LF LearnFrenzy

QUANTITATIVE APTITUDE · FREE STUDY MATERIAL

Odd Man Out and Series

Formulas & Shortcut Tricks

Every important formula, shortcut and exam trick for Odd Man Out and Series in one place – with solved examples, common mistakes and a one-page revision sheet.

WHAT'S INSIDE

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USEFUL FOR

- Bank PO & Clerk (IBPS, SBI, RBI)
- SSC CGL / CHSL / MTS
- Railways (RRB NTPC, Group D)
- Campus placements (TCS, Infosys, Wipro, Accenture)
- UPSC CSAT & state PSC exams

Practise Odd Man Out and Series free on LearnFrenzy – questions with instant explanations →

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1 Topic introduction

What it is, why it matters and how it is asked

A number series follows a hidden rule. Exams ask three kinds of question: find the missing or next number, find the wrong number that breaks the rule, or find the odd man out – the one number in a set that does not share a property with the others.

Nearly every series is built from a small set of patterns: constant or growing differences, multiplying by a fixed or changing number, squares and cubes, primes, Fibonacci-type sums and two series mixed together. Learn the patterns and the order in which to test them.

Why it matters in exams

- Bank prelims ask a set of 5 series questions.
- SSC and railway papers include odd man out every time.
- Fast, sure marks once the patterns are familiar.

Where it is used

- Spotting trends in data.
- Logical and analytical reasoning.
- Coding and pattern-based puzzles.

Common question patterns

Missing number
The next or a blank term.

Wrong number
One term breaks the rule.

Odd man out
One member fails a shared property.

Differences
Constant, growing, squares or cubes.

Multiplication
×k, ×k ± c, ×1 + 1, ×2 + 2 …

Squares and cubes
$n^2 \pm c$, $n^3 \pm c$, $n(n + 1)$.

Special numbers
Primes, Fibonacci, factorials.

Alternating
Two series mixed together.

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2 Important formulas

Cards marked MOST USED are the ones to revise first

Difference patterns

Constant difference (AP)

MOST USED

a, a + d, a + 2d, …; nth term = a + (n − 1)d

Subtract each term from the next.

EXAMPLE 7, 12, 17, 22, ? → +5 → **27**.

Second differences

MOST USED

The differences themselves form an AP

Take differences twice.

EXAMPLE 3, 5, 9, 15, 23, ? → +2, +4, +6, +8, +10 → **33**.

Differences are squares, cubes or powers

Differences 1, 4, 9, 16 … or 1, 8, 27 … or 2, 4, 8 …

Recognise the difference row.

EXAMPLE 2, 3, 7, 16, 32, ? → $+1^2$, $+2^2$, $+3^2$, $+4^2$, $+5^2$ → **57**.

Multiplication patterns

Constant ratio (GP)

MOST USED

a, ar, ar^2, …; nth term = ar^{n-1}

Divide each term by the one before.

EXAMPLE 5, 15, 45, 135, ? → ×3 → **405**.

×k ± c

MOST USED

next = previous × k + c

Fast-growing series that are almost a GP.

EXAMPLE 3, 7, 15, 31, 63, ? → ×2 + 1 → **127**.

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Changing multiplier

×1 + 1, ×2 + 2, ×3 + 3 … or ×1, ×2, ×3 … (factorial type)

The multiplier itself follows a pattern.

EXAMPLE 2, 3, 8, 27, 112, ? → ×5 + 5 → **565**.

Special numbers

Squares and cubes

MOST USED

$n^2 \pm c$, $n^3 \pm c$, $n(n+1) = n^2 + n$, $n^3 - n$

Check whether each term is near a square or cube.

EXAMPLE 2, 5, 10, 17, 26, ? → $n^2 + 1$ → **37**.

Primes and prime squares

2, 3, 5, 7, 11, 13, 17, 19, 23, 29 … and 4, 9, 25, 49, 121, 169 …

Irregular gaps often mean primes.

EXAMPLE 4, 9, 25, 49, 121, ? → 13^2 → **169**.

Fibonacci-type sums

Each term = sum of the two before

Add neighbours and look ahead.

EXAMPLE 2, 5, 7, 12, 19, ? → 12 + 19 → **31**.

Alternating series

MOST USED

Terms 1, 3, 5 … follow one rule; terms 2, 4, 6 … another

Up-and-down series are usually two series.

EXAMPLE 4, 20, 8, 17, 12, 14, ? → 4, 8, 12 → **16**.

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3 Shortcut tricks & smart techniques

Each trick says when to use it – that matters as much as the trick

Order of attack

MOST USED

USE WHEN Any series – read how it grows first.

If the series …	Try
grows slowly	differences, then second differences
grows fast (doubles or more)	ratios, then ×k ± c
sits near squares or cubes	$n^2 \pm c$, $n^3 \pm c$
goes up and down	two alternating series
jumps irregularly	primes, Fibonacci sums

EXAMPLE 6, 11, 21, 41, 81, ? grows fast → ×2 – 1 → **161**.

Finding the wrong number

MOST USED

USE WHEN One term breaks the pattern.

1. Find the rule from the terms that agree.
2. The single term that disagrees is wrong – check it against both neighbours.

EXAMPLE 3, 8, 15, 24, 34, 48 → $n^2 - 1$ gives 35 → **34** is wrong.

Odd man out checklist

USE WHEN Pick the number unlike the rest.

1. Test: prime, even/odd, square, cube, multiple of a number.
2. Then digit patterns: digit sum, first + last digit.

EXAMPLE 27, 64, 125, 144, 216 → all cubes except **144**.

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4 Solved examples

The full method on the left, the exam shortcut on the right

1 PRIMES

Find the next number: 11, 13, 17, 19, 23, ?

STEP BY STEP

1. Differences 2, 4, 2, 4 – no clear rule.
2. All terms are consecutive primes.
3. Next prime after 23 = 29.

SHORTCUT

Irregular small gaps → primes.

Why it works: Trap: 25 – continuing the +2, +4 pattern blindly.

Answer: 29

2 CHANGING RATIO

Find the next number: 4, 6, 12, 30, 90, ?

STEP BY STEP

1. Ratios: ×1.5, ×2, ×2.5, ×3.
2. Next ratio ×3.5.
3. 90 × 3.5 = 315.

SHORTCUT

Multiplier grows by 0.5.

Why it works: Fast growth → look at ratios.

Answer: 315

3 SQUARES

Find the next number: 1, 9, 25, 49, 81, ?

STEP BY STEP

1. $1^2, 3^2, 5^2, 7^2, 9^2$.
2. Squares of odd numbers.
3. Next = $11^2 = 121$.

SHORTCUT

Spot the squares at once.

Why it works: Trap: 100 – taking the next square, not the next odd square.

Answer: 121

4 DOUBLING DIFFERENCES

Find the next number: 6, 9, 15, 27, 51, ?

STEP BY STEP

1. Differences: 3, 6, 12, 24.
2. Each difference doubles → next 48.
3. 51 + 48 = 99.

SHORTCUT

Also ×2 – 3: 51 × 2 – 3 = 99.

Why it works: Two views of the same rule – both give 99.

Answer: 99

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5 N(N + 1)

Find the next number: 2, 6, 12, 20, 30, ?

STEP BY STEP

1. 1×2, 2×3, 3×4, 4×5, 5×6.
2. Next = 6 × 7 = 42.

SHORTCUT

Differences 4, 6, 8, 10 → +12.

Why it works: Products of consecutive numbers.

Answer: 42

6 ALTERNATING

Find the next number: 5, 10, 8, 20, 11, 40, ?

STEP BY STEP

1. Odd places: 5, 8, 11 (+3).
2. Even places: 10, 20, 40 (×2).
3. Next is in an odd place → 14.

SHORTCUT

Split the series into two.

Why it works: Trap: 80 – continuing the even-place series.

Answer: 14

7 WRONG NUMBER

Find the wrong number: 2, 5, 11, 23, 48, 95

STEP BY STEP

1. Rule: ×2 + 1.
2. 2 → 5 → 11 → 23 → 47 → 95.
3. 48 should be 47.

SHORTCUT

23 × 2 + 1 = 47 and 47 × 2 + 1 = 95.

Why it works: Check the suspect against both neighbours.

Answer: 48

8 WRONG NUMBER

Find the wrong number: 1, 8, 27, 63, 125, 216

STEP BY STEP

1. Rule: n^3.
2. 1, 8, 27, 64, 125, 216.
3. 63 should be 64.

SHORTCUT

Know cubes up to 15^3.

Why it works: A term one away from a cube is the usual trick.

Answer: 63

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9 ODD MAN OUT

Find the odd man out: 41, 43, 47, 51, 53

STEP BY STEP

1. 41, 43, 47, 53 are primes.
2. 51 = 3 × 17 is not.

SHORTCUT

Digit sum of 51 is 6 → divisible by 3.

Why it works: Trap: 53 – it is prime too.

Answer: 51

10 DIGIT PATTERN

Find the odd man out: 132, 253, 374, 285, 495

STEP BY STEP

1. Middle digit = first + last: 1 + 2 = 3, 2 + 3 = 5, 3 + 4 = 7, 4 + 5 = 9.
2. For 285: 2 + 5 = 7, not 8.

SHORTCUT

Look inside the digits when number properties fail.

Why it works: All five are composite – the rule is in the digits.

Answer: 285

11 NUMBER PAIRS

Find the odd pair: 3 – 28, 4 – 65, 5 – 126, 6 – 215, 7 – 344

STEP BY STEP

1. Rule: n → $n^3 + 1$.
2. $6^3 + 1 = 217$, not 215.

SHORTCUT

28 = 27 + 1, 65 = 64 + 1 …

Why it works: Pairs follow one rule from left to right.

Answer: 6 – 215

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5 Important exam tips

Patterns, traps and habits that save marks

Frequently asked question patterns

- Second differences and difference of squares.
- ×k ± c and changing multipliers.
- Squares and cubes ± a constant.
- Prime and prime-square series.
- Alternating series.
- Wrong term one away from the rule.
- Odd man out by primes, squares or digits.

Common mistakes to avoid

- Stopping at the first difference row.
- Ignoring alternation in up-and-down series.
- Fixing the wrong term – check both neighbours.
- Missing that 1 is not prime and 2 is even prime.
- Taking the next square instead of the next odd square.
- Spending too long on one series.

Points to remember

- Slow growth → differences.
- Fast growth → ratios.
- Up and down → two series.
- Near squares → $n^2 \pm c$.
- Irregular → primes.

Speed and accuracy

- Learn squares to 30 and cubes to 15.
- Learn primes up to 100.
- Write the difference row under the series.
- Move on after 60 seconds and return later.

Preparation strategy

- Memorise the number tables on the next page.
- Practise on LearnFrenzy in order: Easy → Medium → Hard → Exam Pattern Mix → Data Sufficiency.
- Aim for 30–45 seconds per question.
- Note every new pattern you meet in an error log.
- Read the Quick Revision Sheet (next page) the night before the exam.

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6 Quick revision sheet

Everything on one page for the night before the exam

Formulas

AP	**$a + (n-1)d$**	GP	**ar^{n-1}**
Second difference	**differences form an AP**	×k ± c	**next = prev × k ± c**
Changing ×	**×1 + 1, ×2 + 2 …**	Factorial type	**×1, ×2, ×3 …**
$n(n+1)$	**2, 6, 12, 20, 30**	$n^3 - n$	**0, 6, 24, 60, 120**
Fibonacci	**sum of previous two**	Alternating	**odd and even places**

Shortcut tricks

- Slow → differences.
- Fast → ratios / ×k ± c.
- Up-down → alternate.
- Wrong term: check neighbours.
- Odd man: prime, square, cube.
- Then digit patterns.

Must-know numbers

Primes to 100	2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97
Squares	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
Cubes	6^3 216 · 7^3 343 · 8^3 512 · 9^3 729 · 10^3 1,000 · 11^3 1,331 · 12^3 1,728

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7 A message from LearnFrenzy

For everyone preparing for placements, competitive and government exams

Keep going – you are closer than you think

Success in examinations is not just about how many hours you study. It is about how effectively you understand concepts, practise questions, and improve yourself every day.

Every formula you learn, every problem you solve, and every mistake you correct brings you one step closer to your goal.

Whether you are preparing for campus placements, competitive examinations, or government jobs, remember that consistency, confidence, and smart preparation make a real difference.

Don’t just memorize formulas. Understand the concepts, practise smart techniques, and develop the confidence to solve problems independently.

Your hard work today can create the opportunities you dream of tomorrow.

— Team LearnFrenzy

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