

AAPT PhysicsBowl — Student Edition

A practical preparation guide for Division 1 and Division 2 students

DogKing Competition Library — PhysicsBowl Playbook

2026-05-22

Contents

AAPT PhysicsBowl — Student Edition	1
How to read this edition	2
1. What PhysicsBowl is	2
2. What the paper looks like (verified on disk)	2
3. Pacing and scoring strategy	3
3.1 Your pacing budget	3
3.2 The no-penalty rule — never blank an answer	3
3.3 The end-of-test tie-break — the last 6 items decide your rank	4
4. Topic surface — what the verified 2025 paper actually tested	4
4.1 What this means by division (2025 evidence)	5
4.2 Using this as a checklist	5
4.3 The four physics-history items	5
5. A 6-week preparation plan	5
Week 1 — Diagnostic + conventions	5
Week 2 — Mechanics core	6
Week 3 — Fields, circuits, waves	6
Week 4 — Thermo + modern	6
Week 5 — Late-paper / tie-break rehearsal	6
Week 6 — Last-paper rehearsal + recovery	6
6. The seven test-day conventions you must drill	6
7. Boundaries — what this edition does not claim	7
8. Where to verify any of this (repo pointers)	7
9. The shortest version	8

AAPT PhysicsBowl — Student Edition

Who this is for. A high-school physics student preparing to sit AAPT PhysicsBowl in **Division 1** (you answer Q1–Q40) or **Division 2** (you answer Q11–Q50).

What this is. A practical preparation guide written from PhysicsBowl exam + solutions PDFs that we have verified byte-for-byte on disk for 2013, 2024, and 2025. It tells you what the paper actually looks like, how fast you have to move, which conventions to drill, and a 6-week plan you can run.

What this is not. Not a question bank. Not a curriculum. Not an answer key. Not a claim that we have every PhysicsBowl exam ever held. Anything in this guide that depends on a year outside {2013, 2024, 2025} is flagged in §7.

How to read this edition

Six questions, in order:

1. **What is PhysicsBowl, exactly?** — §1
2. **What does the paper look like in the years we have verified?** — §2
3. **How fast do I have to be, and how is it scored?** — §3
4. **Which topics actually showed up in the verified 2025 paper?** — §4
5. **A 6-week practice plan I can run.** — §5
6. **The seven test-day conventions I must drill.** — §6

§7 records what this guide **does not claim**. Read it before you over-generalize. §8 points you at the underlying repo files if you want to verify anything yourself.

1. What PhysicsBowl is

- **Owner.** AAPT (American Association of Physics Teachers).
- **Format.** One printed multiple-choice physics paper containing **50 numbered questions** with five lettered choices (A–E). The cover reads “**40 QUESTIONS – 45 MINUTES**” because each student only answers 40 of the 50 — the paper hosts two divisions inside one document.
 - **Division 1** answers **Q1–Q40**.
 - **Division 2** answers **Q11–Q50**.
 - **Shared bridge:** Q11–Q40 — these thirty questions appear on both divisions’ answered range.
- **Scoring.** Score = number correct. **No penalty for guessing.** Ties are broken **from the end of the test forward** — Q40 (D1) or Q50 (D2) is the first tiebreaker.
- **Live delivery.** The live contest is administered through Educational Vistas (EdVistas) at \$10 per student. Past papers are published on AAPT’s site at the `printexams.cfm` listing.
- **Cancellations on record. 2020 was cancelled.** No 2020 paper exists.

This structure is verified against three years we have on disk (2013, 2024, 2025). All three show 50 numbered exam stems, 50 numbered solution entries, the 45-minute / 40-answered budget, and the D1=Q1–40 / D2=Q11–50 / shared-bridge=Q11–40 split.

