**📘 Number System Full Explanation (with Tricks)**

**🔹 1. Types of Numbers**

| **Type** | **Example** |
| --- | --- |
| Natural Numbers | 1, 2, 3, 4, 5... |
| Whole Numbers | 0, 1, 2, 3... |
| Integers | -3, -2, -1, 0, 1, 2... |
| Rational | ½, -¾, 4 (a/b form) |
| Irrational | √2, π (non-terminating, non-repeating) |
| Real | All above (Rational + Irrational) |

💡 **Tip**: Remember: Natural ⊂ Whole ⊂ Integers ⊂ Rational ⊂ Real

**🔹 2. Divisibility Rules (Tricks)**

| **Number** | **Rule** | **Example** |
| --- | --- | --- |
| 2 | Last digit is even (0, 2, 4, 6, 8) | 246 ✅ |
| 3 | Sum of digits divisible by 3 | 1+5+6 = 12 → 12 ÷ 3 ✅ |
| 4 | Last 2 digits divisible by 4 | 1324 → 24 ✅ |
| 5 | Ends in 0 or 5 | 85 ✅ |
| 6 | Divisible by both 2 and 3 | 126 ✅ |
| 8 | Last 3 digits divisible by 8 | 1512 → 512 ÷ 8 = 64 ✅ |
| 9 | Sum of digits divisible by 9 | 243 → 2+4+3 = 9 ✅ |
| 10 | Ends with 0 | 120 ✅ |
| 11 | Alt sum of digits is 0 or multiple of 11 | 121 → 1–2+1 = 0 ✅ |

✅ **Practice**: Try checking 5 numbers between 100–150 quickly.

**🔹 3. LCM and HCF (Basics)**

**🔸 LCM (Least Common Multiple)**

Sabse chota number jo dono se divide ho.

**🔸 HCF (Highest Common Factor)**

Sabse bada number jo dono ko divide kare.

**🔸 Trick:**

HCF × LCM = Product of Two Numbers\text{HCF × LCM = Product of Two Numbers}HCF × LCM = Product of Two Numbers

**🧠 Example:**

* 12 and 18
  + HCF = 6
  + LCM = 36
  + 6 × 36 = 216 = 12 × 18 ✅

**🔹 4. Remainder Theorem (Trick)**

**🧠 Example:**

What is the remainder when 472 is divided by 9?

* Add digits: 4+7+2 = 13 → 13 ÷ 9 = 1 **R 4** ✅  
  ➤ So, remainder = 4

**📌 Shortcuts:**

* For 7, 9, 11: use digit sum or division directly
* For large powers (e.g., 220mod  72^{20} \mod 7220mod7), use **cyclicity pattern** (advanced)

**🔹 5. Factor & Multiple**

* **Factors**: Divide a number exactly.
  + Factors of 12: 1, 2, 3, 4, 6, 12
* **Multiples**: Number comes in table of that number.
  + Multiples of 3: 3, 6, 9, 12...

**🔹 6. Prime Numbers (Shortcut)**

* