IB Mathematics: The Exploration
Feedback to Student /20
Name:
Date set: Date submitted:
A: Communication **/4**

0: The exploration **does not** reach the standard described by the descriptor below.

1: The exploration has **some** coherence.

- *Some coherence but not well organized, or some organization but not coherent.*
- *No aim or rationale.*
- *Key explanations missing.*
- *Diagrams (if included) do not aid in the explanation.*

2: The exploration has **some** coherence and shows **some** organization.

- *Perhaps no (or weak) conclusion and/ or introduction.*
- ***Some mathematical and/or non mathematical explanations are missing***
- *Coherent but not well organized, or well-organized but not coherent.*
- *May included aim or rationale.*
- *Aim doesn't "fit" the rest of the paper.*
- *Some terms undefined*
- *Repetitive work and/or calculations.*
- *Tables, diagrams, graphs etc may not be explained.*
- *The diagrams may not aid the explanation very much.*
- *This is the highest achievement if a Q and A format is used.*

3: The exploration **is coherent** and **well organized**.

- *Solid introduction and conclusion*
- ***Most mathematical and/or non mathematical explanations are clear.***
- *Aim and rationale included*
- *Repetitive calculations.*
- *Aspects need clarification.*
- *Diagrams, graphs, tables etc included, explained and aid in the exploration.*
- *Lacks conciseness (could be huge detracting tables that should be in an appendix.)*
- *Typing errors may detract from the flow.*
- *May include irrelevancies (hence lack of conciseness.)*
- *References included.*

4: The exploration **is coherent**, **well organized**, **concise** and **complete**.

- *Strong introduction (which includes the context of the exploration) and conclusion*
- ***Mathematical and/or non mathematical explanations are clear and concise.***
- *Includes rationale (why topic chosen) and aim which is clearly identifiable.*
- *Exploration is logically developed.*
- *All appropriate avenues explored.*
- *Graphs and tables are appropriately placed within the exploration, extra large tables are summarized in paper and then added in an appendix*
- *Easy to follow (written for a peer audience)*
- *Proper citations and referencing where appropriate.*

B: Mathematical Presentation **/3**

0: The exploration **does not** reach the standard described by the descriptor below.

1: There is **some** appropriate mathematical presentation.

- *Poor or minimal use of notation, terminology, and/or mathematical symbols.*
- *References to color, yet printed in black and white.*
- *Diagrams, tables, graphs etc may be unrelated.*
- *Missed opportunities to show mathematical language.*
- *Paper is descriptive rather than mathematical*
- *Lack of appropriate ICT (information and communication technology) tools for the task.*

2: The mathematical presentation is **mostly** appropriate.

- *Inconsistency of terminology and/or variables.*
- *Some key terms and variables defined*
- *Mostly correct use of mathematical language, terminology, symbols and notation (no *, or ^) use of approximate ≈ instead of equal, appropriate use of subscripts etc.*
- *Some appropriate use of ICT tools for the task.*
- *Some Graphs, diagrams etc are clear and appropriately scaled (zoomed in/out) and labeled for clear communication. (ie. Some wasted space on the graph by poor choice of domain and range)*

3: The mathematical presentation **is** appropriate **throughout**.

- *Key terms and variables explicitly defined.*
- *Correct use of mathematical language, terminology, symbols and notation (no *, or ^) use of approximate ≈ instead of equal, appropriate use of subscripts etc.*
- *Appropriate and varied forms of mathematical representation used (formulae, diagrams, tables, charts, graphs, models)*
- *Appropriate ICT tools are used for the task (ie, spreadsheet, GDC, Geogebra, pencil and ruler, etc.)*
- *Appropriate degrees of accuracy for situation.*
- *Discrete versus continuous data clearly articulated if applicable.*
- *Graphs and diagrams appropriately labeled and scaled (zoomed in/out) for clear communication.*

C: Personal Engagement **/4**

0: The exploration **does not** reach the standard described by the descriptor below.

1: There is evidence of **limited** or **superficial** personal engagement.

- *Student created examples may exist.*
- *Unfamiliar math is quoted and not explained.*
- *Unsupported mathematics.*
- *Missed opportunities to explore.*
- *Minimal independent thinking.*
- *Minimal personal interest.*

2: There is evidence of **some** personal engagement.

- *Student created examples but may not have been followed through.*
- *Student applies some unfamiliar mathematics and some research into it has taken place.*
- *Some independent thinking has occurred but limited*
- *Some personal interest shown but limited*

3: There is evidence of **significant** personal engagement.