2. What the paper looks like (verified on disk)

The same skeleton appears across all three verified years:

Signal	What you will see
Cover-page title	PHYSICSBOWL <year> / <date range> / 40 QUESTIONS – 45 MINUTES
Total numbered items on paper	50 stems, each with A–E choices
Items each student answers	40
Time limit	45 minutes
Tie-break rule	Compared from the end of the test forward
Calculator policy	Hand-held, memory cleared, not shared
Default g	$g = 10.0 \text{ m/s}^2$ (verified textually in 2024 and 2025; same cover instruction in 2013, numeric collapsed in OCR)
Formula sheet	Only provided formulas / constants are usable
AAPT solutions style	Sketch key: a letter answer plus 1–3 lines of justification, sometimes only a citation URL

Two surface differences exist between years but **do not** change preparation strategy:

- **Division labels.** 2013 prints Division 01 / Division 02; 2024 and 2025 print Division 1 / Division 2.
- **Region count.** 2013 says “fourteen regions”; 2024 and 2025 say “nineteen regions.” Administrative metadata. Ignore.

3. Pacing and scoring strategy

3.1 Your pacing budget

You have **45 minutes for 40 answered questions** regardless of division:

- **D1.** 40 items in 45 min □ **~67 s / item.**
- **D2.** 40 items in 45 min □ **~67 s / item.**

A correction worth knowing. An earlier note in this repo claimed ~54 s/Q for Division 2 (it had counted all 50 questions instead of the 40 a D2 student actually answers). That was wrong. Use **67 s/item for both divisions.**

Practice in 12-minute / 11-question or 15-minute / 13-question blocks with a stopwatch and a 5-choice bubble sheet. Build the muscle of moving on after 70 seconds.

3.2 The no-penalty rule — never blank an answer

Score = number correct. **There is no penalty for a wrong answer.** Therefore:

What you can do	Expected return
Leave blank	0.00
Pure random guess (5 choices)	0.20
Eliminate 1 choice, guess	0.25

What you can do	Expected return
Eliminate 2 choices, guess	0.33
Eliminate 3 choices, guess	0.50

Never leave a question blank. A guess is always better than a blank.

3.3 The end-of-test tie-break — the last 6 items decide your rank

AAPT's instruction in all three verified years: **ties are broken by comparing answers from the end of the test forward.**

What this means:

- A **D1** student should treat **Q35–Q40** as ranking-decisive.
- A **D2** student should treat **Q41–Q50** as ranking-decisive (D1 students never see these).
- Do **not** treat the late items as bonus questions or leave them blank to “play safe.” Under no-penalty plus end-forward tie-break, that strategy is strictly worse than guessing.

Practice drill. In every full or half paper, log how many of the last 6–10 items in your range you (a) actually reached and (b) got right. This is the single highest-leverage metric in PhysicsBowl preparation.

4. Topic surface — what the verified 2025 paper actually tested

This is a one-year topic checklist taken from the 2025 stems, organised mechanics □ fields □ modern. It is **2025-evident**, not a multi-year syllabus, but it is a defensible “have I seen this?” inventory for a student preparing today.

Topic bucket	2025 questions in this bucket
1-D kinematics & relative motion	Q1, Q3, Q9, Q10
2-D motion / projectile	Q2, Q23
Newton's laws & free-body diagrams	Q5, Q16, Q31, Q32, Q35
Uncertainty propagation	Q7
Fluids in non-inertial frames	Q28
Rotation & rolling	Q11, Q36
Pendulum & oscillation	Q12, Q24
Work–energy / friction	Q13, Q20, Q27
Momentum & impulse / collisions	Q10, Q18, Q21, Q29, Q37, Q44
Gravitation & circular motion	Q20, Q35
Thermodynamics / radiation / Carnot / adiabatic	Q17, Q25, Q33, Q40
DC circuits & resistor networks	Q22, Q46
E-field inside conductors / point charges	Q38, Q49
Waves, standing waves, sound at boundaries	Q34, Q41, Q50
EM waves & Poynting direction	Q42
Geometric optics	Q43

