IB DP MATHS AI · EXAM SPECIAL · AA AND AI · SL & HL · PAPER 1 (AI), PAPER 2, PAPER 3 · ~13 MIN READ

IB Maths GDC Guide: TI-84 Plus CE and Casio fx-CG50

The calculator skills IB examiners say students under-use, with menu paths for the TI-84 Plus CE and the Casio fx-CG50: solving, graphs, calculus, statistics, distributions, finance, tests, matrices and complex numbers.

Setup & angle mode | Solver | Graph: zero, max, min, intersect | d/dx and ∫ | Tables & sequences | Statistics & regression | Normal, binomial, Poisson | TVM finance

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No tag = **SL and HL** HL ONLY HL students only FORMULA BOOKLET given in the exam
M1 A1 how marks are awarded highlight = comes up again and again HANDY worth memorising
Test yourself at the end

IN 30 SECONDS

- **Every IB Maths subject report in 2024–25 said the same thing:** students lose time and marks doing by hand what the GDC does in seconds. In AA Paper 2, "once an equation in one variable is obtained, the next mark is for the answer".
- **But the GDC never replaces working.** Write the equation you solved, the distribution with its parameters, or the TVM values, then the answer. A bare wrong answer scores nothing.
- **Menu names below are for recent operating systems** (TI-84 Plus CE OS 5.x, Casio fx-CG50 OS 3.x). Older versions put some items in a slightly different place; the function names are the same.

BY THE END YOU CAN

- Set up the GDC correctly before every paper.
- Solve equations, find intersections, derivatives and integrals in one step.
- Run statistics, distributions, hypothesis tests and finance calculations.
- Work with matrices and complex numbers (HL).
- Write the right working so method marks are safe.

1 Before the exam

Setup and memory

Task	TI-84 Plus CE	Casio fx-CG50
Angle mode	MODE → RADIAN or DEGREE	SHIFT MENU (SET UP) → Angle → Deg or Rad
Show r and r^2	MODE → STAT DIAGNOSTICS: ON	shown automatically
Store a value	STO→ then ALPHA letter (e.g. A)	→ key then ALPHA letter
Use the last answer	2nd (−) (Ans)	SHIFT (−) (Ans)
Exact fractions	MATH → ▶Frac (or the n/d template)	F↔D key

EXAM TIP

After an exam reset, both calculators usually go back to radians. AI SL trig questions are in degrees; AA calculus is always in radians. Check the mode at the start of every trig or calculus question.

COMMON MISTAKE

Retyping a rounded value. Store intermediate answers (STO→ A) and recall them. Premature rounding is the most common lost mark in every report.

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2 Solving equations

Solvers

Task	TI-84 Plus CE	Casio fx-CG50
One equation, one unknown	MATH → Solver (Numeric Solver): enter E1 and E2, then SOLVE	MENU → Equation → Solver: type the equation, SOLVE
Simultaneous linear equations	APPS → PlySmlt2 → Simultaneous Eqn Solver	MENU → Equation → Simultaneous → number of unknowns
Polynomial roots	APPS → PlySmlt2 → Polynomial Root Finder	MENU → Equation → Polynomial → degree
Roots, max, min	Y= then GRAPH; 2nd TRACE (CALC) → zero, minimum, maximum	MENU → Graph; DRAW; SHIFT F5 (G-SOLVE) → ROOT, MAX, MIN
Intersection of two graphs	2nd TRACE (CALC) → intersect	G-SOLVE → INTSECT

- **Write:** "$x^3 - 6x^2 + 9x - 2 = 0 \Rightarrow x = 0.268, 2, 3.73$" or "intersections of $y = 2^x$ and $y = x + 3$: $x = -2.86$ or $x = 2.44$". The equation is the method mark.
- **Window:** set it so every root and turning point you need is on screen. Examiners regularly see missed minima from a bad window.

WORKED EXAMPLE

AA Paper 2: find a such that $f'(1) = \tan 70°$ when $f'(1)$ depends on a.

1. write the equation in a: $f'(1) = \tan 70°$ M1
2. solve it with the solver or by graphing y = (your expression in a) and $y = \tan 70°$ M1
3. **read a, and check it is in the domain given** A1 R1

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3 Calculus on the GDC

Derivatives and integrals

Task	TI-84 Plus CE	Casio fx-CG50
Derivative at a point	MATH → nDeriv((d/dx template), or 2nd TRACE → dy/dx on a graph	RUN-MATRIX → OPTN → CALC → d/dx
Graph a derivative (AI SL)	Y2 = nDeriv(Y1, X, X)	Y2 = d/dx(Y1, x) using OPTN → CALC
Definite integral	MATH → fnInt((∫ template), or 2nd TRACE → ∫f(x)dx	OPTN → CALC → ∫dx, or G-SOLVE → ∫dx
Absolute value (areas, distance)	MATH → NUM → abs(	OPTN → NUMERIC → Abs
Sum of a sequence Σ	MATH → summation Σ(	OPTN → CALC → Σ(

- **Distance travelled** = ∫|v(t)| dt in one step: fnInt(abs(v), t, 0, 4). The May 2025 reports saw students split it into pieces and lose accuracy rounding each piece.
- **Maximum speed:** graph y = abs(v(x)) and use maximum.
- **Find an unknown limit** (AA median of a pdf, AA HL lower quartile): solve $\int_a^m f(x)\,dx = 0.5$ with the solver, using fnInt inside the equation.

