GrindSpot
ONLINE GRINDS PLATFORM

LEAVING CERT 2027

LEAVING CERT MATHS

Exam Ready

Higher Level · Paper 1 · Workbook A

Dyslexia friendly
large, clear text · room to write

Built from 9 years of real Leaving Cert papers: what comes up, how it's marked, and the practice to nail it.

- **9** years of exam trends, topic by topic
- **54** topic drills with answers
- **1** full practice paper, 300 marks
- ✓ every answer worked out step by step



Know what's coming.
Walk in ready.

Original GrindSpot material written in the style of the Leaving Certificate examination. Not an official SEC paper.

What comes up

2017 to 2026

We read every Higher Level Paper 1 from the last nine exams (there was no exam in 2020) and noted the main topics in each question. Each number is how many questions used that topic in that year's paper; one question often uses two or three topics. We counted a topic for a question when at least one of its parts could not be answered without it.

	2017	2018	2019	2021	2022	2023	2024	2025	2026	Years
Algebra & number	2	2	5	4	4	7	4	6	7	9/9
Differentiation	3	3	3	5	4	4	7	4	4	9/9
Functions & graphs	4	3	3	3	2	3	3	3	2	9/9
Logs & exponentials	3	2	1	3	3	2	2	2	2	9/9
Sequences & series	2	3	1	3	2	3	1	2	3	9/9
Integration	2	2	1	2	2	3	3	2	2	9/9
Complex numbers	1	1	1	1	1	1	1	1	1	9/9
Financial maths	1	–	–	–	–	1	1	1	1	5/9
Proof by induction	–	1	1	1	–	–	–	1	1	5/9

Darker = more questions. Source: State Examinations Commission papers, 2017 to 2026, read and grouped by GrindSpot. Every question we counted is listed at **grindspot.ie/exam-trends**. A guide to what has come up, not a prediction of what will.

Algebra and differentiation are everywhere. Algebra was needed in 41 of the 87 questions, differentiation in 37: four to seven a year since 2021, mostly in Section B.

Complex numbers: one question, every year. Always in Section A, often with De Moivre's theorem.

Seven topics appeared every single year: algebra, complex numbers, sequences and series, logs and exponentials, functions, differentiation and integration.

Financial maths is back. It has been in every paper since 2023, often as loans, mortgages or savings. Proof by induction came up in five of the nine papers.

TOPIC 2

Complex numbers

Worked answers →

In the real exam

Came up in 9 of 9 papers, 2017 to 2026: exactly one question every year.



Fionn's tip: Know De Moivre's theorem in both directions: powers, and finding roots (add $2\pi k$ to the angle before dividing). Draw an Argand diagram to get the angle in the right quadrant.

1. Write $(3 - 2i)(1 + 4i)$ in the form $a + bi$.

2. Find $|5 - 12i|$.

3. Write $-2 + 2i$ in polar form $r(\cos\theta + i\sin\theta)$.

Section B · Contexts and Applications — 150 marks

Answer any three questions from this section.

Question 7 — (50 marks)

An open box is made from a rectangular sheet of card 30 cm long and 20 cm wide. A square of side x cm is cut from each corner, and the sides are folded up.

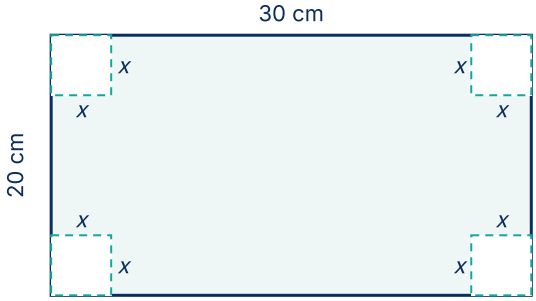


Diagram not to scale

(a) Show that the volume of the box is $V(x) = 4x^3 - 100x^2 + 600x$ cm³. 5

(b) Write down the set of possible values of x (the domain of V). 5

(c) Use calculus to find the value of x that gives the box its maximum volume. Give the exact value, and also its value correct to two decimal places. Find this maximum volume, to the nearest cm³. 15

(d) Use the second derivative to show that your answer to part (c) gives a maximum. 5

(e) A machine cuts the squares, and x increases at a rate of 0·2 cm per second while it cuts. Find the rate at which the volume of the box is changing at the moment when $x = 2$. 10

(f) The area of the base of the box is $A(x) = (30 - 2x)(20 - 2x)$. Find the average value of $A(x)$ for $0 \le x \le 5$. 10

Each part shows the method, the answer, its marks, and a guide to partial credit written in the style of the SEC marking schemes (our guide, not an official scheme). Full credit needs the correct answer with supporting work. In the real exam, marks are given in steps for correct work even when the final answer is wrong, so always write down your method.

Question 1 (30 marks)

(a) Square both sides: $2x + 7 = x^2 - 8x + 16 \Rightarrow x^2 - 10x + 9 = 0 \Rightarrow (x - 1)(x - 9) = 0$.
So $x = 1$ or $x = 9$. Since $x \geq 4$, reject $x = 1$. Check: $\sqrt{25} = 5 = 9 - 4$. $x = 9$

Tip: squaring can create false roots. Always check each answer in the original equation.

10 marks · *Low partial credit:* squares both sides correctly · *High partial credit:* finds both roots but does not reject $x = 1$

(b) $f(2) = 16 + 4k - 26 + 6 = 4k - 4 = 0 \Rightarrow k = 1$
Divide: $2x^3 + x^2 - 13x + 6 = (x - 2)(2x^2 + 5x - 3) = (x - 2)(2x - 1)(x + 3)$.
$x = 2,\ \frac{1}{2},\ -3$

10 marks · *Low partial credit:* writes $f(2) = 0$ · *High partial credit:* finds $k = 1$ and the quadratic factor, with a slip solving it

(c) $\dfrac{2x + 1}{x - 3} - 1 \geq 0 \Rightarrow \dfrac{x + 4}{x - 3} \geq 0$. The critical values are -4 and 3.
Testing the three intervals (or multiplying both sides by $(x - 3)^2$):
$x \leq -4$ **or** $x > 3$

Tip: never multiply an inequality by $(x - 3)$: its sign is unknown. Multiply by $(x - 3)^2$, which is always positive.

10 marks · *Low partial credit:* finds one critical value · *High partial credit:* both critical values, but the wrong interval or $x = 3$ included

Question 2 (30 marks)

(a) $a + 2d = 11$ and $a + 7d = 31 \Rightarrow 5d = 20 \Rightarrow d = 4,\ a = 3$.
$S_{20} = \frac{20}{2}\big(2(3) + 19(4)\big) = 10(82)$. $a = 3,\ d = 4,\ S_{20} = 820$

10 marks · *Low partial credit:* one correct equation in a and d · *High partial credit:* a and d correct, with a slip in S_{20}