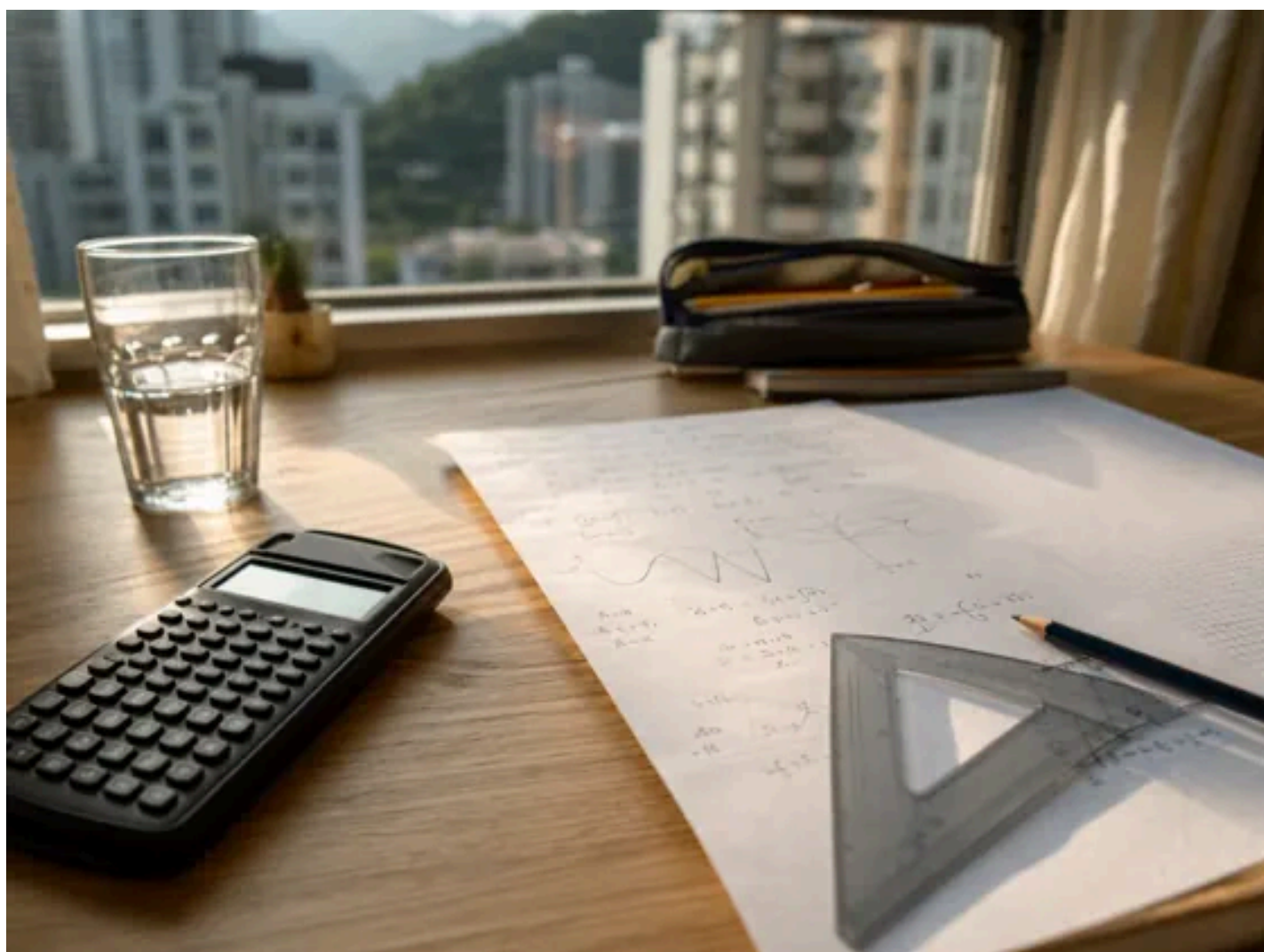


IB Mathematics AA SL Mock Paper — Paper 1 and Paper 2 with Full Worked Solutions and an IA Guide

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Quick answer: IB Mathematics: Analysis and Approaches (AA) at Standard Level is assessed in three parts: **Paper 1 (1 hour 30 minutes, 80 marks, 40%, no calculator)**, **Paper 2 (1 hour 30 minutes, 80 marks, 40%, calculator/GDC required)** and the **Internal Assessment, the Mathematical Exploration, 20 marks, 20%**. Both papers have a Section A of short-response questions and a Section B of extended-response questions, all compulsory. Below is an original TutorZone mock paper — 14 questions across the two papers — with full worked solutions and marking notes; every numerical answer has been checked.



