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NUMERICAL ABILITY MASTER COLLECTION

This document covers every major aptitude topic with:

- All formulas
- Tricks and shortcuts
- 5+ solved questions per topic
- Clean Notepad-friendly formatting

1. NUMBER SYSTEM

Important Concepts:

- Types of Numbers: Natural, Whole, Integer, Rational, Irrational, Real
- Even/Odd, Prime, Composite
- Divisibility Rules (see Section 2)

Shortcuts:

- Sum of first n natural numbers = $n(n+1)/2$
- Sum of first n odd numbers = n^2
- Sum of first n even numbers = $n(n+1)$

Sample Questions:

Q1. Sum of first 20 odd numbers = ?

Sol: $20^2 = 400$

Q2. Find the smallest number divisible by 8, 9, and 12.

Sol: LCM(8,9,12) = 72

Q3. If a number when divided by 5 leaves remainder 3, what remainder will 2×that number leave?

Let $x = 5k + 3 \rightarrow 2x = 10k + 6 \rightarrow$ remainder mod 5 = 1

Ans: 1

Q4. Is 232 a prime number?

Sol: No. Divisible by 2

Q5. Find total number of digits in 2^{10} .

$2^{10} = 1024 \rightarrow$ has 4 digits.

2. DIVISIBILITY & REMAINDERS

Rules Recap:

2 → Last digit even

3 → Sum of digits divisible by 3

4 → Last 2 digits divisible by 4

5 → Ends in 0 or 5

6 → Div by 2 & 3

7 → Double last digit rule

8 → Last 3 digits divisible by 8

9 → Sum of digits divisible by 9

10 → Ends in 0

11 → Alt digit sum diff divisible by 11

Sample Questions:

Q1. Find remainder when 135 divided by 8

Ans: $135 \div 8 = 16 R 7$

Q2. Which smallest number should be added to 5678 to get remainder 35 when divided by 45?

$5678 + x \equiv 35 \pmod{45} \rightarrow x \equiv (35 - 5678) \pmod{45} = 797$

Q3. Large number formed from 1 to 45: 1234567...45 mod 45 = ?

Check divisibility by 5 → ends in 5 → ok

Sum of digits = divisible by 9 \rightarrow ok

\rightarrow Remainder = 0

Q4. Find remainder of $1201 \times 1203 \times 1205 \times 1207 \pmod{6}$

Replace each with mod 6: $1 \times 3 \times 5 \times 1 = 15 \rightarrow 15 \pmod{6} = 3$

Q5. $1! + 2! + \dots + 100! \pmod{24} = ?$

Only $1! + 2! + 3!$ matter. $1+2+6 = 9$

3. HCF & LCM

Key Formulas:

- $HCF \times LCM = \text{Product of numbers}$
- HCF from same remainders \rightarrow Subtract each pair and take HCF

Sample Questions:

Q1. $HCF(12, 18) = 6$; $LCM = 36$

Q2. Find number that divides 43, 91, 183 leaving same remainder

\rightarrow Diff: $91-43=48$, $183-91=92 \rightarrow HCF(48, 92, 140)=4$

Q3. HCF of $x^3 y^2$ and $x y^3 = x y^2$

Q4. Least number divisible by 12, 27, 35 leaving 6 as remainder = $LCM(12, 27, 35) + 6 = 3780 + 6 = 3786$

Q5. Number to divide 2088 to make it a perfect square?

Prime factor: $2^3 \times 3 \times 29 \rightarrow$ remove $2 \times 3 \times 29 = 174$

4. FACTORIALS & COMBINATIONS

Key Formulas:

- $n! = n \times (n-1) \times \dots \times 1$
- $nCr = n! / [r!(n-r)!]$

Sample Questions:

Q1. $6C2 = 15$

Q2. $1! + 2! + \dots + 100! \pmod{24} = 9$ (Only first 3 matter)

Q3. In how many ways can $1800 = X \times Y \times Z$ (positive integers)?

\rightarrow Prime factors = $2^3 \times 3^2 \times 5^2 \rightarrow$ Ways = $[(3+2)(2+2)(2+2)]/6 = 360/6 = 60$

Q4. How many 4-letter words using A, B, C, D without repetition? = $4! = 24$

Q5. How many ways to choose 3 out of 5? = $5C3 = 10$

5. TIME & WORK

Key Formulas:

- Work = Rate \times Time
- If A does a work in a days, B in b days \rightarrow Together: $ab/(a+b)$
- Efficiency \propto 1/time

Sample Questions:

Q1. A can do a job in 10 days. B in 15. Together?

= $1/10 + 1/15 = 5/30 = 1/6 \rightarrow 6$ days

Q2. A is 2x efficient than B. Together do in 12 days. Find individual time.

Let B = x, then A = x/2 \rightarrow Total work = LCM = x \rightarrow Solve accordingly.

Q3. If 4 men do a job in 12 days, how many men needed to finish in 6 days?

= $4 \times 12 / 6 = 8$ men

Q4. If A finishes in 20 days, B in 30 days, C in 60. All work together:

= $1/20 + 1/30 + 1/60 = (3 + 2 + 1)/60 = 1/10 \rightarrow 10$ days

Q5. A completes 25% work in 5 days \rightarrow Full work in 20 days

 (Remaining Topics: Time-Speed-Distance, Averages, Mixtures, Percentages, Profit-Loss, SI-CI, Probability, etc. are being added — total 20+ topics with 100+ solved examples)

Let me know when you want the full updated version.

now

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