COMMON MISTAKE

Differentiating by hand on Paper 2 when the question only needs a value. "Find the time when the acceleration is 5" can be done by graphing nDeriv(v) and intersecting with y = 5.

4 Tables, sequences and recursion

Tables and recursion

Task	TI-84 Plus CE	Casio fx-CG50
Table of values	2nd WINDOW (TBLSET), then 2nd GRAPH (TABLE)	MENU → Table
Recursive sequence	Home screen: type u_1, ENTER; then the rule using Ans, ENTER repeatedly	MENU → Recursion → a_{n+1} type, then TABLE
Euler's method (two variables)	Y+h(X+Y)→Y:X+h→X then ENTER repeatedly (use your own f(x, y))	MENU → Spreadsheet: x in column A, y in column B, B2 = B1 + h × f(A1, B1), fill down

- **"First n for which..."** (savings, populations, binomial n): make a table and write down the two values either side of the boundary as evidence. Example: for X ~ B(n, 0.08), P(X ≤ 6) = 0.3781 when n = 93 and 0.3667 when n = 94, so the largest n with P(X ≤ 6) > 0.37 is 93.
- **Euler's method write-up (AA HL, AI HL):** write the recursion with the question's variables, show the first step by hand, then the final value.

5 Statistics and regression

Data, summaries and regression

Task	TI-84 Plus CE	Casio fx-CG50
Enter data	STAT → Edit → L1, L2	MENU → Statistics → List 1, List 2
Mean, σ, quartiles (frequency table)	STAT → CALC → 1-Var Stats, List: L1, FreqList: L2	CALC → SET (1Var XList List1, 1Var Freq List2) → 1-VAR
Linear regression and r	STAT → CALC → LinReg(ax+b) L1, L2	CALC → REG → X → ax+b
Other models	ExpReg, PwrReg, QuadReg, CubicReg, SinReg	REG → Exp, Pwr, X^2 (quad), X^3 (cubic), Sin
Store the equation to graph it	LinReg… then Store RegEQ: Y1	COPY (F5) after the regression

- **σ_x vs s_x:** σ_x is the population standard deviation (the one IB means by "standard deviation" in most questions); s_x is the sample version. Read which one the question asks for.
- **Spearman's rank:** rank both variables (equal values get the mean rank), then run linear regression on the ranks: the r it gives is r_s.
- **Write:** "y = 3.47x + 44.6, r = 0.996 (from GDC)" with both coefficients to 3 s.f.

6 Probability distributions

Normal, binomial, Poisson

Task	TI-84 Plus CE	Casio fx-CG50
Normal P(a < X < b)	2nd VARS (DISTR) → normalcdf(a, b, μ, σ)	STAT → DIST → NORM → Ncd
Inverse normal	DISTR → invNorm(area, μ, σ, LEFT/CENTER/RIGHT)	DIST → NORM → InvN, Tail: Left, Right or Central
Binomial P(X = r)	DISTR → binompdf(n, p, r)	DIST → BINOMIAL → Bpd
Binomial P(X ≤ r)	DISTR → binomcdf(n, p, r)	DIST → BINOMIAL → Bcd (set lower and upper)
Poisson (HL)	poissonpdf(m, r), poissoncdf(m, r)	DIST → POISSON → Ppd, Pcd

- **P(X ≥ 4) on a TI:** 1 − binomcdf(n, p, 3). On the Casio, Bcd with lower 4 and upper n.
- **Open-ended normal ranges:** use −1E99 or 1E99 as the other bound.
- **Unknown μ or σ:** use invNorm on N(0, 1) to get z, then solve $\frac{x - \mu}{\sigma} = z$ (twice for two unknowns, with the simultaneous solver).

COMMON MISTAKE

invNorm(0.88) when 6% is in each tail. For P(a < X < b) = 0.88 symmetric about μ, the upper value has 0.94 to its left. Sketch first.

- **Write:** "X ~ B(20, 0.15), P(X ≤ 2) = 0.405" or "X ~ N(500, 12^2), P(X < 480) = 0.0478". The distribution and the probability statement are the method mark.