- *Student created examples exist.*
- *Student explores and applies math.*
- *Some evidence of personal interest*
- *Some personal involvement.*
- *Student shows independent thinking.*
- *Some research has been undertaken.*

4. There is **abundant** evidence of **outstanding** personal engagement.

- *Works independently.*
- *Creates strong personal examples*
- *Thinks creatively.*
- *Demonstrates personal interest*
- *Present mathematical ideas in your own way.*
- *Looks for and creates mathematical models for real-world situations (if applicable)*
- *Asks questions, makes conjectures, investigates mathematical ideas.*
- *Researches the area of interest.*
- *Considers different perspectives (historical or global or local)*
- *Actively explores, learns, applies and describes unfamiliar (yet appropriately challenging) mathematics.*
- *Shows independent thinking.*
- *Highly original work.*
- *Shows personal ownership of the work.*
- *Asks questions to explore and explores them.*
- *Passion and interest is abundant in the overall read of the paper.*

D: Reflection **/3**

0: The exploration **does not** reach the standard described by the descriptor below.

1: There is evidence of **limited** or **superficial** reflection.

- *Very limited, simple and superficial reflection.*
- *Opportunities for reflection were not taken.*
- *Some questions raised.*

2: There is evidence of **meaningful** reflection.

- *Student makes connections and links to other mathematical ideas.*
- *Some questions raised.*
- *Implications of the results are considered.*
- *Reflection on results and findings*
- *Accuracy and reasonableness considered.*
- *Reflection is meaningful (but not critical)*
- *A limited discussion on possible limitations (and/or extensions, improvements)*
- *Not enough questions are raised. What if I did….*

3: There is substantial evidence of **critical** reflection.

- *Discusses the implications of results.*
- *Accuracy and reasonableness considered and discussed.*
- *Considers the significance of the findings and results.*
- *Possible limitations (and/or extensions, improvements)*
- *Connections or links to other fields and mathematical areas.*
- *Choices of approach are considered and evaluated along the process.*
- *Critical reflection demonstrated throughout (if applicable) and in conclusion.*
- *Considers personal examples and work.*
- *Mathematical difficulties, problems and contradictions discussed.*
- *Critical reflection on what has been learned.*
- *Insightful questions raised. What if I ….*

E: Use of Mathematics **/6**

0: The exploration **does not** reach the standard described by the descriptor below.

- *There is no use of mathematics.*
- *No mathematical strategy used.*
- *Descriptive not mathematical in nature.*

1: Some relevant mathematics is used.

- *Mathematics is not at SL level*
- *Elementary mathematical strategies used.*
- *Largely descriptive with some mathematics.*

2: Some relevant mathematics is used. Limited understanding is demonstrated.

- *Mathematics is not at SL level*
- *Limited demonstration of understanding.*
- *Can apply the methods without elaboration.*
- *There is some correct mathematics.*

3: Relevant mathematics commensurate with the level of the course is used. Limited understanding is demonstrated.

- *Mathematics is in the syllabus, at a similar level or beyond.*
- *Limited demonstration of understanding.*
- *Can apply the methods without elaboration.*
- *There is some correct mathematics.*

4: Relevant mathematics commensurate with the level of the course is used. The mathematics explored is **partially** correct. **Some** knowledge and understanding are demonstrated.

- *Some demonstration of understanding of "why"*
- *Can apply the method but not the deeper why.*
- *The mathematics is partially correct.*
- *Some connections or links made to other areas of mathematics.*

5: Relevant mathematics commensurate with the level of the course is used. The mathematics explored is **mostly** correct. **Good** knowledge and understanding are demonstrated.

- *Mathematics is understood.*
- *Correctly explores the mathematics from various perspective or angles.*
- *Applies some problem solving techniques*
- *Where appropriate patterns are recognized and explained.*
- *Applies mathematics in different contexts.*
- *A sophistication of mathematics is shown.*
- *Identifying links to different areas of mathematics.*
- *Contains mathematical rigor.*
- *Mathematics is mostly error-free and uses appropriate level of accuracy most of the time.*

6: Relevant mathematics commensurate with the level of the course is used. The mathematics explored **is correct**. **Thorough** knowledge and understanding are demonstrated.

- *Mathematics is fully understood.*
- *Applies problem solving techniques*
- *Is mathematically rigorous.*
- *Clarity of mathematical language and logic when making mathematical arguments and calculations.*
- *Precise mathematics is error-free and uses appropriate level of accuracy at all times.*

Compiled by Munich International School Mathematics Deparment
Buchanan, Laurie et al. *Mathematics Standard Level*. Oxford, U.K.: Oxford University Press, 2012.
"Examples of Explorations." *IBO.org*. International Baccalaureate Organization. n.d. Web. 25 March 2013.