AA SL is evenly weighted: 80 marks per paper and 20 for the exploration — no part can be written off.

Assessment at a glance (IB Maths AA SL)

Component	Format	Time	Marks	Weighting
Paper 1	No technology allowed ; Section A short-response (compulsory) + Section B extended-response (compulsory)	1 h 30	80	40%
Paper 2	Technology required (GDC) ; Section A short-response (compulsory) + Section B extended-response (compulsory)	1 h 30	80	40%
Internal assessment	Mathematical Exploration: an individual written investigation, marked internally and externally moderated	During the course	20	20%
Total			180	100%

How HL differs: at HL, Papers 1 and 2 are 2 hours and 110 marks each (30% each) with a further Paper 3 (1 hour, 55 marks, 20%); the IA is still 20 marks for 20%. SL has no Paper 3.

How AA differs from AI: the two courses share 60 hours of common SL content, but AA emphasises **functions and calculus**, algebraic reasoning and proof (the route into mathematics, engineering and economics), while AI emphasises statistics, modelling and technology.

Heads-up on the 2029 course (planning matters): the IB has announced a new mathematics AA course, published in **February 2027**, first taught from **August 2027**, with **first assessment in May 2029**. Under the new course the SL papers drop from 80 to **75 marks** (fewer items); at HL Papers 1 and 2 drop from 110 to 100 marks and Paper 3 from 55 to 50 marks with a one-hour duration; the IA criteria are also revised around the mathematical inquiry process. In other words: **students sitting in 2027 and 2028 are examined on the current structure (the one this paper follows)**; only students starting in August 2027 meet the new course.

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How this paper was written, and its copyright status

This mock paper was written by TutorZone tutors from publicly available IB information — the *Mathematics: analysis and approaches* subject brief and the assessment outline in the course guide. It is **not an IB past, specimen or official paper**. IB names, IB documents and IB examination material are the copyright of the International Baccalaureate Organization, and **no official question or course-document content is reproduced here**. Every question, worked solution and marking note is original to this paper, and each numerical answer has been independently checked. The mark allocations are this paper's own, laid out to mirror the official 80-mark papers, and are for practice and self-assessment only.

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Paper 1 mock paper (no calculator, 80 marks)

Section A: short-response (5 questions, 8 marks each, 40 marks) — give exact values unless a question asks for a given number of significant figures, and show enough working.

1. In an arithmetic sequence, $u_3 = 16$ and $u_8 = 41$.
 - (a) Find the common difference d and the first term u_1 . (3 marks)
 - (b) Find the sum of the first 20 terms, S_{20} . (5 marks)
2. Find the coefficient of x^4 in the expansion of $(2 + 3x)^6$. (8 marks)
3. Solve $\log_2 x + \log_2(x - 2) = 3$. (8 marks)
4. Given the complex number $z = 2 - 2\sqrt{3}i$:
 - (a) find $|z|$ and $\arg z$ (in radians or degrees); (4 marks)
 - (b) hence find z^3 . (4 marks)
5. Given $f(x) = x^2 \ln x$ for $x > 0$:
 - (a) find $f'(x)$; (4 marks)
 - (b) find the equation of the tangent to $y = f(x)$ at $x = 1$. (4 marks)

Section B: extended-response (2 questions, 20 marks each, 40 marks)

6. Let $f(x) = x^3 - 6x^2 + 9x + 1$.
 - (a) Find $f'(x)$ and solve $f'(x) = 0$. (4 marks)
 - (b) Determine the nature of each stationary point and give its coordinates. (6 marks)
 - (c) Find the coordinates of the point of inflection. (4 marks)
 - (d) Solve $f(x) = 1$ and state how many times the graph meets the line $y = 1$. (6 marks)
7. In triangle ABC, $AB = 7$ cm, $AC = 9$ cm and $\angle A = 60^\circ$.
 - (a) Find the exact length of BC. (5 marks)
 - (b) Find the exact area of the triangle and give it to 3 significant figures. (7 marks)
 - (c) Find $\angle C$ and $\angle B$ to 3 significant figures. (8 marks)

Paper 1 answers and marking notes

1. (a) 3 marks: $u_8 - u_3 = 5d \Rightarrow 41 - 16 = 5d \Rightarrow d = 5$ (2); $u_1 = u_3 - 2d = 16 - 10 = 6$ (1).

(b) 5 marks: $S_{20} = 20/2 [2(6) + 19(5)] = 10(12 + 95) = 1070$ (formula 2, substitution 2, answer 1).

