IB Mathematics: Analysis & Approaches SL Year 2

Summer Assignment Packet

Rising Year 2 Students

Welcome to IB Math AA SL Year 2

Congratulations on successfully completing Year 1 of IB Mathematics: Analysis & Approaches SL. This summer assignment is designed to:

- Maintain and strengthen your mathematical fluency
- Reinforce foundational algebraic and trigonometric skills
- Prepare you for the rigor of Year 2
- Introduce expectations for your Internal Assessment (IA)
- Build mathematical habits of persistence, precision, and communication

You are expected to complete all sections independently and show all work clearly.

Assignment Overview

Section	Focus	Estimated Time
Part A	Algebra Foundations Review	4–6 hours
Part B	Trigonometry Review & Extension	4–5 hours
Part C	Skills Without Calculator	2–3 hours
Part D	Internal Assessment Exploration	3–5 hours
Reflection	Goal Setting & Reflection	30 minutes

Expectations

- Show ALL mathematical work.
- Organize your work neatly.
- Clearly label each section.
- Write complete mathematical explanations when required.
- This assignment will count as a graded assessment at the start of Year 2.

PART A — Algebra Foundations Review

Purpose

Strong algebra skills are essential for success in IB Math AA SL. This section reviews skills that will appear throughout Year 2.

A1. Simplifying Algebraic Expressions

Simplify completely.

1. $3x^2 - 5x + 7 + 2x^2 + 9x - 4$
2. $(4a - 3)(2a + 5)$
3. $(x - 4)^2$
4. $\frac{3x^2y^3}{9xy}$
5. $\frac{x^2-16}{x+4}$
6. $\frac{2}{x} + \frac{5}{2x}$
7. $(27x^6)^{\frac{1}{3}}$
8. $\frac{5x^{-2}y^3}{10y^{-1}}$

A2. Solving Equations

Solve for the variable.

1. $5x - 12 = 3x + 8$
2. $2(x - 5) + 3 = 4x - 7$
3. $x^2 - 9x + 14 = 0$
4. $2x^2 + 7x - 15 = 0$
5. $\frac{3}{x} + 2 = 5$
6. $\sqrt{2x + 1} = 5$
7. $3^{x+1} = 81$
8. $\log_2(x + 1) = 4$

A3. Functions

Answer the following questions.

1. Evaluate:

$$f(x) = 2x^2 - 3x + 1$$
$$Find\ f(4)$$

2. Given $g(x) = \frac{2x-1}{x+3}$:

   Find the domain
   Find $g(5)$

3. Determine whether each relation is a function.

4. Find the inverse of:

$$f(x) = 3x - 7$$

5. Describe the transformations of:

$$y = -2(x+3)^2 + 5$$

A4. Graphing and Interpretation

For each function below:

- Identify intercepts
- State domain and range
- Describe end behavior
- Sketch the graph

1. $y = x^2 - 4x + 3$
2. $y = x - 1$
3. $y = 2^x$
4. $y = \frac{1}{x-1}$

PART B — Trigonometry Review & Extension

Purpose

You ended Year 1 working with the unit circle and trigonometric equations. This section is designed to reinforce those concepts and prepare you for future trigonometric applications.

B1. Unit Circle Fluency

Without using a calculator, evaluate:

1. $\sin\left(\frac{\pi}{6}\right)$
2. $\cos\left(\frac{\pi}{3}\right)$
3. $\tan\left(\frac{\pi}{4}\right)$
4. $\sin\left(\frac{5\pi}{6}\right)$
5. $\cos\left(\frac{7\pi}{6}\right)$
6. $\tan\left(\frac{11\pi}{6}\right)$
7. Convert $225°$ to radians.
8. Convert $\frac{5\pi}{3}$ to degrees.

B2. Solving Trigonometric Equations

Solve all solutions for $0 \leq x < 2\pi$.

1. $2\sin x = 1$
2. $\cos x = -\frac{\sqrt{2}}{2}$
3. $\tan x = \sqrt{3}$
4. $2\cos^2(x) - 1 = 0$
5. $\sin(2x) = 0$
6. $\tan(x) + 1 = 0$

B3. Introduction to Applications of Trigonometry

These problems will introduce you to future trigonometry concepts.

1. A ladder leans against a wall, making a $65°$ angle with the ground. If the ladder is 12 feet long, how high up the wall does it reach?