Topic bucket	2025 questions in this bucket
Modern / quantum / atomic / units	Q14, Q30, Q39, Q45, Q47
Special relativity (length contraction)	Q48
Physics-history items	Q4 (Apollo 8), Q14 (Planck), Q19 (Marconi), Q26 (CME)

4.1 What this means by division (2025 evidence)

- The **D2-only tail (Q41–Q50)** concentrates the harder modern + advanced-EM items: **Q42** Maxwell-equation Poynting direction, **Q44** 2-D inelastic stick-together collision, **Q45** natural units ($\text{GeV} / \text{GeV}\cdot\text{c}^{-1} / \text{GeV}\cdot\text{c}^2$), **Q48** length contraction at $0.97c$, **Q49** dipole midpoint E-field & potential, **Q50** sound at boundary.
- A **D1 student** never sees those in 2025 — Division 1 stops at Q40.
- Either way, the **bridge band Q11–Q40** is where most of the points are decided.

4.2 Using this as a checklist

If you cannot do at least one clean problem in **every row** of the table above, you have a 2025-evident gap. Close those gaps before drilling for speed.

4.3 The four physics-history items

The 2025 AAPT solutions key cites Smithsonian, Wikipedia, and NOAA SWPC for Q4, Q14, Q19, and Q26 respectively. These are not problems you can derive from first principles — they reward **read-and-recall**. Skim the cited references; do not try to reason your way to “Apollo 8” or “1901 transatlantic Marconi” from scratch on test day.

5. A 6-week preparation plan

This plan assumes you have access to the locally byte-validated 2013, 2024, and 2025 papers and their AAPT solutions. One timed paper per week plus topic drilling.

Week 1 — Diagnostic + conventions

- Sit the **2025 exam** under timed conditions: 45 minutes, your division’s range, 5-choice bubble sheet, calculator with cleared memory.
- Mark with the AAPT 2025 solutions. Record three numbers:
 - raw correct / 40
 - how many of the **last 10 answered items** in your range you reached, and how many you got right
 - per-question time vs the 67 s/item budget
- For each miss, write a **working solution**. The AAPT key is a sketch — fill in the algebra yourself.

- **Conventions drill.** Before every session, recite: $g = 10.0 \text{ m/s}^2$ · “only provided formulas/constants are usable” · “5 choices, never 4” · “calculator memory cleared” · “no penalty — never blank an answer”.

Week 2 — Mechanics core

Topic drill on weak rows from §4 in the **mechanics** band: 1-D kinematics, 2-D, Newton, work–energy, momentum, rotation, oscillation. Re-do every 2025 miss, then use 2024 problems in the same buckets as cross-year reinforcement.

Week 3 — Fields, circuits, waves

Topic drill: E-fields, DC circuits, gravitation, waves, geometric optics. Then sit a **timed 20-question half-paper** drawn from 2024 in the bridge band (Q11–Q30).

Week 4 — Thermo + modern

Topic drill: thermodynamics / radiation / Carnot, modern / quantum / atomic / units, special relativity (D2 only, but D1 should still know the qualitative ideas). Sit the **2024 exam** under full timed conditions in your division’s range.

Week 5 — Late-paper / tie-break rehearsal

Two short timed sets:

- **Set A.** Q35–Q40 of 2024 and 2025, full timing, mark immediately.
- **Set B (D2 only).** Q41–Q50 of 2024 and 2025, full timing, mark immediately.

The goal is not coverage; it is hitting the late items at speed without panic.

Week 6 — Last-paper rehearsal + recovery

- Sit **2013** as a full timed paper. It is the oldest year we have verified, and the 2013 solutions carry a compact letter-only answer-key grid that makes scoring fast.
- Re-sit **any** earlier paper where you scored below your target.
- Stop hard 24 h before your live sitting. Sleep. Eat. Check your calculator.

