LUMIKNOW PARENT RESOURCE SERIES

IB Physics
Parent Guide

A practical guide to understanding the Diploma Programme Physics course, assessments, skill demands and the kind of support that actually helps.

First assessment 2025 framework

For: Parents of IBDP Physics students

Focus: Structure, clarity, long-term capability

START HERE

What this guide helps you see

IB Physics can look like a subject of formulas and difficult calculations. In practice, students are being asked to build a connected system of conceptual understanding, mathematical processing, data interpretation, scientific reasoning and exam communication.

What parents often see

- Test marks that rise and fall
- Long homework sessions
- Formula sheets and problem sets
- Stress near examinations
- A student who "understands in class" but loses marks in tests

What is usually happening underneath

- Concepts may not yet be linked together
- Knowledge may not transfer to unfamiliar questions
- Data, graph or uncertainty skills may be weak
- Students may know a method but not recognise when to use it
- Exam execution may be limiting otherwise good understanding

LumiKnow principle

Diagnosis before advice. A low score is not a complete diagnosis. The useful question is: **which part of the learning system failed - understanding, retrieval, application, interpretation, communication, practice consistency or exam execution?**

2 yrs
DIPLOMA PROGRAMME COURSE

20%
SCIENTIFIC INVESTIGATION

80%
EXTERNAL EXAMINATIONS

COURSE ARCHITECTURE

SL and HL: same foundation, different depth

The IB recommends **150 teaching hours for Standard Level (SL)** and **240 teaching hours for Higher Level (HL)**. Both levels share a concept-based course, experimental work, a scientific investigation and the collaborative sciences project. HL extends the breadth and depth of the content and requires students to connect more ideas across the course.

STANDARD LEVEL

150

recommended teaching hours

Designed to develop a strong fundamental understanding of physics and the associated scientific skills.

HIGHER LEVEL

240

recommended teaching hours

Includes greater breadth, greater depth and more demanding conceptual integration across topics.

The five syllabus themes

- **A. Space, time and motion**
- **B. Particulate nature of matter**
- **C. Wave behaviour**
- **D. Fields**
- **E. Nuclear and quantum physics**

These themes are not intended to behave like five isolated chapters. Strong students build connections between them and can move between representations, equations, graphs, models and real contexts.

Parent interpretation

If a student says, "I finished the chapter," that is only the beginning. In IB Physics, completion matters less than whether the student can **retrieve the idea, recognise it in a new setting, choose a valid model, calculate accurately and explain the result.**

WHAT IS ASSESSED

IB Physics measures more than knowledge

The official assessment objectives move from knowing, to applying, to analysing and evaluating, and finally to carrying out an insightful and ethical investigation.

1. Knowledge

Terminology, facts, concepts, techniques and scientific methods. This is necessary, but not enough for high performance.

definitions · relationships · methods

2. Understanding and application

Using concepts and methods correctly in both familiar and less familiar situations.

model choice · equations · transfer

3. Analysis, evaluation and synthesis

Working with data, trends, experimental procedures, uncertainty, patterns and predictions.

graphs · data · evaluation

4. Investigation

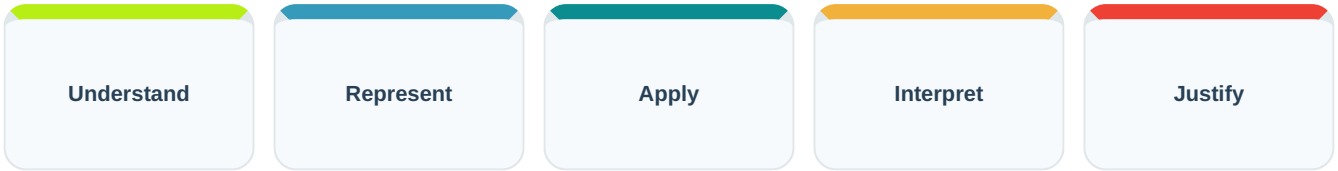
Designing, carrying out and evaluating a scientific investigation with appropriate scientific and ethical judgement.

research design · evidence · reflection

Why some capable students plateau

They keep revising content when the actual weakness is **transfer**. Re-reading notes can improve familiarity while leaving unfamiliar-question performance almost unchanged. Improvement requires targeted practice in the specific skill that is failing.

The physics skill chain



ASSESSMENT BLUEPRINT

How the final Physics grade is built

The first-assessment-2025 structure gives the same overall weighting at SL and HL: **80% external assessment and 20% internal assessment**. The difference is primarily the amount and depth of content and the length of the examination papers.

Component	SL	HL	What it mainly demands
Paper 1 Paper 1A + 1B	1 h 30 min 45 marks **36%**	2 h 60 marks **36%**	Multiple-choice reasoning plus data-based interpretation. Tests knowledge, application and analysis.
Paper 2	1 h 30 min 55 marks **44%**	2 h 30 min 90 marks **44%**	Short-answer and extended-response problems. Requires structured thinking, working, explanation and synthesis.
Scientific investigation	10 hours 24 marks **20%**		Independent research question, data gathering and analysis, conclusion and evaluation.

External assessment = 80%

Performance must be reliable under time pressure. Students need fluency, recognition, calculation discipline, data handling and written reasoning.

Scientific investigation = 20%

Students have more time, but the standard shifts to research quality, data analysis, reasoning, evaluation and authenticity.

A useful parent question

Instead of asking, "What mark did you get?" ask, "Which assessment demand cost you the most marks - concept, calculation, interpretation, explanation or time?"

PAPER 1

Fast decisions + data reasoning

Paper 1 combines two different modes of thinking. **Paper 1A** uses multiple-choice questions. **Paper 1B** uses data-based questions. Calculators and the Physics data booklet are permitted.

PAPER 1A

Multiple-choice reasoning

- Recognise the governing idea quickly
- Eliminate tempting distractors
- Estimate before calculating
- Use units, signs and limiting cases as checks
- Avoid overworking a question that needs a short physical argument

PAPER 1B

Data-based reasoning

- Read graphs and tables precisely
- Identify trends and relationships
- Process data accurately
- Handle uncertainty and experimental context
- Explain what the evidence supports

Four common causes of lost marks

1. **Recognition delay:** the student knows the concept but cannot identify it quickly in a new context.
2. **Representation error:** graph, vector, sign convention or diagram is misread before the calculation even begins.
3. **Calculation control:** units, powers of ten, calculator entry or rounding create avoidable losses.
4. **Evidence reading:** the student describes data without actually interpreting what it means physically.

Best preparation

Short, frequent, mixed practice with immediate error analysis. A student should know **why** each wrong option was wrong, not only which option was correct.

PAPER 2

Where understanding becomes visible

Paper 2 asks students to construct the solution. This makes hidden weaknesses visible: model choice, working, justification, command-term interpretation and the ability to connect several ideas in sequence.

Strong answers usually show

- ✓ A clear representation: diagram, variables or known information
- ✓ The correct governing relationship before substitution
- ✓ Logical steps with units and signs
- ✓ A final answer that matches the physical situation
- ✓ Explanations that answer the exact command term

Weak answers often show

- Formula hunting without a model
- Correct physics with incomplete explanation
- Substitution before thinking
- Unlabelled directions or ambiguous symbols
- Time loss on one long question

A reliable solution routine

1. **Represent:** sketch, define the system and label known quantities.
2. **Predict:** decide what should increase, decrease, be positive, be conserved or be approximately true.
3. **Relate:** write the physical principle or equation that connects the quantities.
4. **Process:** substitute, calculate and keep units/signs under control.
5. **Interpret:** check whether the answer is physically sensible and state the requested conclusion.

Parent warning sign

If a student repeatedly says, "I knew it after seeing the solution," the issue is usually not pure knowledge. It is **independent retrieval and method selection**. More solution-watching will not fix that by itself.

INTERNAL ASSESSMENT

The scientific investigation, without the jargon

The scientific investigation is the same requirement at SL and HL. It contributes **20% of the final grade**, is allocated about **10 hours**, and results in a written report with a maximum overall word count of **3,000 words**.

24
TOTAL MARKS

The report is assessed using four equally weighted criteria.

4 x 6
CRITERION STRUCTURE

Research design, data analysis, conclusion and evaluation.

Criterion	What strong work demonstrates	Parent-friendly interpretation
Research design	A focused research question, relevant context and a reproducible, justified methodology.	The student knows what is being tested and why the method can answer it.
Data analysis	Relevant processing, uncertainty awareness, appropriate graphs/calculations and sound interpretation.	The student turns measurements into evidence rather than simply presenting numbers.
Conclusion	A conclusion that directly answers the research question and is justified by the processed data and accepted physics.	The claim matches the evidence.
Evaluation	Specific limitations, their impact, and realistic improvements.	The student can judge the quality of the investigation rather than just list generic errors.

