Number Series

~ Reasoning · SSC Exams ~

← circled = key tricks!

A **number series** is a sequence of numbers arranged by a hidden rule. You must spot the rule and use it to find the missing / next / wrong term.

① The Core Method — 3 Looks

Look 1 — Differences: subtract consecutive terms. Constant? → it's an AP. Changing steadily? → look at the differences of differences.

Look 2 — Ratios: divide consecutive terms. Constant? → it's geometric (×/÷).

Look 3 — Special shapes: check for squares (n^2), cubes (n^3), factorials, primes, or two series mixed together (alternate terms).

Worked example — spot the rule

Series: **3, 5, 9, 15, 23, ?**

Step 1 — differences: 3 →**(+2)** 5 →**(+4)** 9 →**(+6)** 15 →**(+8)** 23.

Step 2 — the differences (2,4,6,8...) increase by a constant 2 → next difference = 10.

Answer → 23 + 10 = **33**. ✅

✓ This notebook covers **every SSC series type:** AP, changing-difference, geometric, ×+add, squares, cubes, primes, alternating, mixed-ops, wrong-term & fraction/decimal series — each with a solved example.

Tip → always test at least **2 gaps** (find 2 differences/ratios) before deciding the rule — one gap can trick you!

② Constant Difference (A.P.)

Rule

Every term = previous term ± **a fixed number d**. Simplest & most common SSC pattern.

Worked example (real SSC CGL Q.)

2460 →**(+1110)** 3570 →**(+1110)** 4680 →**(+1110)** ?

Step 1 — 3570−2460 = 1110; 4680−3570 = 1110 ∴ constant difference.

Answer → 4680 + 1110 = **5790**. ✅

③ Increasing / Decreasing Difference

Rule

The 1st differences are not constant, but **they themselves form a pattern** (an AP, or they double). This is the "difference-of-differences" trick.

Worked example — 1438, 1429, 1417, 1402, ?

Step 1 — differences: 1438→**(−9)**1429→**(−12)**1417→**(−15)**1402.

Step 2 — the differences fall by a constant 3 each time (−9,−12,−15,...) → next diff = −18.

Answer → 1402 − 18 = **1384**. ✅

Try this — differences that double

22 →**(+2)** 24 →**(+4)** 28 →**(+8)** ? →**(+16)** 52 →**(+32)** 84

Differences double every step (2,4,8,16,32) ∴ missing term = 28+8 = **36**. ✅

If differences aren't constant, write them on a second row below the series — the pattern almost always jumps out (AP, doubling, or squares of 1,2,3...).

④ Geometric / Constant Ratio

Rule

Every term = previous term **× (or ÷) a fixed number r**. Test by dividing consecutive terms.

Worked example — 1, 2, 4, 8, ?

1 →**(×2)** 2 →**(×2)** 4 →**(×2)** 8 →**(×2)** ?

Step 1 — ratio is constant: 2/1=2, 4/2=2, 8/4=2.

Answer → 8 × 2 = **16**. ✅

Variable-ratio series (real SSC Q.)

5760, 960, ?, 48, 16, 8 — read **right to left**:

8 →**(×2)** 16 →**(×3)** 48 →**(×4)** ? →**(×5)** 960 →**(×6)** 5760

The multiplier itself grows 2,3,4,5,6 ∴ missing term = 48 × 4 = **192**. ✅

Quick ratio-pattern gallery

2,6,18,54,**162** (×3)	729,243,81,**27** (÷3)
5,10,20,40,**80** (×2)	4000,400,40,**4** (÷10)

If the numbers grow **very fast**, suspect multiplication, not addition — check the ratio before wasting time on differences.

When numbers shrink towards small values, the series is likely being **divided** — solve it backwards (right to left) as shown above.

⑤ Multiply-and-Add Series ×+

Rule

Each term = (previous term **× k**) **± a number**, where k is fixed but the added number often increases by 1 each step.

Worked example — 15, 31, 64, 131, ?

