

IB Math Standard Level

Summer Assignment and Internal Assessment Rubric

Purpose: To create a draft of your internal assessment for IB Math Standard Level. **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 final paper will be 6 – 12 pages in length. There is no specific word count, as with your extended essay, due to the inclusion of computations, graphs, diagrams, tables, etc. In a math paper, precision, logic and clarity count more than 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.

Method: Using the topic you chose in IB Math SL 1, research and write your internal assessment which 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 exhaustively** (using every math technique you have learned thus far). Then, draw some conclusions about their performance and how it could improve. Think of how you could analyze the runners' performance using all the math knowledge you have accumulated thus far. In your conclusion, you should 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 can also comment on what you learned through this investigation.
3. A conclusion which ties up all the major ideas of your paper. Rule of thumb: it should answer the question, "So what?" Referencing 2d, you should consider the ramifications of your project. How useful are my findings? If I studied this further, where would I take it and why? What went wrong, and why? Are my conclusions and model reasonable? Think along the lines of TOK.
4. Please use the rubric 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 via **SafeAssign located in our IB Math SL IA Group**. The **DUE DATE** is the **first day of class**. You will receive feedback via direct comments on your paper AND a face-to-face meeting in the fall. Please submit your draft as a **Word document** or an **editable PDF**. Do NOT use Google Docs – you will lose your computations, formatting and equations.

Summer Contact Information: Mrs. Small can be reached at aksmall@fcps.edu . I check email frequently, so please feel free to contact me with any questions. I welcome student emails and I am happy to help you!

Summer IA Work Sessions: These are to allow you focused time in the library to work on your IA, do research and iron out any details/questions regarding your paper. You will not be able to check out materials. Please check Blackboard announcements for the exact date, location, and time.

Summer Assignment Rubric

Descriptor	Points
1. Did the student submit the rough draft on time?	_____/10
2. Was the rough draft AT LEAST 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)

Criterion A – Communication

Achievement Level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	The exploration has some coherence.
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.

Bullets from IB regarding Communication:

- *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.

Make sure you define terms unfamiliar to the reader. For example, you would define a word like "tensor", but not a word like "circumference."

Criterion B – Mathematical Presentation

Achievement Level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	There is some appropriate mathematical presentation.
2	The mathematical presentation is mostly appropriate.
3	The mathematical presentation is appropriate throughout.

According to the IB Mathematics SL Guide, this criterion assesses:

- Use appropriate mathematical language and representation (notation, symbols and terminology). DO NOT use calculator notation OR include calculator keystrokes in your paper. We all know how to use a calculator. DO NOT describe how to use Excel or any other software. It is irrelevant.
- Define key terms where required
- Use multiple forms of mathematical representation **such as** tables, graphs, formulas, diagrams, charts, and models.
- Express your results to an appropriate degree of accuracy (3 sig figs). When writing an approximation, use ' \approx ' and not '='.

While minor, inconsistent errors will not be penalized, consistent errors (e.g. using "=" when " \approx " is more appropriate), will not allow you to receive a mark of more than 1. Avoid words such as "plug in", and "tweak". Use "substitute" and "modify" instead. Also, do not include information, charts, diagrams, etc. just to include them in the paper. The key word here is "appropriate". In other words, does it enhance the understanding of my reader?

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 limited or personal engagement.
2	There is evidence of some personal engagement.
3	There is evidence of significant personal engagement.
4	There is abundant evidence of outstanding personal engagement.

The criterion is assessing the student's level of thinking independently or creatively, addressing personal interest or presenting mathematical ideas in their own way. For example, creating your own code using a given encryption method, and learning and describing unfamiliar math topics.

Personal engagement is about working independently, asking questions, making conjectures and investigating mathematical ideas. How well did YOU choose and write about a topic that was of interest to YOU. Other ideas from IB include:

- *Looking for and creating mathematical models for real-world situations*
- *Considering historical and global perspectives*
- *Exploring mathematics unfamiliar to you and expressing your results in your own words.*

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 or superficial reflection.
2	There is evidence of meaningful reflection.
3	There is substantial evidence of critical reflection.

Opportunities for reflection lie mostly in the conclusion of your paper. However, there are often moments in your writing, where it is necessary to reflect on your topic. For example, if you are discussing the application of statistics to an industry, is it possible to use the selected techniques to slant the presentation of data? If so, how? What are the impacts of this action on the consumer and/or company?

From IB:

- *Discussing the implications of the results.*
- *Considering the significance of the exploration.*
- *Looking at possible limitations and/or extensions. For example, if you choose to create a mathematical formula which models fish migration, are there any limitations to this model? Can you use it to model bird migration? Bug migration? People migration?*
- *Making links to different fields and/or areas of mathematics (or other disciplines).*

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.

The mathematics and mathematical language should be at a comparable level to the course. For example, a topic which requires the use of mathematics you are currently using to clearly explain the concepts is a good choice. Minor errors in the paper are acceptable, but consistent errors will be awarded a mark of 2 or less. From IB:

- *Did the student demonstrate their knowledge and understanding at their current level of knowledge. If you write this like a 4th year PhD student or a middle school student the answer would be NO.*
- *Applying mathematics to different contexts and applying problem solving techniques*
- *Recognizing and explaining patterns in science, nature, art, etc.*