2. 8 marks: general term $T_{k+1} = C(6, k) \cdot 2^{6-k} \cdot (3x)^k$ (3); with $k = 4$: $C(6, 4) = 15$ (2); $15 \times 2^2 \times 3^4 = 15 \times 4 \times 81 = 4860$ (3).

3. 8 marks: combine the logarithms: $\log_2[x(x-2)] = 3$ (2) $\Rightarrow x(x-2) = 2^3 = 8$ (2) $\Rightarrow x^2 - 2x - 8 = 0 \Rightarrow (x-4)(x+2) = 0$ (2) $\Rightarrow x = 4$ or $x = -2$; since the logarithm requires $x > 2$, **$x = 4$** (2). *Answering $x = 4$ without rejecting $x = -2$ loses 1 mark.*

4. (a) 4 marks: $|z| = \sqrt{2^2 + (2\sqrt{3})^2} = \sqrt{4 + 12} = 4$ (2); $\arg z = -\pi/3$, i.e. **-60°** , since z lies in the fourth quadrant (2).

(b) 4 marks: $z = 4 \operatorname{cis}(-\pi/3)$ (1) $\Rightarrow z^3 = 4^3 \operatorname{cis}(-\pi) = -64$ (3). Direct expansion of $(2 - 2\sqrt{3}i)^3$ is also accepted.

5. (a) 4 marks: product rule: $f'(x) = 2x \cdot \ln x + x^2 \cdot (1/x) = 2x \ln x + x$ (2 + 2).

(b) 4 marks: $f(1) = 0$, so the point is (1, 0) (2); $f'(1) = 1$ (1); tangent: **$y = x - 1$** (1).

6. (a) 4 marks: $f'(x) = 3x^2 - 12x + 9 = 3(x-1)(x-3)$ (2); $f'(x) = 0 \Rightarrow x = 1, x = 3$ (2).

(b) 6 marks: $f''(x) = 6x - 12$ (1); $f''(1) = -6 < 0 \Rightarrow$ **local maximum (1, 5)** (2); $f''(3) = 6 > 0 \Rightarrow$ **local minimum (3, 1)** (2); $f(1) = 5, f(3) = 1$ (1).

(c) 4 marks: $f''(x) = 0 \Rightarrow x = 2$ (2); $f(2) = 3$, so the point of inflection is **(2, 3)** (2).

(d) 6 marks: $x^3 - 6x^2 + 9x = 0 \Rightarrow x(x-3)^2 = 0$ (3) $\Rightarrow x = 0$ or **$x = 3$ (a repeated root)** (2). The graph meets $y = 1$ at **two distinct points**, (0, 1) and (3, 1) (1). *Answering "three intersections" is a conceptual error.*

7. (a) 5 marks: cosine rule: $BC^2 = 49 + 81 - 126(1/2) = 67$ (3) $\Rightarrow$ **$BC = \sqrt{67}$ cm** (2).

(b) 7 marks: area = $\frac{1}{2}(7)(9)\sin 60^\circ = (63\sqrt{3})/4 \text{ cm}^2$ (4) $\approx$ **27.3 cm^2** to 3 s.f. (3).

(c) 8 marks: sine rule: $\sin C / 7 = \sin 60^\circ / \sqrt{67}$ (2) $\Rightarrow \sin C \approx 0.7407$ (2) $\Rightarrow \angle C \approx 47.8^\circ$ (2); $\angle B = 180^\circ - 60^\circ - 47.8^\circ \approx 72.2^\circ$ (2). The cosine rule at C is equally acceptable.

Paper 2 mock paper (calculator required, 80 marks)

Section A: short-response (5 questions, 8 marks each, 40 marks) — give answers to 3 significant figures and state the distribution or function you used.

1. Given $X \sim N(52, 8^2)$, find:

- (a) $P(X > 60)$; (3 marks)
- (b) $P(45 < X < 58)$; (3 marks)
- (c) the value a such that $P(X < a) = 0.9$. (2 marks)

2. A production line has 12% non-conforming items. Twenty items are chosen at random.

- (a) Find the probability that exactly 3 are non-conforming. (4 marks)
- (b) Find the probability that at least one is non-conforming. (4 marks)

3. A bacterial population is modelled by $N(t) = 500e^{0.35t}$, where t is in hours.

- (a) Find the population at $t = 6$. (4 marks)
- (b) Find the doubling time. (4 marks)

4. Given the vectors $\mathbf{a} = (2, -1, 3)$ and $\mathbf{b} = (1, 4, -2)$:

- (a) find $\mathbf{a} \cdot \mathbf{b}$ and the angle between the vectors; (5 marks)
- (b) find the vector projection of $\mathbf{a}$ onto $\mathbf{b}$. (3 marks)

