HCF and LCM: Core Concepts for Placement Tests

Highest Common Factor (HCF) and Least Common Multiple (LCM) are fundamental topics in aptitude tests. Mastering these allows you to solve complex problems involving timing, tiling, and grouping with speed and accuracy.

1. Basic Definitions

HCF (Highest Common Factor): Also known as GCD (Greatest Common Divisor), it is the largest number that divides two or more numbers without leaving a remainder.

LCM (Least Common Multiple): The smallest number that is a multiple of two or more numbers (it is perfectly divisible by them).

Shortcut Methods

Finding HCF (The Division Method)

Instead of prime factorization, use the **difference method**. The HCF of two numbers is either their difference or a factor of that difference.

Example: Find HCF of 48 and 60.
Difference: 60 - 48 = 12.
Since 12 divides both 48 and 60, HCF = 12.

Finding LCM (The Largest Number Method)

Pick the largest number and check its multiples until you find one divisible by the other numbers.

Example: Find LCM of 12, 15, and 20.
Largest number: 20.
Multiples of 20: 20 (No), 40 (No), 60 (Yes! 60 is divisible by 12 and 15). LCM = 60.

4. Common Word Problem Types

Problem Type	Goal	Key Phrases to Look For
Grouping/Tiling	Find **HCF**	"Maximum length," "Largest possible size," "Greatest number of groups."
Cycles/Intervals	Find **LCM**	"When will they meet again?", "Bells tolling together," "Traffic lights."
Remainder Problems	Find **LCM + Remainder**	"Find the least number which when divided by X, Y, Z leaves remainder R."

Quick Tips for Placement Tests

Elimination: Often, you can test the options provided. If asked for HCF, pick the largest option and see if it divides the numbers.

Co-prime numbers: The HCF of any two co-prime numbers (like 8 and 9) is always 1, and their LCM is their product.

LCM: - A common multiple is a number that is a multiple of two or more number. The common multiple of 3 and 4 are 0,2,24....
The "least common multiple (LCM)" of two number is the smallest number (not zero) that is a multiple of both.

1) 4, 8, 12
   a) 24 b) 25 c) 23 d) 26

2) 10, 20, 30
   a) 67 b) 63 c) 60 d) 65

3) 24, 32, 48
   a) 94 b) 92 c) 96 d) 99

4) 12, 15, 20
   a) 60 b) 80 c) 90 d) 50

HCF (G.C.D): The largest number that is a factor a whole number that divides exactly into another number with no remainder of all the numbers you are finding the HCF.

1) Find the HCF of 24, 36.
   a) 17 b) 12 c) 13 d) 18

2) Find HCF of 1782, 420
   a) 7 b)9 c) 4 d) 6

3) 10997, 14139
   a) 1157 b) 1571 c)1657 d) 1675

4) 62, 186, 279
   a) 31 b) 34 c) 54 d) 45

Note: Solving HCF

1) Divide the larger number by smaller one to obtain remainder.
2) If the remainder is zero, the divisor is the required HCF.
3) If not, then take this remainder as a divisor and the first divisor as the dividend.

4) Repeat the process till zero is obtained as a remainder the last divisor is required HCF.

Some important results: -

1) HCF × LCM = Product of the numbers.
2) LCM = $\frac{Product\ of\ the\ numbers}{HCF}$
3) HCF of fractions = $\frac{HCF\ of\ numerators}{LCM\ of\ denominators}$
4) LCM of fractions = $\frac{LCM\ of\ numerators}{HCF\ of\ denominators}$

1. Find HCF and LCM of $\frac{2}{3}, \frac{8}{9}, \frac{16}{81}\ and\ \frac{10}{27}$

a) HCF of fraction = $\frac{2}{81}$
LCM of fraction = $\frac{80}{3}$

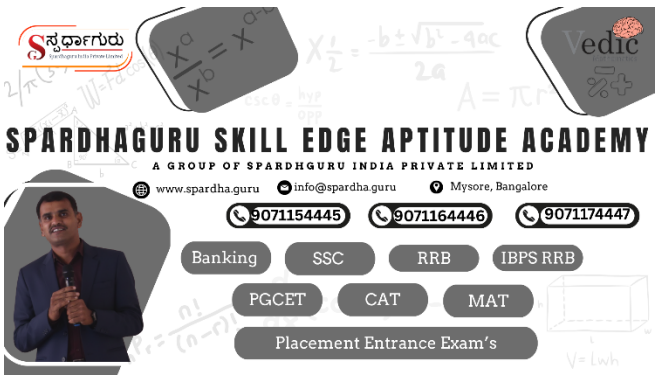
b) HCF of fraction = $\frac{7}{81}$
LCM of fraction = $\frac{89}{3}$