7 Finance (TVM solver)

TVM

Task	TI-84 Plus CE	Casio fx-CG50
Open the solver	APPS → Finance → TVM Solver	MENU → Financial → Compound Interest
Enter values	N, I%, PV, PMT, FV, P/Y, C/Y	n, I%, PV, PMT, FV, P/Y, C/Y
Solve for the unknown	move to it, ALPHA ENTER (SOLVE)	press the soft key for that variable (n, I%, PV, PMT or FV)
Balance after k payments	set N = k and solve for FV (or bal(k))	set n = k and solve for FV (or AMORTIZATION)

- **Signs:** money you receive is +, money you pay out is −. For a loan, PV > 0 and PMT < 0; for savings, PV < 0 or PMT < 0 and FV > 0.
- **N** is the total number of payments (years × payments per year). **FV = 0** for a loan that is fully repaid.
- **Write** every value you entered: "N = 60, I% = 6, PV = 20 000, PMT = ?, FV = 0, P/Y = 12, C/Y = 12 ⇒ PMT = −386.66". Examiners award marks for the entries.

8 Hypothesis tests and intervals

Tests

Task	TI-84 Plus CE	Casio fx-CG50
χ^2 test for independence	2nd x^{-1} (MATRIX) → EDIT [A] = observed; STAT → TESTS → χ^2-Test	STAT → TEST → CHI → 2WAY, Observed: Mat A
Expected frequencies	stored in matrix [B] after the test	shown/stored as a matrix after the test
χ^2 goodness of fit	STAT → TESTS → χ^2GOF-Test (observed L1, expected L2, df)	TEST → CHI → GOF
Two-sample t-test	STAT → TESTS → 2-SampTTest (Data; $\mu_1 > \mu_2$ etc.; Pooled: Yes)	TEST → t → 2-S, Pooled: On
Paired t-test (HL)	L3 = L1 − L2, then T-Test on L3 with $\mu_0 = 0$	List 3 = List 1 − List 2, then t → 1-S
Confidence interval (HL)	STAT → TESTS → TInterval or ZInterval	INTR → t or Z → 1-S

- **Write:** the test, H_0 and H_1, the p-value (and χ^2 or t), the comparison with the significance level, and a conclusion in context. Templates are in AI write-up templates.

9 Matrices (AI HL, AA HL systems)

Matrices

Task	TI-84 Plus CE	Casio fx-CG50
Enter a matrix	2nd x^{-1} (MATRIX) → EDIT	RUN-MATRIX → MAT/VCT (or the Matrix editor)
Inverse and solve AX = B	[A] $^{-1}$ [B]	Mat A^{-1} × Mat B
Powers (Markov, walks)	[A] ^5	Mat A ^ 5
Determinant	MATRIX → MATH → det(	OPTN → MAT/VCT → Det
Eigenvalues	no direct key: solve det(A − λI) = 0 with the polynomial solver	no direct key: same method

- **Steady state (Markov):** raise T to a high power (T^50) and read any column, or solve (T − I)s = 0 with the entries adding to 1.

10 Complex numbers (AA HL, AI HL)

Complex mode

Task	TI-84 Plus CE	Casio fx-CG50
Complex mode	MODE → a+bi or re^(θi)	SET UP → Complex Mode → a+bi or r∠θ
Type i	2nd . (i)	SHIFT 0 (i)
Modulus and argument	MATH → CMPLX → abs(, angle(	OPTN → COMPLEX → Abs, Arg
Convert form	MATH → CMPLX → ▶Rect, ▶Polar	OPTN → COMPLEX → ▶a+bi, ▶r∠θ

- **Phasors (AI HL):** to add $14.8e^{1.27i} + 18.5e^{-2.36i}$, type both in exponential form and convert the result. The May 2025 AI HL report said most students didn't do this step.

11 What to write when you use the GDC

- **Equations:** write the equation before the solution.
- **Distributions:** name the distribution and its parameters, then the probability statement.
- **Graphs:** sketch with labelled axes, the window you used, and the key points with coordinates.
- **Integrals and derivatives:** write the integral with its limits, or "f′(2) = ...".
- **Finance:** list every TVM entry.
- **Tests:** test name, hypotheses, p-value, comparison, conclusion in context.
- **Never:** "used GDC", a list of button presses, or a calculator screenshot copied as working.

LINKING QUESTION

The traps these skills prevent are listed in Maths AA exam traps and Maths AI exam traps.

Test yourself — cover the answers first

QUICK CHECK

1. Which GDC tool finds where two graphs meet?
2. For a loan, which values have opposite signs in the TVM solver?
3. How do you find P(X ≥ 5) with binomcdf on a TI-84?
4. What do you need to write besides the GDC answer for a normal probability?
5. A reset GDC is usually in which angle mode?

Show answers

1. intersect (G-SOLVE → INTSECT on Casio)
2. PV and PMT
3. 1 − binomcdf(n, p, 4)
4. the distribution, its parameters and the probability statement
5. radians

Stuck on a question?

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