

IB Mathematics Applications and Interpretations SL

Summer Assignment and Internal Assessment Rubric

Purpose: To create a draft of your internal assessment for IB Math Applications and Interpretations SL. **This is the ONLY rough draft you will be able to submit.** Please give it your best effort. It will save you time and aggravation in September.

Length: Your rough draft should be at least 900 words. Remember the more work you do on this assignment **NOW**, the less you will have to do in September when you are swamped with other assignments as well as college essays.

FOR FUTURE REFERENCE: IB suggests your **final** paper “*should be approximately 12-20 pages long with **double spacing**, including diagrams and graphs, but excluding the bibliography. HOWEVER, it is the QUALITY of the mathematical writing that is important, not the length.*” In a math paper, precision, logic and clarity count more than length. Do not make your paper twelve pages, when an excellent job can be completed in eight pages.

Method: Your internal assessment should include:

1. An introduction. In the introduction state your rationale (purpose for choosing the topic) as well as your thesis statement.
2. A logically developed exploration which is easy to follow by your peers. It **MUST** include
 - a. citing references, direct quotes, etc. Use MLA format for this.
 - b. stating appropriate definitions and explanations of concepts,
 - c. Use of precise notation, applicable graphs and mathematical computations
 - d. **Personal engagement.** You need to personally engage in your topic. For example, if you were to study the performance of the mile runners on the track team, you would collect their times, analyze the data statistically and draw some conclusions about their performance and how it could improve. In your conclusion, you would discuss the results, but more importantly, how *reasonable* your results and conclusions appear. Also think about how to apply what you learned or if there were any improvements which could be made to your study. You would also comment on what you learned through this investigation. In IB’s words, “How much of the investigation did you make your own?”
3. A conclusion which ties up all the major ideas of your paper.
4. Please use the rubric information below as a guide to help you write your paper. Pay attention to each of the criterion. It is very easy to lose points by not including personal reflection/engagement, appropriate mathematical notation and language, or using the proper format. IB is **VERY** strict when it comes to these items.

Deadline: Your draft must be submitted to Mrs. Hiles no later than the first two weeks of school. This does **NOT** mean you wait until Day 13 to do this work. This rough draft is worth **40 points**.

Summer Contact Information: Mrs. Hiles can be reached at jbhiles@fcps.edu. I check email almost every day. **Please feel free** to contact me with any questions. I welcome student emails and am more than willing to help you. I am serious – I LOVE when students email me!!! To access materials and resources, I have created a Google Classroom for you to use over the summer. The code to join is **rjov2kk**

Summer Assignment Rubric (This is what I am looking for in the rough draft)

Descriptor	Points
1. Did the student submit the rough draft on time?	_____/10
2. Was the rough draft AT LEAST 900 words? OR Was there enough mathematical work/research completed that could be summed up into 900 words?	_____/10
3. Was the draft coherent? That is, did it have an aim/rationale? Did it show some development based on that aim/rationale? Did the student at least state where it was going if it was unfinished?	_____/10
4. Did the rough draft have appropriate mathematical terminology AND vocabulary? That is NO calculator notation (^, *, etc.) Usage of terms such as 'substitute' were used instead of 'plug in'.	_____/10
Total	_____/40

IB Guidelines (Rubric)

Taken from the IB Teacher Support Material

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 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, concise and complete.

Specifics regarding the Communication criterion:

- *Express your ideas clearly*
- *Identify a clear aim for the exploration*
- *Focusing on the aim and avoiding irrelevance. Don't put information into your paper just to put it in.*
- *Structure your ideas in a logical manner. Make sure it is easy to follow. If the reader has to pause to figure out what you are saying OR look back a few pages to 'get the idea', you have a fault in your communication.*
- *Include graphs, tables, and diagrams at appropriate places. DO NOT tack them on the end in an Appendix.*
- *Cite references where appropriate.*

To achieve marks above a 2, the exploration must contain an introduction, a logically organized and well-written explanation, and a conclusion. More words does not mean better! Avoid being repetitive.

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.

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

- Use appropriate mathematical language (**notation, symbols and terminology**). Calculator and computer notation is acceptable only if it is software generated (meaning you are typing it what was returned to you by software OR what you had to code to generate your findings)
- **Define key terms** where required. For example, you would define a word like “tensor”, but not a word like “circumference.”
- Use multiple forms of mathematical representation **such as** tables, graphs, formulas, diagrams, charts, and models where it is appropriate.
- Express your results to an appropriate degree of accuracy (3 sig figs). When writing an approximation, use ‘ \approx ’ and not ‘ $=$ ’.
- Use 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 penalized.

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 abundant evidence of outstanding 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.

Significant means: *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 means: *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 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.

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.

Limited Reflection = merely describing the results.

Meaningful Reflection: examples include linking the aims of the exploration, commenting on what they have learned, or considering some limitation or comparing different mathematical approaches.

Critical Reflection: crucial, deciding or deeply insightful. Will often develop the exploration by addressing the mathematical results and their impact on the student’s understanding of the topic. Examples: considering what next, discussing the implications of the results, discussing strengths and weaknesses of approaches, and considering different perspectives.

Substantial Reflection: critical reflection is present throughout the exploration.

Criterion E – Use of Mathematics

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.

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.

Commensurate with the level of the course: means it should not be completely based on mathematics of their prior learning. The mathematics explored should be in the syllabus or beyond.

Demonstrated: “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. **Understanding** must be demonstrated for a student to achieve higher than a level 1. Substituting numbers into a formula does not necessarily demonstrate understanding.