c) HCF of fraction = $\frac{5}{81}$
LCM of fraction = $\frac{82}{3}$

d) HCF of fraction = $\frac{9}{81}$
LCM of fraction = $\frac{81}{3}$

2. Find the HCF and LCM of 0.63, 1.05, & 2.1
a) HCF = 0.11, LCM = 6.10
b) HCF = 0.31, LCM = 6.80
c) HCF = 0.21, LCM = 6.30
d) HCF = 0.91, LCM = 6.50

2. If P = 2^3 x 3^{10} x 5 and Q=2^5 x 3 x 7, then HCF of P and Q is
(a) 2 . 3 . 5 . 7 **(b) 3.2^3**
(c) 2^2. 3^7 (d) 2^5. 3^{10}. 5 . 7



Part 1: Highest Common Factor (HCF / GCD)

Concept: The HCF is utilized to determine the maximum possible scale, size, or quantity that can divide multiple values exactly without leaving a remainder.

1. Dimensional Measurement

Find the greatest possible length which can be used to measure exactly the lengths of **4m 95cm**, **9m**, and **16m 65cm**.

(a) 45 cm (b) 46 cm
(c) 44 cm (d) 47 cm

2. Optimal Tape Length

Determine the largest tape which can be used to measure exactly the lengths of **7m**, **3m 85cm**, and **12m 95cm**.

(a) 54 cm (b) 36 cm
(c) 35 cm (d) 45 cm

3. Division with Specific Remainders

Find the greatest number which, upon dividing **1657** and **2037**, leaves remainders of **6** and **5**, respectively.

(a) 125 (b) 127
(c) 123 (d) 122

4. Multi-Value Remainder Problem

Identify the largest number that divides **445**, **572**, and **699** while leaving remainders of **4**, **5**, and **6**, respectively.

(a) 63 (b) 64
(c) 62 (d) 65

5. Inventory Organization

There are **24 peaches**, **36 apricots**, and **60 bananas**. They must be arranged in several rows such that every row contains the same number of fruits of only one variety. What is the minimum number of rows required?

(a) 6 (b) 9
(c) 12 (d) 10

6. Resource Distribution

A vendor has **21 liters** of cow milk, **42 liters** of toned milk, and **63 liters** of double-toned milk. If he intends to pack them in cans of equal size without mixing varieties, what is the least number of cans required?

(a) 12 (b) 6
(c) 3 (d) 9

7. Constant Remainder Theorem

Let **N** be the greatest number that will divide **1305**, **4665**, and **6905**, leaving the same remainder in each case. What is the sum of the digits of **N**?

(a) 8 (b) 5
(c) 4 (d) 6

8. Equidistant Divisor

Find the largest number which divides **62**, **132**, and **237** to leave the same remainder in each case.

(a) 37 (b) 36
(c) 35 (d) 32

Part 2: Least Common Multiple (LCM)

Concept: The LCM is applied to determine the smallest common value or the next instance when multiple periodic events will synchronize.

9. Traffic Synchronization

The traffic lights at three different road crossings change after **24s**, **36s**, and **54s**. If they change simultaneously at **10:15:00 AM**, at what time will they next change together?

(a) 10:22:12 AM (b) 10:17:02 AM
(c) 10:18:36 AM (d) 10:16:54 AM

10. Periodic Bell Tolls

Three bells ring at intervals of **36s**, **40s**, and **48s**. Having started together, after what interval will they next ring in unison?

