

IB Math SL Exploration Checklist

In addition to sitting examination papers, Mathematics SL students are also required to complete a **mathematical exploration**. This is a short report written by you (the student), based on a topic of your choice and should focus on the mathematics of that topic. The mathematical exploration comprises 20% of the final mark. If a student chooses to not do one, they do not get any grade for Math from the IB (or a Diploma).

Quick Facts

The purpose is to enable 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. It is an *individual* exploration that involves investigating an area of mathematics. The exploration should be approximately 6 – 12 pages long (usually end up being around 20 pages with tables and graphs), and should be written at a level which is accessible to an audience of your peers. Expect to spend 10 hours in class and 10 hours at home completing your Exploration. The exploration needs to be cited and have a bibliography. Teachers are only allowed to give advice on the rough draft. ***The version submitted after that must be considered the final IA.***

When deciding on how to structure your exploration, you may wish to include the following sections:

Introduction: This section can be used to explain why the topic has been chosen and to include any relevant background information. Describe your process or tell a story on how you arrived at your topic and explain why it is of high interest to you. Use the word "I" and make the introduction interesting and personal.

Rationale: Explain why, outside of your personal interest, why your topic is relevant and worthy of study. What connections to global topics are there?

Aim: A clear statement of intent should be given to provide perspective and direction to your exploration. This should be a short paragraph which outlines the problem or scenario under investigation. Write down what math/analysis techniques you will be using and in what order.

Data/Tables/Scatterplots: Any data or tables relevant to your research. This may also be background information in the topic.

Method/Mathematics: Based on your background information, data, tables, and/or scatterplots what math will you be using and why.

Analysis and Reflection: In this section, you should use graphs, diagrams, and calculations to analyze your results. You must define all variables (independent and dependent) and parameters while using appropriate letters for each. Show any calculations as you would see them in a math text book (use equation editor). After each result give a brief explanation of what you found or solved for. How does this help investigate your topic?

Results: Using all of the results from your Analysis section, make a final grand result about your topic. You should also form some conjectures based on your analysis.

Conclusion: You should summarize your investigation, giving a clear response to your topic, rationale, and aim. You should reflect on your exploration and tie it back to your introduction. Again, use the word "I" to make this conclusion personal. Write about any potential for further exploration and global implications. Limitations and sources of error should also be discussed.

Other: Create a brief title page with your name on it, but do not put your name or identifying information on your paper (i.e. your name, school name). Page numbers must be included. APA citations will be used.

Academic Honesty

This is extremely important in all your work. Make sure that you have read and are familiar with the IB Academic Honesty document.

Academic Honesty (in this context) means:

- That your work is authentic
- That your work is your own intellectual property
- That any work taken from another source is properly cited

Authentic work:

- Is work based on your own original ideas
- Can draw on the work and ideas of others, but this must be fully acknowledged (in Citations and Bibliography)
- You must use your own language and expression

Checklist:

Your exploration will be assessed by your teacher, against given criteria. It will then be externally moderated by the IB using the same assessment criteria. The final mark is the sum of the scores for each criterion. The maximum possible final mark is 20. This is 20% of your final grade for Mathematics SL. A good exploration should be clear and easily understood by one of your peers and self-explanatory all the way through. The criteria are split into five areas, A to E.

Criteria	Title	Points
Criterion A	Communication	4
Criterion B	Mathematical Presentation	3
Criterion C	Personal Engagement	4
Criterion D	Reflection	3
Criterion E	Use of Mathematics	6

Criterion A: Communication

This criterion assesses the organization and coherence of the exploration. A well-organized exploration includes an introduction, has a rationale (which includes explaining why this topic was chosen), describes the aim of the exploration and has a conclusion. A coherent exploration is logically developed and easy to follow.

Graphs, tables and diagrams should accompany the work in the appropriate place and not be attached as appendices to the document.

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.

Checklist for Criterion A	Yes/No
I believe I expressed my ideas clearly so that my grandmother could understand my work (coherent)	
My ideas are structured in a logical manner so that my classmates can follow the logic (coherent)	
My exploration includes: Introduction, rationale, body, conclusion, and bibliography (organized)	
I included all tables and diagrams at appropriate places and not in appendices (organized)	
I cited all references appropriately (organized)	
Every single sentence I wrote is needed and all work I did cannot be omitted. No repetition! Ms van won't get bored when reading my work; In fact, all my work focused on the aim and nothing irrelevant. (Concise)	
I identified a clear aim for my exploration so my grandmother did not need any clarifications – No missing explanations. (Complete)	

Notes:

Criterion B: Mathematical presentation

This criterion assesses to what extent the student is able to:

- use appropriate mathematical language (notation, symbols, terminology)
- define key terms, where required
- use multiple forms of mathematical representation, such as formulae, diagrams, tables, charts, graphs and models, where appropriate.

Students are expected to use mathematical language when communicating mathematical ideas, reasoning and findings.

Students are encouraged to choose and use appropriate ICT tools such as graphic display calculators, screenshots, graphing, spreadsheets, databases, drawing and word-processing software, as appropriate, to enhance mathematical communication.

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.

Checklist for Criterion B	Yes/No
I used Microsof 'equation' (or equivalent) to write formulae	
I used the appropriate method for representation (A table when needed, a graph when I am supposed to, spreadsheet when possible. Etc.)	
I revieewed the work and made sure that all key terms are defined	
My results are expressed appropriately. When the result was exact, I used (=) and when it was approximated, I used \cong or indicated significant figures.	

Notes:

Criterion C: Personal engagement

This criterion assesses the extent to which the student engages with the exploration and makes it their own. Personal engagement may be recognized in different attributes and skills. These include thinking independently and/or creatively, addressing personal interest and presenting mathematical ideas in their own way.

Achievement level	Descriptor
0	The exploration does not reach the standard described by the descriptors below.
1	There is evidence of limited or superficial 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.

Checklist for Criterion C		Yes/No
I explained why I took the initiative for working on MY exploration		
MY exploration is related to MY interests and this is explained in MY exploration		
I enjoyed working on MY exploration		
I worked on MY exploration independently		
I read about the mathematics used in MY exploration		
I expressed then, the mathematical ideas in MY own way		
I considered historical and global perspectives related to MY exploration		

Notes:

Criterion D: Reflection

This 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.

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.

Checklist for Criterion D	Yes/No
I discussed the implications of my results	
I reflected on the method(s) I used and made links to different fields and/or areas of Mathematics	
I stated possible limitations	
I considered the significance of my exploration	
I discussed possible extensions	
My reflection in the conclusion and within the work went beyond correct interpretations and reached critical interpretations	

Notes:

Criterion E: Use of mathematics

This criterion assesses to what extent students use mathematics in the exploration.

Students are expected to produce work that is commensurate with the level of the course. The mathematics explored should either be part of the syllabus, or at a similar level or beyond. It should not be completely based on mathematics listed in the prior learning. If the level of mathematics is not commensurate with the level of the course, a maximum of two marks can be awarded for this criterion.

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.

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.

Checklist for Criterion E		Yes/No
The mathematics I used is either within the SL syllabus or on a similar level		
I applied mathematics in different contexts		
I reviewed my calculations and they are all correct		
I applied different problem-solving techniques		
I generalized and justified my conclusions		

Notes: