EXAM-DAY · 90-MIN REVISION CARD

Algebra — Sets, Relations & Functions, Sequences & Series

Print this · Fold it · Carry to the exam-hall gate · Revise once · Then walk in.

FORMULAS & KEY RESULTS

SET TYPES: empty ∅; subset A ⊆ B; power set P(A) has 2^n members if |A| = n; universal set U contains everything in context.

SET OPERATIONS: A ∪ B (in A or B), A ∩ B (in both), A – B (in A not B), A' = U – A (complement).

INTERVALS: [a, b] closed (both ends in); (a, b) open (both ends out); [a, b) and (a, b] half-open. Round bracket = excluded, square = included.

INCLUSION-EXCLUSION: |A ∪ B| = |A| + |B| – |A ∩ B|; for three sets add |A∩B∩C| back after subtracting the pair-overlaps.

CARTESIAN PRODUCT: A × B = {(a, b) : a ∈ A, b ∈ B}; |A × B| = |A|·|B|; generally A × B ≠ B × A (ordered pairs).

RELATION: any subset of A × B. DOMAIN = set of first elements; RANGE = set of second elements achieved.

FUNCTION: a relation where every input has EXACTLY ONE output. Types: one-one (injective), onto (surjective), into, many-one.

AP nth TERM: $a_n = a + (n – 1)d$, where a = first term, d = common difference.

AP SUM: $S_n = n/2\ [2a + (n – 1)d] = n/2\ (a + l)$, where l = last term.

GP nth TERM: $a_n = a \cdot r^{n-1}$, where a = first term, r = common ratio.

GP FINITE SUM: $S_n = a(r^n – 1)/(r – 1)$ for $r \neq 1$ (use $a(1 – r^n)/(1 – r)$ when $r < 1$).

GP INFINITE SUM: $S_\infty = a/(1 – r)$, valid ONLY when $|r| < 1$.

MEANS: arithmetic mean AM = (a + b)/2; geometric mean GM =

TOP 5 PYQ PATTERNS

1 GP sum — finite S_n or infinite S_∞
3 marks · 92% of years
Find a and r · finite: $S_n = a(r^n–1)/(r–1)$ · infinite: check $|r|<1$ then $S_\infty = a/(1–r)$ · recurring decimals are infinite GPs in disguise.

2 AP nth term or sum of n terms
3 marks · 85% of years
Identify a and d · term: $a_n = a+(n–1)d$ · sum: $S_n = n/2[2a+(n–1)d]$ or $n/2(a+l)$.

3 Venn-diagram counting word problem
4 marks · 80% of years
Use $|A\cup B| = |A|+|B|–|A\cap B|$ · draw the two circles · fill only-A, both, only-B, neither · verify the four regions sum to the total.

4 Cartesian product / domain-range / is-it-a-function
3 marks · 78% of years
A×B = ordered pairs · domain = first elements, range = second · function test: every input exactly one output (no repeated x with different y).

5 Set type / power-set count / interval notation
2 marks · 70% of years
Power set of n elements = 2^n subsets · ∈ for element, ⊆ for subset · round bracket excludes, square bracket includes the endpoint.

90-MIN REVISION FLOW

0-15 min
Memorise the four series formulas (AP term + sum, GP term + sum) and the infinite-GP formula with its |r| < 1 condition. These five formulas are the spine of nearly half the chapter's marks.

15-35 min
Do 4 AP problems (two nth-term, two sum) and 4 GP problems (two finite-sum, two infinite-sum). Write a, d or a, r explicitly at the top of each. Speed target: 2 minutes each.

35-50 min
Drill 4 Venn-diagram counting problems. Draw the two circles every time and fill all four regions (only-A, both, only-B, neither); verify they sum to the total.

50-65 min
Practise 4 relations/functions items — write A × B for small sets, give domain and range, and decide 'function or not' with the one-output-per-input justification.

65-80 min
Sets quick-fire: power-set counts (2^n), ∈ versus ⊆, and interval notation (open versus closed). Aim for 30 seconds per item.

80-90 min
Self-check — recall from memory: the GP infinite-sum formula and its condition, the inclusion-exclusion formula, the domain/range definitions, and the AP sum formula. If all four come instantly, you are chapter-ready.

√(ab); always AM ⩾ GM for positive a, b.		

Confidence, not anxiety. You've practised this all year. Trust your steps. Don't change strategy on exam morning.
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