How parents can help ethically

Ask the student to explain the research question, method and evidence aloud. Do not rewrite, edit or solve the investigation for them. The work must remain authentic and individually authored.

READING RESULTS

A mark is an outcome. A diagnosis is more useful.

When a test comes back, separate the score into performance dimensions. This prevents the common mistake of prescribing more revision when the student actually needs a different kind of practice.

Pattern	Likely issue	What to do next
High MCQ accuracy, weak extended responses	Written reasoning, structure, command terms or multi-step application	Timed structured questions + marking against explicit answer requirements
Understands examples, struggles with unfamiliar contexts	Transfer and model selection	Mixed problem sets with "why this method?" reflection
Good method, frequent arithmetic/unit errors	Calculation discipline	Unit checks, powers-of-ten drills, final-answer routine
Graph/data questions are weaker than calculations	Data literacy	Graph interpretation, trend language, uncertainty and evidence practice
Scores collapse under time pressure	Pacing and decision-making	Section timing, question triage and shorter timed sets before full papers
Performance varies sharply week to week	Practice consistency, sleep/load or weak retrieval	Track completion, accuracy and study rhythm before changing content

Concept
Does the student understand why the physics works?

Application
Can they choose and use the idea independently?

Data
Can they interpret evidence, graphs and uncertainty?

Communication
Can they answer the exact question clearly?

Execution
Can they do all of this under exam conditions?

PARENT SUPPORT SYSTEM

Support without taking over

The goal is not to supervise every hour. The goal is to create enough structure that the student can increasingly manage the learning process themselves.

Weekly parent check-in: 10-15 minutes

1. What was the hardest concept this week?
2. What evidence shows whether it is improving?
3. Which practice is incomplete?
4. What is the next assessment demand?
5. What is the one priority for next week?

What not to turn it into

- A lecture about marks
- A comparison with other students
- A daily interrogation about study time
- A rescue operation the night before a test
- A search for shortcuts, predicted questions or "important chapters"

Better language

Instead of: "Why did you lose 12 marks?"
Try: "Which three types of errors created most of the lost marks, and what practice will reduce them?"

Instead of: "Study more physics this week."
Try: "What is the measurable target - complete the pending practice, raise accuracy on vectors, or finish a timed data set?"

Instead of: "You know this, just be confident."
Try: "What evidence would make you confident - two timed sets above target accuracy, or one paper completed within time?"

COURSE RHYTHM

What good preparation looks like over time

IB Physics becomes harder when students try to compress an entire two-year learning system into the final months. A strong plan changes focus as the course progresses.

1. Foundation

Build clear concepts, units, diagrams, algebra, graph reading and consistent practice routines.

2. Integration

Mix topics. Force the student to decide which principle applies rather than being told the chapter.

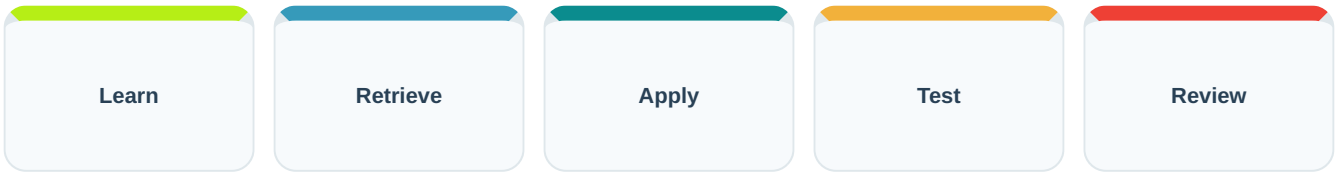
3. Assessment maturity

Use timed sets, data questions, extended responses and detailed error classification.

4. Exam readiness

Full papers, pacing strategy, weak-area repair and stable revision cycles.

The weekly learning loop



Healthy sign

The student can explain what improved, what still fails and which evidence supports that judgement.

Risk sign

The student reports only time spent: "I studied three hours" or "I finished the notes" without evidence of retrieval or application.

Evidence-based confidence

Confidence should come from repeatable performance: completion, accuracy, timed success, fewer repeated errors and the ability to solve unfamiliar questions independently.

COMMON MISTAKES

Six parent responses that often backfire

1. **"Just work harder."**
   Effort is not a diagnosis. Define the skill or behaviour that must change.

2. **Adding more tuition immediately.**
   More input can increase overload if the gap is independent practice or retrieval.