5. Solve $3 \sin x = 2 \cos x$ for $0 \leq x \leq 2\pi$, giving answers in radians to 3 significant figures. (8 marks)

Section B: extended-response (2 questions, 20 marks each, 40 marks)

6. An open-topped box has a square base of side x cm and a volume of 1000 cm^3 .

- (a) Express the height h in terms of x . (3 marks)
- (b) Show that the surface area $S = x^2 + 4000/x$. (5 marks)
- (c) Find the values of x and h that minimise the surface area, to 3 significant figures. (8 marks)
- (d) Prove that this is a minimum and give the minimum surface area. (4 marks)

7. A ball is dropped from a height of 3 m and rebounds to 60% of its previous height each time.

- (a) Find the height after the third bounce. (4 marks)
- (b) Write an expression for the height after the n th bounce. (4 marks)
- (c) Find the exact total vertical distance travelled before the ball comes to rest. (12 marks)

Paper 2 answers and marking notes

1. (a) 3 marks: $z = 1$ (1); $P(X > 60) \approx \mathbf{0.159}$ (2).

(b) 3 marks: $z_1 = -0.875$, $z_2 = 0.75$ (2); $P \approx \mathbf{0.583}$ (1).

(c) 2 marks: $z = 1.2816 \Rightarrow a = 52 + 1.2816(8) \approx \mathbf{62.3}$.

2. 4 + 4 marks: let $Y \sim B(20, 0.12)$. (a) $P(Y = 3) = C(20, 3)(0.12)^3(0.88)^{17} \approx \mathbf{0.224}$ (setup 2, answer 2). (b) $P(Y \geq 1) = 1 - (0.88)^{20} \approx \mathbf{0.922}$ (method 2, answer 2).

3. 4 + 4 marks: (a) $N(6) = 500e^{2.1} \approx \mathbf{4083}$ (2 + 2). (b) $e^{0.35t} = 2 \Rightarrow t = \ln 2 / 0.35 \approx \mathbf{1.98 \text{ hours}}$ (3 + 1).

4. (a) 5 marks: $\mathbf{a \cdot b = -8}$ (2); $|a| = \sqrt{14}$, $|b| = \sqrt{21}$ (1); $\cos \theta \approx -0.4666 \Rightarrow \theta \approx \mathbf{117.8^\circ}$ (2).

(b) 3 marks: $\text{proj}_{\mathbf{b}} \mathbf{a} = (-8/21)(1, 4, -2) \approx \mathbf{(-0.381, -1.524, 0.762)}$.

5. 8 marks: $\tan x = 2/3$ (3); $x \approx \mathbf{0.588}$ (3); second solution $x \approx \mathbf{3.73}$ (2). *One solution only scores below 3.*

6. (a) 3 marks: $x^2 h = 1000 \Rightarrow \mathbf{h = 1000/x^2}$.

(b) 5 marks: $S = x^2 + 4xh = \mathbf{x^2 + 4000/x}$ (setup 3, simplification 2).

(c) 8 marks: $dS/dx = 2x - 4000/x^2$ (3); setting it to zero: $x^3 = 2000 \Rightarrow \mathbf{x \approx 12.6 \text{ cm}}$ (3); $h = 1000/x^2 \approx \mathbf{6.30 \text{ cm}}$ (2).

(d) 4 marks: $S'' = 2 + 8000/x^3$ (2); at $x \approx 12.6$, $S'' = 6 > 0$, so it is a minimum (1); $S \approx \mathbf{476 \text{ cm}^2}$ (1). *"The curve opens upwards" without calculation earns no credit for the second mark.*

7. (a) 4 marks: $h_3 = 3(0.6)^3 = \mathbf{0.648 \text{ m}}$ (2 + 2).

(b) 4 marks: $h_n = \mathbf{3(0.6)^n \text{ m}}$.

(c) 12 marks: first drop 3 m (2); each later rise and fall contributes $3(0.6)^n$, giving $2 \times \sum_{n=1}^{\infty} 3(0.6)^n$ (4); geometric sum $= 1.8/0.4 = 4.5$ (3); total $= 3 + 2(4.5) = \mathbf{12 \text{ m}}$ (3). *Answering $3 + 4.5 = 7.5 \text{ m}$ omits the downward legs and scores 4.*

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The Internal Assessment (20 marks): how to do the Exploration

Criterion	What is assessed
A: Presentation	Whether the whole piece is coherent and well organised — aim, mathematical process and conclusion — with consistent notation and graphs.
B: Mathematical communication	Accurate use of mathematical language and symbols, defined variables and clear reasoning that a reader can follow.
C: Personal engagement	Whether the topic genuinely interests you, and whether your own choices, assumptions and reflections are visible.
D: Reflection	Whether you examine the reasonableness of results, the limitations of the method, the effect of error, and what could be improved.
E: Use of mathematics	Whether the mathematics fits the aim, matches the level of the course, and shows understanding of concepts rather than formula-plugging.