6. The seven test-day conventions you must drill

Paper-specific habits taken from the cover instructions of the 2024 and 2025 papers (and the equivalent boilerplate on 2013):

1. $g = 10.0 \text{ m/s}^2$ — not 9.8, not 9.81. Drill this. Reflexes from school physics will burn you.
2. **Five lettered choices**, A through E. Never four.
3. **45 minutes** total. **No penalty for a wrong answer**, so never blank.
4. **Tie-break is from the end of the test forward**. Late items decide rank.
5. **Calculator memory cleared** before you start. **Not shared**.

6. **Only the provided formulas and constants** — do not invoke an unstated constant from memory.
 7. **Five-choice elimination math.** Eliminating one choice raises your random expected return from 0.20 to 0.25; two ruled out lifts it to 0.33. **Always answer.**
-

7. Boundaries — what this edition does not claim

- It does **not** claim that the 50-stem / two-division architecture holds for any year outside {2013, 2024, 2025}. Six PDFs are byte-validated locally; thirty year-pairs are listing-level leads only.
 - It does **not** claim the 2025 topic surface (§4) is “the PhysicsBowl syllabus.” It is **one-year evidence** that has not been cross-checked against the bulk of the unarchived listing leads.
 - It does **not** claim AAPT’s solution style is consistent year over year. The _v2 suffix in PB25–Answers–solutions_v2.pdf itself signals revisions; only one revision is on disk for 2025.
 - It does **not** establish AAPT scoring norms, percentile cutoffs, regional thresholds, selection rules, or “what counts as a strong score.” Those are not present in any local PDF.
 - It does **not** speak to the live-contest mechanics inside the EdVistas backend or to Asia partner portals (SEEDCOMP, SEEDASDAN). Those remain out of scope.
 - It does **not** assert per-question content fidelity for any item whose stem, choices, or figure was lost to pdftotext –layout normalization. If a question references “the figure shown,” open the **PDF**, not the .txt.
 - It is **not** a question bank, **not** an answer key, **not** a curriculum, and **not** an archive completeness claim.
-

8. Where to verify any of this (repo pointers)

- Companion guide for your teacher / coach: 07-publish/manuscript/editions–v1/instructor-edition.md
 - Local question-structure matrix (the spine of §§1–3): 05-analysis/physics-bowl-2013–2024–2025-local-question-structure-matrix-2026-05-08.md
 - 2025 single-year digest (source for §4): 05-analysis/physics-bowl-2025-local-pair-digest-2026-05-06.md
 - 2024 + 2025 two-year structure brief: 05-analysis/physics-bowl-2024–2025-local-structure-brief-2026-05-06.md
 - 2013 pair validation: 05-analysis/physics-bowl-2013-pair-validation-2026-05-08.md
 - AAPT exam-surface map: 05-analysis/physics-bowl-official-exam-surface-map-2026-05-06.md
 - Source ledger (per-asset rows + provenance): 02-asset-ledger/source-ledger.yaml
 - Verified raw PDFs (study from these, not the text exports): 03-archive-raw/{2013, 2024, 2025}/
 - Normalized text (search-and-index aid only): 04-archive-normalized/{2013, 2024, 2025}/
-

9. The shortest version

If you only remember nine things:

1. 50 questions on the paper. You answer 40. **D1 = Q1–Q40. D2 = Q11–Q50.**
2. 45 minutes. ~67 seconds per question. Both divisions.
3. **Five choices**, A–E.
4. **No penalty.** Never leave a question blank.
5. **End-of-test tie-break.** The **last 6 questions in your range decide ranking.**
6. **$g = 10.0 \text{ m/s}^2$.** Not 9.8.
7. **Only provided formulas.** Calculator memory cleared. Not shared.
8. The AAPT solutions are sketches. Derive every miss yourself.
9. Sit the 2025 paper first. Sit the 2024 paper. Sit the 2013 paper. Don't trust years you have not seen.

Good luck.

— End of Student Edition.