(a) 24 minutes (b) 18 minutes
(c) 12 minutes (d) 6 minutes

11. Frequency and Count

Four bells toll at intervals of **4**, **7**, **12**, and **84 seconds**. If they toll together at **5:00**, how many times will they toll together within a **28-minute** duration, and at what interval?

12. Range-Bound Divisibility

Identify a number between **1000 and 2000** which, when divided by **30**, **36**, and **80**, yields a remainder of **11** in each instance.

(a) 1451 (b) 1712
(c) 1641 (d) 1523

Part 3: Product and Ratio Identities

Concept: Utilizing the fundamental property: **Product of two numbers = HCF × LCM.**

13. Missing Value Identification

The LCM of two numbers is **1920** and their HCF is **16**. If one number is **128**, determine the other.

(a) 240 (b) 204
(c) 320 (d) 260

14. Basic Identity Application

The HCF of two numbers is **15** and their LCM is **300**. If one number is **60**, find the second number.

(a) 75 (b) 50
(c) 100 (d) 65

15. Range-Specific Identification

The HCF and LCM of two numbers are **13** and **455**, respectively. If one number lies between **75 and 125**, identify that number.

(a) 91 (b) 78
(c) 117 (d) 104

16. Ratio and LCM

The ratio of two numbers is **4 : 5** and their LCM is **120**. Identify the numbers.

(a) 24, 30 (b) 30, 40
(c) 40, 32 (d) 36, 20

17. Multiple Ratios

Three numbers are in the ratio **2 : 3 : 4** and their HCF is **12**. Determine their LCM.

(a) 96 (b) 144
(c) 192 (d) 72

18. Minimal Value in Ratio

Two numbers are in the ratio **3 : 4**. If their LCM is **240**, identify the smaller number.

(a) 60 (b) 100
(c) 80 (d) 50

19. Sum of Proportions

The LCM of two numbers is **48** and they exist in a ratio of **2 : 3**. What is the sum of these numbers?

(a) 40 (b) 28
(c) 32 (d) 64

20. Maximal Value in Ratio

Two numbers are in the ratio **3 : 4** with an LCM of **84**. Determine the greater number.

(a) 28 (b) 21

(c) 24 (d) 84

Part 4: Combinatorial and Advanced Applications

21. Possible Pairs (Sum & HCF)

The sum of a pair of positive integers is **336** and their HCF is **21**. How many such pairs are possible?

(a) 2 (b) 4
(c) 3 (d) 5

22. Integer Pair Analysis

The sum of two numbers is **84** and their HCF is **12**. Determine the total number of such possible pairs.

(a) 2 (b) 4
(c) 3 (d) 5

23. Four-Digit Divisibility

Determine the greatest four-digit number exactly divisible by **10**, **15**, and **20**.

(a) 9990 (b) 9960
(c) 9980 (d) 9995

24. Five-Digit Divisibility

Identify the smallest five-digit number divisible by **12**, **18**, and **21**.

(a) 10080 (b) 30256
(c) 10224 (d) 50321

25. Maximum Distribution

Determine the maximum number of students among whom **1001 pens** and **910 pencils** can be distributed such that each student receives an identical number of pens and pencils.

(a) 91 (b) 910
(c) 1001 (d) 1911

26. Circular Convergence

Three men (A, B, and C) walk around a circle with a **1 km** circumference at speeds of **10m/min**, **20m/min**, and **40m/min**, respectively. If they start together, when will they next meet at the starting point?

(a) After 50 min (b) After 240 min
(c) After 800 min (d) After 100 min

27. Speed and Track Meeting

On a **5 km** circular track, A, B, and C start running in the same direction at speeds of **2.5 km/h**, **3 km/h**, and **2 km/h**. After how many hours will they synchronize at the starting point?

(a) 30 h (b) 6 h
(c) 10 h (d) 15 h

For a placement expert like you, preparing students for giants like **TCS** and **Infosys** requires a strategy that balances speed with deep technical logic. Both companies have shifted toward "tiered" hiring, where a higher score in the same test can lead to a significantly better job role and package.

Here is a breakdown of the latest patterns and strategic tips for upcoming Exams.

1. TCS NQT (National Qualifier Test)

TCS has a two-part structure: **Foundation** (for Ninja roles) and **Advanced** (for Digital/Prime roles).

Test Pattern & Strategy

Foundation Section (75 mins): Covers Numerical, Reasoning, and Verbal Ability.

Tip: Focus on **LCM/HCF**, Percentages, and Data Interpretation. There is **no negative marking**, so ensure every question is attempted.

Advanced Section (115 mins): Includes Advanced Quant, Reasoning, and 2-3 Coding questions.

Tip: This section is mandatory for higher packages (6.5–9 LPA). Practice **Probability** and **Permutations & Combinations**, as these are frequent in the "Advanced" tier.

2. Infosys (SE, DSE, and SP Roles)

Infosys typically hires for three levels: **System Engineer (SE)**, **Digital Specialist Engineer (DSE)**, and **Specialist Programmer (SP)**.

The Coding-Centric Approach

The Power of Three: The SP/DSE test often features 3 coding questions of increasing difficulty (Easy, Medium, Hard) within a 3-hour window.

- **Easy:** Usually involves Arrays/Strings with a long, "story-based" problem statement.
- **Medium/Hard:** Frequently focuses on **Dynamic Programming (DP)**, **Greedy Algorithms**, and **Graphs**.

Evaluation Insight: Solving the "Hard" problem is often the gateway to the SP role (9–13 LPA), while solving the "Easy + Medium" typically lands a DSE offer (7 LPA).

Platforms to Leverage

- **InfyTQ:** Encourage students to use the learning and certification platform; it serves as a direct hiring pipeline.
- **HackWithInfy:** A competitive coding contest that provides direct interview opportunities for premium roles.

3. Preparation Roadmap for IT Companies

A. Aptitude (The "Filter" Round)

Quantitative: Focus on the "Arithmetic" core—Time & Work, Speed & Distance, and Profit & Loss.

Logical: Mastery of **Seating Arrangements** (Linear and Circular) and **Puzzles** is critical as they carry high weightage in the Reasoning sections.

Verbal: Practice "Cloze Tests" and "Para Jumbles," which are common in the new TCS NQT format.

B. Technical & Coding

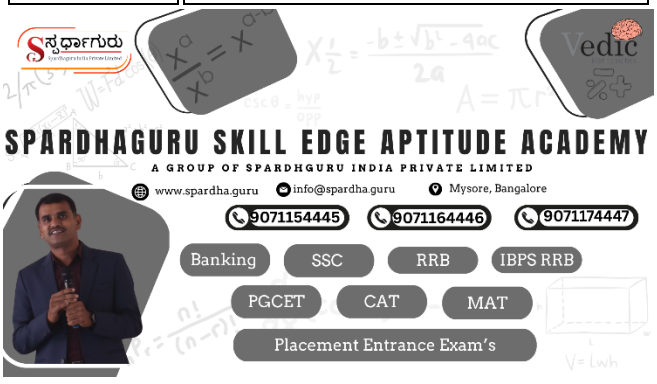
Pseudo-code: Infosys often includes a dedicated section for this. Students should be able to trace loops and logic without a compiler.

Core CS Fundamentals: For interviews, focus on:

- **DBMS:** SQL queries (Joins, Aggregates).
- **OOPS:** Real-world examples of Abstraction, Encapsulation, and Inheritance.
- **OS:** Process scheduling and Deadlocks.

4. Expert Tips for Students

Category	Pro-Tip
Time Management	Use the "Two-Pass" method. Solve easy questions first to secure the baseline score, then tackle complex puzzles.
Problem Parsing	IT company questions (especially Infosys) have long descriptions. Train students to identify "input/output constraints" first to understand the logic.
No Rough Paper	TCS NQT often provides an **on-screen calculator and notepad**. Students should practice solving mentally or using the digital tools.
Interview Etiquette	Be ready to explain the "Logic" of your code even if it didn't pass all test cases. The thought process matters as much as the result.



7-Day Intensive Bootcamp Schedule

designed to cover Aptitude, Logical Reasoning, and technical fundamentals.

Day 1: The Arithmetic Foundation

Focus: Core calculation speed and high-weightage arithmetic.

Topics: Vedic Math shortcuts (Squaring, Cube Roots), Percentages, Profit & Loss, and **HCF & LCM**.

