraged to use technology to obtain results where appropriate, but **understanding must be demonstrated** in order for the student to achieve level 1 or higher, for example merely substituting values into a formula does not necessarily demonstrate understanding of the results.

The mathematics only needs to be what is required to support the development of the exploration. This could be a few small elements of mathematics or even a single topic (or sub-topic) from the syllabus. It is better to do a few things well than a lot of things not so well. If the mathematics used is relevant to the topic being explored, commensurate with the level of the course and understood by the student, then it can achieve a high level in this criterion.

Criterion E: Use of mathematics—HL

Use of mathematics

- Demonstrate knowledge and understanding
- Apply mathematics in different contexts
- Apply problem-solving techniques
- Recognize and explain patterns, where appropriate
- Generalize and justify conclusions

Academic Honesty and Authenticity of Work

Authenticity may be checked by discussion with the student on the content of the work, and scrutiny of one or more of the following:

- the student's initial proposal
- the draft of the written work
- the references cited
- the style of writing compared with work known to be that of the student
- the analysis of the work by a web-based plagiarism detection service such as www.turnitin.com.

The same piece of work cannot be submitted to meet the requirements of both the internal assessment and the extended essay.

Assessment component	Weighting
External assessment (3 hours) **Paper 1 (90 minutes)** No technology allowed. (80 marks) *Section A* Compulsory short-response questions based on the syllabus. *Section B* Compulsory extended-response questions based on the syllabus.	**80%** **40%**
Paper 2 (90 minutes) Technology required. (80 marks) *Section A* Compulsory short-response questions based on the syllabus. *Section B* Compulsory extended-response questions based on the syllabus	**40%**
Internal assessment This component is internally assessed by the teacher and externally moderated by the IB at the end of the course. **Mathematical exploration** Internal assessment in mathematics is an individual exploration. This is a piece of written work that involves investigating an area of mathematics. (20 marks)	**20%**

Assessment Outline SL

Assessment component	Weighting
External assessment (5 hours)	**80%**
Paper 1 (120 minutes)	
No technology allowed. (110 marks)	**30%**
Section A	
Compulsory short-response questions based on the syllabus.	
Section B	
Compulsory extended-response questions based on the syllabus.	
Paper 2 (120 minutes)	**30%**
Technology required. (110 marks)	**20%**
Section A	
Compulsory short-response questions based on the syllabus.	
Section B	
Compulsory extended-response questions based on the syllabus.	
Paper 3 (60 minutes)	
Technology required. (55 marks)	
Two compulsory extended response problem-solving questions.	
Internal assessment	**20%**
This component is internally assessed by the teacher and externally moderated by the IB at the end of the course.	
Mathematical exploration	
Internal assessment in mathematics is an individual exploration. This is a piece of written work that involves investigating an area of mathematics. (20 marks)	

Assessment Outline HL

List of Previously Submitted Titles

The following list gives the titles of some explorations for the internal assessment that attained a variety of marks. Some titles are more descriptive than others and in most cases the original wording has been retained. These categories and titles are not an exhaustive list and have been chosen only as guidance.

Aesthetics

Calculating beauty–the golden ratio

Colour preferences

Daylight in a classroom–architectural design

Is my mirror showing an accurate image?

M.C. Escher: Symmetry and infinity of art

Modelling the surface area of the glass dome of the Galleria Vittorio Emanuele II in Milan, Italy

Searching for the ideal sound

Shadows and height

Business and finance

A comparative study of shares, real estate, bonds and banks

Analysis of stock market changes

Applications of calculus to the economics of firms

Buying a car or a house–payment options

Code breaking

Economic development and levels of income

Finding the lowest values of the dimensions of differently shaped storage rooms using differential calculus and optimisation

International phone call pricing

Statistics on flight information for an international airline

Food and drink

Costs of products bought online compared to local grocery stores

Dine in or dine out?

How many peas are there in a 500 gram box of peas?

Jelly bean study

The cookie problem–taste is all-important

The operation of a tuck shop

The volume of an egg

What is the greatest candy bar in the world?

Health and fitness

A comparison between calorie intake and gender

A comparison between lung capacity, age, weight and body fat

Aids awareness in Maseru

Blood pressure

Breakfast and school grades

Breast and cervical cancer–ethnic comparison

Infant mortality

Investigating reaction times

The SIR model in relation to world epidemics

Geometry and trigonometry

Geodesic domes

Graph theory–finding the shortest path

Newton-Raphson

Origami applications to mathematics

Sine waves in pitch frequencies

Spanning trees

Spherical geometry

Stacking bricks

The ideal cut of a diamond

The Ferris wheel

The open Knight's Tour on a chessboard

Topography and distance

Nature and natural resources

Airfoil and lift force

Analysis of the cost and utility of gas versus electricity in an average domestic situation

Animal population

Calculating the time of sunrise and sunset

Chaos theory: universal prediction

Counting weeds

Earthquakes–can they be predicted?

Florence Nightingale and modelling spread of disease

Graphing the Pharmacokinetic Profile

How does population density affect the transmission of Ebola?

Is the swell of the sea influenced by the temperature?

Modelling Arctic Sea ice cover

Modelling rainfall

Modelling the cooling of a cup of tea

Optimum dimensions of an aluminium drink can

Predicting cooling times

Rainfall compared to grape vine yield

Statistical investigation of leaves

The quality of local water

The SIR model in relation to world epidemics

The volume of an egg

Sunspot cycles

What is the relationship between the duration of drainage and water height in my bathtub?

