Electricity & Magnetism makes up roughly one-third of examinable content, so exam setters tend to devote a similar share of marks, although SEAB publishes no exact percentage. The practical paper is a fixed 20 % for Pure Physics and H2 Physics (15 % for the Combined-Science track). [9][10][11]
This guide compresses the must-knows into a single page of myth-busting explanations, step-by-step methods and a one-week micro-practice plan.

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1 Why electricity + practical skills decide your IP grade

- **Weightage in written exams** - SEAB does not release a marks-by-topic table, but O-level 6091 lists Electricity & Magnetism as 7 of 20 topics (≈ 35 % coverage). A-level H2 shows a comparable fraction, so the oft-quoted “25-35 % of marks” is a reasonable estimate, not an official guarantee. [9][10][11]
- **Weightage in practicals** - The practical component is locked at 20 % for Pure Physics (O-level 6091) and H2 Physics, and 15 % for Combined Science. Most IP tracks follow the 20 % route. [9][10][11]
- **High misconception rate** - Misideas such as "current is used up" or "a battery is a constant-current source" often survive formal teaching.
- **Sparse free help online** - Tuition ads invoke “Kirchhoff nightmares” yet rarely share full worked solutions or uncertainty math.

Miss this cluster and recovery at Promo time is brutal; master it now and the rest of the syllabus feels lighter.

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2 Concept mastery - circuits, fields and graphs

2.1 Five killer misconceptions and the one-line fixes

Misconception	Quick fix
Current is lost in a bulb	Charge *flows through*; energy converts, current stays equal in series.

Higher resistance means less current *everywhere*	In a divider, the branch with higher R can still get full supply V. Use $I = V/R$.
Battery is a constant-current source	Treat it as a constant **emf** source; current depends on external R.
Potential rises round the loop	Kirchhoff's loop rule: algebraic sum of drops and rises is zero. Pick a sign convention and stick to it.
Field lines show particle paths	They indicate force on a +test charge, not the trajectory.

2.2 Three-step method for multi-loop circuit problems

1. **Label currents** in each branch with clear directions.
2. **Write node equations** (KCL).
3. **Write two independent loop equations** (KVL) and solve simultaneously.

A worked example with full algebra lives in the downloadable worksheet below.

2.3 Energy model beyond $V = IR$

Picture the circuit as *energy hills*: emf lifts you up, resistors are slopes. Sketch a quick potential graph around the loop to see voltage division without heavy algebra.

2.4 Graph-question playbook

1. Transform raw data to the **linear** form requested, e.g. $1/I$ vs R.
2. Draw a best-fit line with even scatter above and below.
3. Gradient reveals the physical constant; intercept often exposes internal resistance.

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3 Practical skills - stopwatch to uncertainty table

3.1 Four-minute clean setup

- Clamp meters so your eye meets the scale perpendicularly.
- Run leads along bench edges to avoid loops that pick up noise.
- Zero all instruments, then **restart** the stopwatch.

These steps wipe out the common MMO penalties flagged in the SEAB rubric.

3.2 Data-logger hacks the rules allow

- Use on-board averaging to tame probe flicker.
- Save as CSV, not proprietary formats, so you can re-plot instantly if an examiner asks.

3.3 The 1-2-5 rule for uncertainty

Record every raw reading with its *instrument precision*, then round absolute uncertainty to 1, 2 or 5 × 10^n.

3.4 Sample full-mark graph

R/Ω	I/A
1.0	0.190
2.2	0.126
3.3	0.090
4.7	0.065

- Plot I on the y-axis, $1/R$ on the x-axis.
- Gradient ≈ emf.
- Add *one* small error bar per point to show ±uncertainty.

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4 One-week micro-practice plan

Day	15-min mission	Habit reinforced
Mon	Derive node + loop equations for a two-battery circuit	Self-explain each step
Tue	Redraw yesterday's circuit as a potential graph	Sketch-symbol-sentence loop
Wed	Timed practical: set up a potential divider, measure V vs R	Four-minute setup
Thu	Calculate percentage uncertainty and comment on result validity	Uncertainty log
Fri	Mixed retrieval: 5 MCQs on fields, series, parallel, emf	Retrieval roulette
Sat	Write one variation of each MCQ and solve it	One-knob variation
Sun	Record a 90-s Feynman video explaining internal resistance	Spaced teaching

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5 FAQ

What formulas must I memorise?
Only $V = IR$, $P = IV$, $Q = It$, Kirchhoff's laws and the potential-divider equation. Everything else derives on the fly. [1]

How is Paper 3 marked?
15 % of the final grade, split across planning, MMO, PDO and ACE as per SEAB. [2][3]

Do digital meters remove the need for reading uncertainty?
No. Quote ±½ least count or the manufacturer spec. [4][5]

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6 Further Reading and Internal Links

6.1 Our Internal Links

- *IP Physics Crash Course — 9 Micro-Moves for Instant Concept Clarity* - use the interleaving routine with circuit problems.
- *Make Your Own SUVAT Questions* - adapt the variation habit to electric fields.
- *Weighted Assessments vs Mid-Year Examination* - simulate a full-length practical under WA timing.

6.2 Further Readings on Preparing for IP Physics

[1]: Kirchhoff's laws (article) | Khan Academy

[2]: O-LEVEL SCIENCE (PHYSICS) PRACTICAL - Singapore Learner

[3]: [PDF] Singapore-Cambridge O Level 6091 Physics syllabus for examination in 2026

[4]: [A levels] Physics practical queries : r/SGExams

[5]: Mastering GCE O Level Science Practical: Tips and Tricks - SmileTutor

[6]: Physics Classroom - Common Misconceptions Regarding Electric Circuits

[7]: [PDF] Secondary School Students' Misconceptions about Simple Electricity

[8]: O Level Pure Physics Practical Tips - KeyNote Learning

6.3 Familiarising with IP Physics Syllabus

[9]: SEAB O-level Physics syllabus 6091 (2025) - Scheme of Assessment and content list

[10]: SEAB H2 Physics syllabus 9478 (2026) - Scheme of Assessment

[11]: SEAB O-level Combined Science syllabus 5088 - assessment weighting

[12]: Future Academy - “O-level Science Practical weightage”

[13]: The Learning Lab - “Ace the O-level Science practical exam”

[14]: Singapore Learner - “H2 Physics Practical” guide

[15]: Concept First tuition blog - “Physics Practical weightage”

[16]: SEAB specimen Paper 1 (O-level 6091) - distribution of MCQs

[17]: SEAB specimen Paper 2 (O-level 6091) - structured-question sample

[18]: Reddit discussion confirming 6091/03 practical weighting