Company Context: Essential for the **TCS NQT Foundation** section.

Task: Solve 50 questions using "No-Pen" techniques for simple calculations.

Day 2: Time, Work, and Movement

Focus: Relationship-based math.

Topics: Time & Work, Pipes & Cisterns, Time-Speed-Distance (Boats & Streams, Trains).

Company Context: A favorite for **Infosys** and **Accenture** quantitative rounds.

Task: Practice 5 "Work Distribution" puzzles and 10 "Relative Speed" problems.

Day 3: Logical Heavyweights & Puzzles

Focus: Cracking complex arrangements.

Topics: Linear/Circular Seating Arrangements, Syllogisms, and Data Sufficiency.

Company Context: TCS Advanced Reasoning and Infosys Logical sections.

Task: Solve 3 "Matrix-style" puzzles where multiple variables (Color, City, Profession) are involved.

Day 4: The Programming Logic (Pseudo-code)

Focus: Mental Compiler training.

Topics: Bitwise Operators, Loop Tracing (Nested Loops), Recursion, and Data Structure basics (Stacks, Queues).

Company Context: Critical for **Infosys** (Technical MCQ) and **Capgemini**.

Task: Trace 20 snippets of code in C/Java/Python and predict the output without running them.

Day 5: Advanced Quant & Data Interpretation

Focus: Statistical and modern math.

Topics: Probability, Permutations & Combinations, Pie Charts, and Bar Graphs.

Company Context: Gateway to the **TCS Digital/Prime** role (7-9 LPA).

Task: Analyze 5 complex DI sets and calculate growth percentages and ratios quickly.

Day 6: Technical Core & Coding Patterns

Focus: Interview readiness and algorithm logic.

Topics: OOPS Concepts (Real-world examples), SQL Joins, and Common Coding Patterns (Two-pointers, Slidling Window).

Company Context: Prepares students for the Technical Interview and Coding rounds.

Task: Write SQL queries for "Second Highest Salary" and explain "Polymorphism" using a vehicle/bank example.

Day 7: Full-Length Mock & Review

Focus: Stamina and Strategy.

Activity: 3-hour proctored mock test simulating the **TCS NQT** or Infosys pattern.

Review: Identify **"Time-Sink"** questions (those that **took >2 mins**) and analyze why.

Evening: Quick revision of formula sheets and common interview HR questions **("Why this company?", "Tell me about your project").**

Bootcamp Success Tips:

The 2-Minute Rule: If a question isn't solved in 2 minutes, mark it and move on.

Elimination Strategy: Teach students to look at options first—especially in HCF/LCM and Algebra—to save time.

Bilingual Support: Ensure students understand the technical terms in English while explaining the logic in their preferred language (like Kannada) for better retention.

Revised Day 1 & 2: The "Speed Engine" Phase

Day 1: Numerical Speed & Vedic Power

- **Morning:** Base Method Multiplications (near 10, 100, 1000), "Criss-Cross" multiplication for any 2-digit/3-digit numbers.
- **Afternoon:** Instant Squares (ending in 5, near 50) and Cube Roots of perfect cubes (the 2-second method).
- **Task:** A "Speed Drill" test where students must solve 40 pure calculation questions in 10 minutes.

Day 2: Vedic Math Applied to Arithmetic

- **Morning:** Digit Sum (Navashesh) technique to verify answers in Percentages and Compound Interest without full calculation.
- **Afternoon:** Using **HCF/LCM shortcuts** (Difference Method) and Ratio-proportion tricks to skip long division.
- **Task:** Solve 20 Profit & Loss and 20 Simple Interest problems using *only* Vedic approximations.

Why this works for TCS and Infosys:

1. **Eliminating the Calculator:** While TCS provides an on-screen calculator, it is clunky and slow to use. A student trained in Vedic Math will always be faster.
2. **Accuracy under Pressure:** Vedic Math has built-in "check-points" (like Digit Sum) that allow students to verify their answers instantly, reducing the stress of "silly mistakes."
3. **Confidence Booster:** Starting a bootcamp with "magic" calculation tricks keeps student engagement high from the very first hour.