15 →**(x2+1)** 31 →**(x2+2)** 64 →**(x2+3)** 131 →**(x2+4)** ?

Check — 15×2+1=31 ✓, 31×2+2=64 ✓, 64×2+3=131 ✓.

Answer → 131×2+4 = **266**. ✅

Try this — alternating ×2 ±1

2 →**(x2+1)** 5 →**(x2−1)** 9 →**(x2+1)** 19 →**(x2−1)** 37 →**(x2+1)** ?

The step alternates +1 / −1 ∴ 37×2+1 = **75**. ✅

Try this — alternating ×2 / ×1.5

4 →**(x2)** 8 →**(x1.5)** 12 →**(x2)** 24 →**(x1.5)** 36 →**(x2)** ?

36 × 2 = **72**. ✅ The multiplier itself alternates between two fixed values.

💡 Always verify your rule on **at least 3 pairs** before applying it to the missing term — multiply-add rules are easy to mis-guess from just one gap.

⑥ Squares & Square ± Constant ☐

Rule

Terms follow n^2 or $n^2 \pm k$. Clue: differences of differences are **constant** (2nd difference fixed), or terms are near perfect squares.

Worked example — 3, 15, 35, 63, ?

Step 1 — try n^2-1 for even n: $2^2-1=3$, $4^2-1=15$, $6^2-1=35$, $8^2-1=63$.

Step 2 — next even number is 10, so 10^2-1.

Answer → 100−1 = **99**. ✅ (equivalently $(2n-1)(2n+1)$)

Try this — squares hidden in an interleaved series

1, 2, 4, 3, 9, 4, 16, 5, ?, ?

Odd positions: 1,4,9,16,**25** ($=1^2,2^2,3^2,4^2,5^2$). Even positions: 2,3,4,5,**6** (plain count). Answer → **25, 6**. ✅

Square-list — memorise up to 20^2

11^2=**121**	12^2=**144**	13^2=**169**	14^2=**196**
15^2=**225**	16^2=**256**	17^2=**289**	18^2=**324**
19^2=**361**	20^2=**400**	n(n+1): 4×5=**20**	n(n+1): 9×10=**90**

💡 A constant **2nd difference** almost always means a squares-based (quadratic) series — a very common SSC signature.

⑦ Cubes & Cube ± Constant

Rule

Terms follow n^3 or $n^3 \pm k$. Growth is much faster than squares — suspect cubes when numbers jump very sharply.

Worked example — 3, 28, 4, 65, 5, 126, 6, ?

Odd positions (counters): 3, 4, 5, 6 — plain integers.

Even positions (results): 28, 65, 126, ? — check n^3+1: $3^3+1=28$ ✓, $4^3+1=65$ ✓, $5^3+1=126$ ✓.

Answer → $6^3+1 = 216+1 =$ **217**. ✅

Plain-cube list — memorise up to 10^3

1^3=**1**	2^3=**8**	3^3=**27**	4^3=**64**	5^3=**125**
6^3=**216**	7^3=**343**	8^3=**512**	9^3=**729**	10^3=**1000**

e.g. 1,8,27,64,125,**216** is the plain n^3 series — a frequent SSC opener.

⑧ Prime-Number Series ∴

Primes (2,3,5,7,11,13,17,19,23...) have no fixed difference/ratio — recognise the actual numbers.

Example: 2, 3, 5, 7, 11, 13, ? → next prime after 13 is **17**. ✅

Trap — 1 is **not** prime, and after 2 (the only even prime) all primes are odd — don't confuse with an odd-number AP.

⑨ Alternating / Two Interleaved Series

Rule

Split into two series: odd positions (1st, 3rd, 5th…) and even positions (2nd, 4th, 6th…). Solve each separately — each usually has its own simple AP/GP rule.

Worked example — 1, 0, 3, 2, 5, 6, ?

