

The ESAT specification, decoded

The short answer

The official map is finite: Mathematics 1 plus the modules required by your course. Every science module and Mathematics 2 assumes Mathematics 1. Revise from the **point IDs**, not chapter names.

How to read the map

Our machine-readable copy of the current official specification contains the following top-level point records. Many records contain several examinable sub-points, so the count is an index, not a difficulty score.

Module	Sections	Point records	Official section spine
Mathematics 1	7	76	Units; number; ratio; algebra; geometry; statistics; probability
Mathematics 2	8	39	Functions; series; coordinate geometry; trigonometry; logs; calculus; graphs
Physics	7	32	Electricity; magnetism; mechanics; thermal physics; matter; waves; radioactivity
Chemistry	17	89	Atomic structure through air and water, including quantitative, redox, bonding, rates and organic
Biology	11	34	Cells through plant physiology, including inheritance, gene technologies and ecosystems

The safe revision loop is point, retrieval, application, timed mix. Highlighting a chapter does not test recall.

1 The tell

If your checklist says “done: waves”, it hides five different jobs: properties (P6.1), reflection/refraction and Doppler (P6.2), ray diagrams (P6.3), sound (P6.4), and the electromagnetic spectrum (P6.5). Keep the official IDs beside your notes.

Mathematics 1: familiar content, complete coverage

Mathematics 1 is compulsory and assumed everywhere else. The trap is treating familiar GCSE labels as automatic marks.

- **Units and number (M1, M2):** compound-unit conversions; bounds and error intervals (M2.12 to M2.13); exact fractions, surds and π ; estimates rather than calculator-shaped decimals.
- **Ratio and algebra (M3, M4):** inverse proportion with integer or fractional powers (M3.9); growth, decay and simple iteration (M3.11); linear-quadratic simultaneous equations (M4.15); graph gradients and areas in context (M4.14).
- **Geometry (M5):** negative and fractional scale factors (M5.6); circle theorems (M5.9); plans, elevations and bearings (M5.12 to M5.13); vectors used for arguments (M5.19).

- **Statistics and probability (M6, M7):** unequal-width histograms and frequency density (M6.2); estimates from grouped data (M6.3); interpolation versus dangerous extrapolation (M6.4); conditional probability without replacement (M7.7).

One useful boundary: Mathematics 1 explicitly says candidates are not expected to recall or use the sine and cosine rules (M5.18). They are in Mathematics 2 instead.

Mathematics 2: small clauses with large consequences

- Recurrences and finite/infinite geometric series sit beside arithmetic series (MM2.1 to MM2.3).
- The sine rule includes the ambiguous case, and problems may be in 3D (MM4.1). Radian measure includes sector *and* segment area (MM4.2).
- Log laws are examinable, but change of base is explicitly excluded (MM5.2).
- Differentiation from first principles is excluded. Rational powers, second derivatives, normals and strict increasing/decreasing intervals are included. Inflexions need qualitative understanding only and are not examined (MM6.1 to MM6.3).
- Integration includes signed integral versus geometric area (MM7.1), contiguous ranges (MM7.4), trapezium over/under-estimates (MM7.5) and $dy/dx = f(x)$ (MM7.6).
- Composite transformations (MM8.2) and graph intersections as simultaneous equations (MM8.7) are examinable.

Worked example The integral is zero; the area is not

Find the area between $y = x^2 - 1$ and the x -axis for $-1 \leq x \leq 2$.

The tempting single integral cancels equal signed pieces:

$$\int_{-1}^2 (x^2 - 1) dx = \left[\frac{x^3}{3} - x \right]_{-1}^2 = 0.$$

Area cannot cancel. Split where the curve crosses the axis, at $x = 1$:

$$A = \int_{-1}^1 (1 - x^2) dx + \int_1^2 (x^2 - 1) dx = \frac{4}{3} + \frac{4}{3} = \boxed{\frac{8}{3}}.$$

Correct: MM7.1 explicitly expects the difference between a definite integral and the area between a curve and an axis. MM7.4 rewards clean range splitting.

Trap: “the integral is zero, so the area is zero” confuses signed accumulation with geometric area. A sketch catches the impossibility in seconds.

Physics: the words around each formula matter

- **Electricity (P1):** V-I graphs for a resistor and filament lamp; thermistors, LDRs and ideal diodes; series/parallel rules. The spec asks only the qualitative fact that a parallel total is below any branch resistance, not a memorised reciprocal formula.
- **Magnetism (P2):** field directions, left-hand rule, $F = BIL$ only at right angles, induction direction and output graphs, transformer ratios and transmission losses.
- **Mechanics (P3):** graph areas/gradients, force diagrams, Hooke’s law and spring energy, momentum and rate of change, terminal velocity. Of the usual constant-acceleration equations, only $v^2 - u^2 = 2as$ is expressly named.
- **Thermal and matter (P4 to P5):** density-driven convection, specific heat, latent heat, ideal-gas $PV = \text{constant}$, hydrostatic pressure.
- **Waves and radioactivity (P6 to P7):** what refraction changes and preserves; Doppler effect; full EM order, uses and hazards; nuclear equations; fields and penetrating/ionising power; half-life graphs including decay products.

Chemistry: breadth is the difficulty

The 17 sections make selective revision dangerous. High-yield corners include weighted A_r from mass-spectrometer data (C1.5 to C1.6); equilibrium changes (C3.5); limiting reactants, titrations and yield (C4.6 to C4.11); disproportionation and agents (C5.5 to C5.6); separation methods including centrifugation and a separating funnel (C8.3); polyprotic acids (C9.1); catalysts not moving equilibrium (C10.6); electrolysis competition (C12.4); condensation polymers (C13.4); and the full test tables (C16).

Two boundaries stop wasted cramming: crude-oil fraction names and uses are not expected (C13.1), and alkene mechanisms or carbocation stability are not required (C13.3). You still need to predict named addition products and write equations.

2 Try it

For C16, make a blank grid with gas, anion, cation, flame and water tests. Fill reagent, observation and inference from memory. "Silver nitrate gives a precipitate" is incomplete until nitric acid and the white/cream/yellow mapping are secure.

Biology: processes, comparisons and data

Biology is not eleven vocabulary lists. The verbs in the specification demand mechanism and interpretation.

- Osmosis is specified in terms of water potential, beside diffusion and active transport (B2.1).
- Mitosis, meiosis and reproduction must be compared by divisions, ploidy, identity and purpose (B3); pedigrees and single-gene probabilities are in B4.3.
- Genetic engineering includes restriction enzymes and ligase; stem cells require totipotent, pluripotent and multipotent distinctions (B6).
- Animal physiology includes ECGs, nephron structure, ADH, four menstrual-cycle hormones, vaccination, and pre-clinical versus clinical testing (B9).
- Ecosystems include quadrats, belt transects, fish farming, acid rain and eutrophication (B10). Plant physiology includes xylem/phloem adaptation, stomata and environmental effects on transpiration (B11).

Do not inflate the list into an A-level molecular-biology course. Learn the exact chain the point names, then practise applying it to unfamiliar data, diagrams and competing explanations.

Build a checklist that can finish

For each required point, use four boxes: recall, apply untimed, apply mixed, apply timed. A point is not closed because notes exist. It is closed when you can retrieve it, recognise it inside a mixed problem and execute it without donating two minutes. Re-open any point that causes the same error twice.

The official PDF is authoritative if wording changes. Course requirements decide which modules you need; check yours with the module chooser before you revise an optional science by accident.