2. A kite is flying with 80 meters of string. The angle of elevation is $38°$. Find the height of the kite.

3. Research:

    - What is the Law of Sines?
    - What is the Law of Cosines?
    - When are they used?

Write a short paragraph (5–7 sentences) summarizing your findings.

PART C — Non-Calculator Skills

Purpose

IB examinations include non-calculator sections. Mental math and algebraic fluency are critical.

Complete this section WITHOUT a calculator.

C1. Exact Values

1. $\sin 30°$
2. $\cos 45°$
3. $\tan 60°$
4. $\sin^2 x + \cos^2 x$
5. $(x + 5)(x - 5)$
6. $(2x - 3)^2$
7. Factor: $x^2 - 16$
8. Factor: $x^2 + 7x + 12$

C2. Algebraic Fluency Drill

Solve mentally or with minimal written work.

1. $15\% \; of \; 240$
2. $\frac{3}{4} + \frac{5}{8}$
3. 2^{-3}
4. $\sqrt{144}$
5. $\sqrt{50}$
6. Rationalize: $\frac{5}{\sqrt{2}}$
7. $\log_{10} 1000$
8. 3^4

PART D — Internal Assessment (IA) Exploration

Purpose

The IB Math Internal Assessment is an individual exploration in which you investigate a mathematical topic that interests you.

Strong explorations:

- Investigate meaningful mathematics
- Include personal engagement
- Demonstrate clear communication
- Use accurate mathematics
- Show reflection and interpretation

This summer exploration is designed to help you begin thinking about your IA topic early.

IA Exploration Assignment

Step 1 — Brainstorm Interests

Choose THREE areas of interest from the list below or create your own:

- Sports
- Music
- Art
- Architecture
- Social media
- Gaming
- Fashion
- Medicine
- Fitness
- Business
- Economics
- Transportation
- Education
- Psychology
- Statistics in sports
- Population growth
- Cryptography
- Probability
- Physics
- Engineering

Step 2 — Topic Exploration

For EACH of your three interests:

A. Describe the Topic

Write 1 paragraph explaining:

- Why the topic interests you
- How mathematics connects to the topic

B. Identify Possible Mathematics

List at least 3 mathematical concepts that could relate to the topic.

Examples:

- Functions
- Trigonometry
- Statistics
- Probability
- Geometry
- Sequences
- Optimization
- Modeling
- Regression

C. Research Component

Find:

- 1 article
- 1 graph/data set
- 1 real-world application

Summarize each source in 3–5 sentences.

Step 3 — Mini Mathematical Investigation

Choose ONE of your three topics and complete a brief exploration.

Your exploration must include:

Required Components

1. A clear mathematical question
2. A small data set OR mathematical model
3. At least TWO mathematical calculations
4. At least ONE graph/table/diagram
5. A conclusion interpreting your findings
6. A reflection discussing:
    - What worked well
    - Challenges encountered
    - Questions you still have

Examples of How to Develop IA-Style Questions

- How does the angle of a basketball shot affect scoring probability?
- Can exponential functions model social media growth?
- How is trigonometry used in music and sound waves?
- Is there a relationship between study time and academic performance?
- How can statistics predict sports performance?
- How does geometry influence architectural design?

IA Exploration Requirements

Component	Requirement
Length	2–3 pages typed
Font	12 pt Times New Roman or Arial
Spacing	Double spaced
Graphs	Clearly labeled
Mathematics	Must be shown and explained
Submission	Digital (teacher preference)

Reflection Section

Respond thoughtfully in complete sentences.

1. What mathematical topics do you feel most confident about?
2. What topics do you struggle with most?
3. What is one goal you have for IB Math AA SL Year 2?
4. What study habits do you want to improve?
5. What concerns or questions do you currently have about Year 2?

Suggested Summer Review Schedule

Week	Suggested Focus
Week 1	Algebra Review
Week 2	Functions & Graphing
Week 3	Trigonometry Review
Week 4	Non-Calculator Practice
Week 5	IA Exploration Research
Week 6	Complete Final Drafts

Academic Integrity Reminder

All work submitted should reflect your own understanding and effort. Collaboration for discussion is acceptable, but copying work from another student or online source is not permitted.

If outside resources are used during the IA exploration section, sources must be cited appropriately using APA Format.

Final Encouragement

IB Mathematics rewards consistency, curiosity, and perseverance. Use this summer as an opportunity to strengthen your confidence and prepare yourself for a successful Year 2.

Come back ready to think critically, communicate mathematically, and challenge yourself.

Have a safe and productive summer!