Step 1 — odd positions (1st,3rd,5th,7th): 1, 3, 5, ? — a simple +2 AP.
Step 2 — even positions (2nd,4th,6th): 0, 2, 6 — a separate rule, not needed here.
Answer → the 7th term continues the odd series: 5+2 = **7**. ✅

Try this — opposite-direction pair

40, 60, 47, 53, 54, ?
Odd positions: 40 →**(+7)** 47 →**(+7)** 54. Even positions: 60 →**(−7)** 53 →**(−7)** ?
∴ 53−7 = **46**. ✅ (one series climbs, the other falls by the same step)

Try this — both series share the same step

18, 24, 21, 27, ?, 30, 27 — odd positions: 18, 21, ?, 27 (+3 AP) → missing = 21+3 = **24**. ✅

Try this — quadratic second series

1, 2, 3, 14, 5, 34, 7, ?, ? — odd positions: 1,3,5,7,**9** (odd numbers). Even positions: 2,14,34,? — differences 12, 20 (2nd diff = 8) → next diff 28 → 34+28=**62**. Answer → **62, 9**. ✅

If a series looks "messy" with no visible pattern in one row, ***write alternate terms on two separate lines*** *before giving up.*

⑩ Mixed-Operation Series

Rule

Two different operations **alternate** (e.g. +9 then +2, or ×odd then +even). Write out the operation under every gap before deciding.

Worked example — 12, 21, 23, 32, 34, ?

12 →(+9) 21 →(+2) 23 →(+9) 32 →(+2) 34 →(+9) ?

Answer → steps alternate +9 / +2, so 34+9 = **43**. ✅

Try this — product-pattern (n × (n+1))

110, 132, 156, ?, 210 — these are 10×11, 11×12, 12×13, 13×14, 14×15 → missing = 13×14 = **182**. ✅

⑪ Odd-One-Out / Wrong-Term Series

Find the rule from the terms that **do** fit, then check which single term breaks it.

Series: 3, 8, 15, 24, 34, 48, 63
Rule: n(n+2) → 1×3=3, 2×4=8, 3×5=15, 4×6=24, **5×7=35**, 6×8=48, 7×9=63.
Wrong term is **34** (should be 35). ✅

Trap — the wrong term is usually **close** to the correct value, so don't be fooled just because it "looks reasonable." Always compute the true rule.

⑫ Fraction & Decimal Series ÷

Rule

Fractions: treat numerator and denominator as two separate series (each its own AP/GP).

Decimals: apply the usual +/−/×/÷ rule while keeping the decimal point aligned.

Worked example — fractions

Series: 3/4, 5/7, 7/10, 9/13, ?

Step 1 — numerators: 3,5,7,9,**11** (+2 AP).

Step 2 — denominators: 4,7,10,13,**16** (+3 AP).

Answer → **11/16**. ✅

Worked example — decimals

Series (AP): 1.1, 2.2, 3.3, 4.4, ? → constant +1.1 ∴ = **5.5**. ✅

Series (GP): 0.5, 1.5, 4.5, 13.5, ? → constant ×3 ∴ = **40.5**. ✅

Try these — quick fraction checks

2/3, 4/5, 6/7, ? → **8/9**

1/2, 2/4, 3/8, ? → **4/16**

0.2, 0.4, 0.8, 1.6, ? → **3.2**

7.5, 6.0, 4.5, 3.0, ? → **1.5**

*Never cross-cancel a fraction before spotting the pattern — keep numerator & denominator in their **original, un-simplified** form.*

How to Attack ANY Series

1→ Take **differences** of consecutive terms. Constant? Done (AP). Changing? Take differences again.

2→ If differences grow fast, check **ratios** instead (constant ratio = GP).

3→ Compare terms to $\mathbf{n^2}$, $\mathbf{n^3}$, **n!**, **primes** — write the nearby perfect square/cube next to each term.

4→ If nothing fits in one row, split into **odd & even position** sub-series.

5→ If one term seems "off," you may have a **wrong-term** question — test the surrounding rule first.

Common traps → ignoring negative differences; forgetting decimal points; missing that a series alternates; and cancelling fractions too early.

