IMPORTANT REMINDERS AS YOU WRITE

This template is designed to guide you in planning and writing your IB Mathematics AA HL Internal Assessment on modelling light deviation in a prism. Read through these reminders before you start and refer back to them as you draft each section.

- Keep explanation proportional to the mathematics: avoid long non-mathematical storytelling, and ensure that most of the space is devoted to mathematical reasoning, derivations, calculations, and interpretation.
- Label all figures, tables, and equations clearly and refer to them properly in the text (for example, "as shown in Figure 1" or "from equation (3)").

- Use appropriate technology (e.g. GDC, Desmos, spreadsheet) sparingly, and always interpret results in words. Show at least one worked example by hand for any type of calculation before relying on technology for more complex or repetitive cases.
- Ensure that every substantial mathematical step is clearly linked back to the AIM and to the physical context of light passing through a prism.
- Ensure that all mathematics stays within realistic high-school / IB expectations for Mathematics: Analysis and Approaches (AA) Higher Level. Focus on algebra, trigonometry, functions, and single-variable calculus that are firmly within the syllabus.
- Show Personal engagement (Criterion C) throughout: use your own choices of prism angle, refractive index, or applications; explain why you made these choices and what you find interesting or surprising.

- Build Reflection (Criterion D) into multiple sections: comment on why you chose particular methods or assumptions, how realistic your model is, and how your thinking changed as you progressed.
- Use accurate and consistent notation, appropriate units, and clear logical structure to support Criterion A (Presentation) and Criterion B (Mathematical communication).
- When you use technology to solve an equation (for example, a trigonometric equation arising from differentiation), explain why solving it exactly by hand would be impractical, and then interpret the numerical solution in the context of prisms and light.

- VERY IMPORTANT: Number the pages starting from the Introduction page as page 1, and continue numbering up to and including the last page of the Conclusion section. Do NOT number the reminder page, title page, Bibliography page, or Appendix page. Use double-space lines, the font family Ariel, and font-size 12.

If you **follow this template and fill it with your own derivations, personal data, and thoughtful commentary**, you will be well-positioned to reach **at least** the 15/20 range for HL and 17/20 range for SL, with especially strong potential in Criteria C, D, and E.

This is a planning template, not a finished IA. It is non-exclusive and may be purchased by other students. You must use it only as a guide to structure your own original work. Copying wording, derivations, or structure too closely from this document or from another student's work may be considered academic misconduct by the IB. You are responsible for ensuring your final IA is genuinely your own.

Modelling the Deviation of Light in a Prism using Snell's Law, Trigonometry, and Calculus

CREATED BY SAMZ HUB
2026-01-03 07:59

1 Introduction (approximately 1–1.5 pages)

1.1 Personal context and motivation

In this subsection, you should:

- Explain briefly why you chose to model light passing through a prism. This might relate to:
  - An interest in physics or optics.
  - Experiences with laboratory experiments using prisms.
  - Curiosity about rainbows, spectrometers, or how optical instruments work.
- Link the topic to something meaningful to you personally, such as:
  - A school experiment that sparked your interest.
  - A hobby involving photography or astronomy.
  - Future plans in science or engineering.

You can use prompts like:

- "What personal experiences or interests led me to investigate how light behaves in a prism?"
- "Why do I find the idea of minimum deviation or refraction angles particularly interesting or important?"
- "Have I encountered prisms or spectra in real life (e.g. in a lab, camera, or prism decoration), and what questions did that raise?"

This supports Criterion C – Personal engagement, because you are connecting the mathematical exploration to your own interests and experiences.

1.2 Background and mathematical context

In this subsection, you should:

- Provide only the essential physical and mathematical background needed to understand the problem:
  - Briefly describe what a triangular prism is and how a single ray of light can be refracted at each interface.
  - State Snell's law in words and in mathematical form, for two media with refractive indices n_1 and n_2:

$$n_1 \sin\theta_1 = n_2 \sin\theta_2.$$

- Mention the key mathematical ideas you expect to use, without full technical detail yet:
  - Trigonometric functions (sine, inverse sine) and angle relationships in triangles.
  - Functions and graphing to express deviation as a function of incidence angle.
  - Differentiation and optimization to find an angle that minimizes deviation.

Note that good organisation and clear, concise background support Criterion A – Presentation and Criterion B – Mathematical communication. Avoid long textbook-style expositions and focus instead on what is directly relevant to your later modelling.

Bibliography

Bibliography: (Here write all the references you've used)