Five workable exploration topics: (1) model phone battery charge and discharge with exponential and logarithmic functions; (2) test whether a set of school data (travel times, say) is approximately normal; (3) use geometry and calculus

to design the most material-efficient packaging; (4) analyse the decay of a bouncing basketball with a geometric series and limits; (5) use regression to relate temperature and electricity consumption. **What matters is real data, real mathematics and real reflection** — not an impressive-sounding title.

Three fatal IA errors: (1) writing a data report with plentiful background but no mathematical development; (2) a topic so broad ("mathematics and art") that there is no research question; (3) submitting an existing exploration found online — plagiarism forfeits the qualification. **Suggested timeline:** choose the topic and collect data in S5 Term 2, draft over the summer, revise in S6 Term 1 on your teacher's feedback.

08

Where AA SL marks are most often lost

- **Not using the GDC in Paper 2:** the paper expects the graphing calculator for normal and binomial distributions, regression and numerical solutions; hand computation is slower and error-prone.
- **Ignoring command terms:** "Show that" requires the derivation, "Hence" means you must use the previous part, "Sketch" needs the key features but not exact points.
- **Significant figures and units:** unless an exact value is asked for, give 3 s.f.; rounding too early in intermediate steps loses marks.
- **Answers without working:** AA papers carry method marks — a correct answer with no visible method still loses marks.
- **Ignoring domains:** logarithm, root and function-domain traps are common (as in question 3, where $x = -2$ must be rejected).
- **Proving with graphs:** graphs support an argument, but "prove" needs algebra or calculus.

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A twelve-week preparation plan

Weeks	Paper 1 (no calculator)	Paper 2 (with GDC)	IA
1–3	Algebra and functions: roots, exponentials and logs, complex numbers	GDC drills: solving, graphing, distribution functions	Choose the topic, confirm the data source
4–6	Calculus: differentiation, tangents, extrema, integration	Calculus and graph analysis with the GDC	Collect data, draft about half
7–9	Trigonometry, vectors, sequences and the binomial theorem	Probability and statistics: normal, binomial, regression	Complete the draft, submit for teacher feedback
10–11	Timed papers: 80 marks in 90 minutes	Timed papers: 80 marks in 90 minutes	Revise on the feedback (especially reflection)
12	Redo the questions you got wrong	Final GDC speed check	Final formatting and referencing check

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FAQ

AA SL or AI SL?

For mathematics, engineering, economics or computer science pathways, AA is usually the right choice; for business, social sciences, design or humanities, AI's statistics-and-modelling emphasis fits better. Both SL courses are 150 teaching hours with the same assessment structure (two papers at 40% each plus a 20% IA).

Which calculator may I use in Paper 2?

A school-approved graphing display calculator (GDC); the accepted models are listed by the IB, and memory must be cleared or handled as the regulations require.

When should the IA be done?

Choose the topic in S5 Term 2, draft over the summer and revise in S6 Term 1. It is 20% of the grade — more than half of either paper — so it should not be left to the last minute.

Does the assessment change for 2027 or 2028?

No. The new course is first taught in August 2027 with first assessment in May 2029, so students sitting in 2027 and 2028 follow the current structure used in this paper (two 80-mark papers plus the 20-mark IA).

How do I practise for a paper with no calculator?

Put the phone and calculator away entirely during Paper 1 practice and work only on paper; memorise the common values ($\sqrt{2}$, $\sqrt{3}$, $\sin 60^\circ = \sqrt{3}/2$, $\log 2$) and practise mental arithmetic.

Can I get IB maths tutoring in Hong Kong?

Yes — TutorZone matches students with tutors who know the AA and AI courses and can supervise the IA, including specific training for the no-calculator paper.

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Official sources to check against

Source	What to use it for
IB — Mathematics: analysis and approaches subject brief (PDF)	Confirming the SL/HL weightings, paper durations and teaching hours
IB — Mathematics: analysis and approaches curriculum update	The new course (first taught August 2027, first assessed May 2029): SL papers to 75 marks and revised IA criteria
IB — DP mathematics curriculum page	The difference between AA and AI and how to choose

Also useful: [IB Mathematical Studies course guide](#) and the [TutorZone exam practice questions](#). For IB maths or IA supervision, start with the [subject guides](#) and then get matched with a tutor.