3. **Focusing on predicted marks.**
   Predictions are less actionable than current evidence and repeated error patterns.

4. **Rescuing incomplete work.**
   Repeated rescue teaches dependence and hides the real operating problem.

5. **Using reassurance instead of evidence.**
   "You'll be fine" does not tell the student what to do next.

6. **Waiting for a major exam to diagnose gaps.**
   Small weekly checks reveal issues while they are still inexpensive to fix.

Better principle

Structure before motivation. A clear weekly system reduces the amount of motivation the student must manufacture every day.

"What is the next observable behaviour that would show this problem is improving?"

That question keeps feedback practical, measurable and focused on learning capability rather than personality.

PARENT DASHBOARD

A simple monthly review

Use this page as a conversation framework. The aim is to spot patterns, not to create another layer of pressure.

Area	What to review	Questions to ask
Completion	Revision sheets, MCQs, structured practice, school work	What remains incomplete? Is there a consistent reason?
Accuracy	MCQ average, targeted sets, test scores	Is accuracy stable, improving or volatile?
Assessment	Paper 1, Paper 2, school tests, LFTs	Which question type is creating most of the mark loss?
Skill	Concept, application, data, investigation, communication	Which skill has improved because of targeted practice?
System	Study rhythm, deadlines, sleep, distractions, planning	Is the student relying on urgency, or following a repeatable routine?

Monthly notes

Strongest evidence of progress

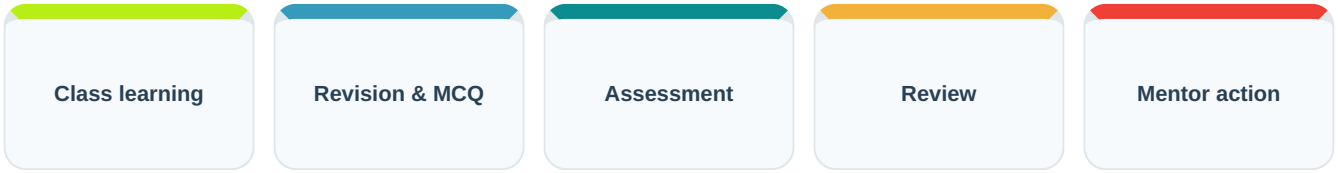
Most important current bottleneck

Single priority for the next four weeks

HOW LUMIKNOW APPROACHES PROGRESS

Connect teaching, practice, assessment and mentoring

A student improves more reliably when the different parts of the academic system are connected. LumiKnow treats performance data as evidence for the next learning decision, not as a scoreboard.



What is tracked

- ✓ Practice completion and pending work
- ✓ MCQ accuracy and consistency
- ✓ Test and assessment patterns
- ✓ Question-level and skill-level gaps
- ✓ Learning goals and repeated error patterns

What the data is used for

- ✓ Identify the root cause before prescribing work
- ✓ Set a small measurable next target
- ✓ Align teachers, assessment and mentoring
- ✓ Move from content coverage to capability building
- ✓ Build evidence-based confidence over time

The parent role

Stay close enough to understand the system, but leave enough responsibility with the student for independence to grow. The long-term outcome is not only a better Physics grade; it is a stronger learner.

FINAL REFERENCE

Parent FAQ + source note

Should my child memorise every formula?

The Physics data booklet is available in the examinations. Students still need to understand relationships, recognise when an equation applies and use it correctly.

Is a high MCQ score enough?

No. It is useful evidence of some skills, but Paper 2 and the scientific investigation demand extended reasoning, data analysis, method selection and communication.

How much should a parent intervene?

Enough to support structure, deadlines and reflection. Avoid doing the reasoning, writing or research on the student's behalf.

What is the best sign of progress?

Performance becomes more stable across different question types and contexts, while repeated errors reduce and the student needs less prompting.

Official source used for course structure

International Baccalaureate Organization. *Diploma Programme Physics guide - First assessment 2025.* Published 2023.

Important note

This LumiKnow parent guide is an independent explanatory resource. It is not an official IB publication and is not endorsed by the International Baccalaureate Organization. Schools and students should follow the latest official IB documentation and school guidance for formal assessment requirements.

LumiKnow philosophy

Diagnosis before advice. Structure before motivation. Systems over shortcuts. Evidence-based confidence over reassurance. Long-term learning capability over short-term marks.

One final parent question

"What is the smallest change in the learning system that would create the biggest improvement over the next four weeks?"