Number

Approximation of pi

Cyclic situations and patterns through happy numbers

e, π and φ: are they related?

The golden number phi

What is e?

Euler's totient theorem

People

Assuming a person has an 85% chance of meeting a soul mate during their lifetime, what does that mean about the number of potential soul mates in the world?

Correlation between divorce rate and financial uncertainty

Does gender influence choice of favourite animal?

Does the electoral college in the US truly represent the political choice of the people?

Effect on tipping percentages

Exploring the gamblers' fallacy–why it can cause fatal decisions

Is film genre choice more dependent on nationality or gender?

Gender-based discrimination

Left-handed students

Memory

Perception of time

Relationship between a country's human development index and infant mortality rate

Relationship between GDP and fertility rate in countries across the world

Relationship between income inequality and rate of corruption in a country

Relations between international and bilingual students: jobs, pocket money and spending behaviour

Relationship between unemployment and criminality in Sweden from 1988-1999

Relationship between women's secondary education and fertility rates in developing countries

Statistical comparison of the number of words in a sentence in different languages

The birthday paradox

When can I use "swimmed" and "knowed" correctly?

Voter turnout

Sport and leisure

Baseball bat speed compared with body weight

Body proportions for track and field events

Does the team win when it was the dominating team during the match?

Effective short corners in hockey

Exploring card counting in blackjack using probability

Factors affecting athletic performance

Has sports performance improved more on land or in water?

Height, weight and swimming performance

How does the amplitude of a ski turn affect the speed of the skier?

How far do tennis balls roll?

The geometry involved in billiards

Modelling musical chords

Modelling the jump of a horse

Practice makes perfect

Relationship between skiing ability and distance travelled to ski

Resistance of fishing line

Rollerblading and the maths behind it

The Monty Hall problem

The Tower of Hanoi puzzle

Video games and response times

Will female swimmers ever overtake male swimmers?

Travel and transport

Cost efficiency of vehicles

Driving skills

How many bicycles are there in Amsterdam?

Petrol prices

Public transportation costs and car usage: a personal comparison

Running late and driving habits

Seat belt use

The effect of blood alcohol content law on the number of traffic collisions in Sacramento

Traffic study of Schiphol International Airport

Transport safety in town centres

Formula Pack for IB Mathematics Analysis and Approaches

https://drive.google.com/file/d/1ZrrBxWdKztcIj2d90WCUsF8tq-ixoW0o/view?usp=sharing

Analysis and Approaches Year 1 - Pacing Guide from FCPS

- Quarter 1
  - Intro to Functions (3 weeks)
  - Linear Functions w/Statistical Applications (4 weeks)
  - Exponential and Log Functions (2 weeks)
- Quarter 2
  - Continue Exponential and Log Functions (2 weeks)
  - Quadratics and Polynomials (4 weeks)
  - Circular Functions and Complex Numbers (3 weeks)
- Quarter 3
  - Continue Circular Functions and Complex Numbers (6 weeks)
  - Rational Functions (3 weeks)
- Quarter 4
  - Continue Rational Functions (1 week)
  - Derivative Functions and Antiderivatives (7 weeks)

Analysis and Approaches SL - Pacing Guide from FCPS

- Quarter 1
  - Differential Calculus (7 weeks)
  - IA Work (2 weeks)
- Quarter 2
  - IA Work (1 week)
  - Integral Calculus (6 weeks)
  - IA Work (2 weeks)
- Quarter 3
  - Geometry and Trigonometry (3 weeks)
  - Counting and Probability (6 weeks)
- Quarter 4
  - Exam Prep (2 weeks)
  - IB Exams and Post Exam Teacher Determined Math Explorations

Analysis and Approaches HL - Pacing Guide from FCPS

- Quarter 1
  - Differential Calculus (7 weeks)
  - Integral Calculus (2 weeks)
- Quarter 2
  - Continue Integral Calculus (3 weeks)
  - Differential Equations and Series (5 weeks)
  - Vectors (1 week)
- Quarter 3
  - Continue Vectors (6 weeks)
  - Counting and Probability (3 weeks)
- Quarter 4
  - Counting and Probability (3 weeks)
  - IB Exams and Post Exam Teacher Determined Math Explorations (6 weeks)

Sampe IA - Horse Jump

- Horse Jump Student IA
  https://drive.google.com/file/d/1_GbP9L2gzvljvftjOHP3mypDQ6K6NvDF/view?usp=sharing

- Horse Jump Student IA Annoted
  https://drive.google.com/file/d/1pQ_PzvKifYZhteGnPLqQhlzLn6vKEtr5/view?usp=sharing

- Horse Jump Score and Comments
  https://drive.google.com/file/d/1D45UcGi8P8LxlgbJE4O7ChNZkGaOKkIH/view?usp=sharing

Sampe IA - Packaging and Geometric Shapes

- Packaging and Geometrical Student IA
  https://drive.google.com/file/d/1yCeZpS7igpVFga6vM6YRp-_wcBhei4yk/view?usp=sharing

- Packaging and Geometrical Student IA Annoted
  https://drive.google.com/file/d/1h-YNQBIFc8Qgp2-0IEOijZsIHXrV9Xzp/view?usp=sharing

- Packaging and Geometrical Score and Comments
  https://drive.google.com/file/d/1g3Uii5DeuDQkhhplYMQNhHj_GwG5EJow/view?usp=sharing