Quick Pattern Gallery — one-glance revision

AP: 5→(+3)8→(+3)11→(+3)**14**

GP: 3→(×2)6→(×2)12→(×2)**24**

Squares: 1,4,9,16,**25** (n^2)

Cubes: 1,8,27,64,**125** (n^3)

Factorial: 1,2,6,24,**120** ($n!$)

Primes: 2,3,5,7,**11**

×+add: 2→(×2+1)5→(×2+1)**11**

Product: 2,6,12,20,**30** ($n(n+1)$)

Alternating: two rows, solve apart

Fraction: num & deno separate APs

Decimal: keep point aligned, same rule

Wrong-term: rule fits all but one

Exercise — Find the Missing Term

Real SSC CGL / CPO questions — solve, then check the Answer Key on the next page.

Q1. 8, 24, 40, 56, ?, 88
(1) 76 (2) 72 (3) 70 (4) 74

Q2. 33, 28, 24, ?, 19, 18
(1) 21 (2) 22 (3) 20 (4) 23

Q3. 156, 506, ?, 1806
(1) 1056 (2) 856 (3) 1456 (4) 1506

Q4. 3, 10, 20, 33, 49, 68, ?
(1) 75 (2) 85 (3) 90 (4) 91

Q5. 44, 56, 69, 83, ?, 114
(1) 90 (2) 98 (3) 100 (4) 110

Q6. 1, 2, 6, 24, ?, 720
(1) 3 (2) 5 (3) 120 (4) 8

Q7. 3, 15, ?, 63, 99, 143
(1) 27 (2) 45 (3) 35 (4) 56

Q8. 110, 132, 156, ?, 210
(1) 162 (2) 172 (3) 182 (4) 192

Q9. 5, 7, 11, ?, 35, 67
(1) 23 (2) 28 (3) 30 (4) 19

Q10. 27, 32, 30, 35, 33, ?
(1) 28 (2) 31 (3) 36 (4) 38

Q11. 1, 0, 3, 2, 5, 6, ?
(1) 9 (2) 8 (3) 10 (4) 7

Q12. 1, 2, 3, 14, 5, 34, 7, ?, ?
(1) 68,7 (2) 63,9 (3) 60,11 (4) 62,9

✓ Solve every question on paper first — write differences/ratios under each gap — then flip the page to check.

Answer Key

Q1 → 72 — 8→(+16)24→(+16)40→(+16)56→(+16)**72**→(+16)88. Constant-difference AP.

Q2 → 21 — differences −5,−4,−3,−2,−1 (shrink by 1) → 24−3=**21**.

Q3 → 1056 — differences 350, 550, 750 (2nd difference constant = 200) → 506+550=**1056**.

Q4 → 90 — differences 7,10,13,16,19,22 (+3 each) → 68+22=**90**.

Q5 → 98 — differences 12,13,14,15,16 (+1 each) → 83+15=**98**.

Q6 → 120 — factorials: 1!,2!,3!,4!,5!,6! = 1,2,6,24,**120**,720.

Q7 → 35 — series is (2n−1)(2n+1): 1×3,3×5,**5×7=35**,7×9,9×11,11×13.

Q8 → 182 — n(n+1): 10×11,11×12,12×13,**13×14=182**,14×15.

Q9 → 19 — differences double: 2,4,8,16,32 → 11+8=**19**.

Q10 → 38 — alternating +5/−2: 27→(+5)32→(−2)30→(+5)35→(−2)33→(+5)**38**.

Q11 → 7 — odd positions 1,3,5,**7** (+2 AP); even positions 0,2,6 (separate).

Q12 → 62, 9 — odd positions 1,3,5,7,**9**; even positions 2,14,34,**62** (2nd difference = 8).

Score yourself

10–12 correct → **excellent**, series is your strength! 6–9 → **good**, revisit pages 2–9. Below 6 → **redo** the "How to Attack" steps on page 10 slowly.

☆ Spot the pattern, crack the series! ☆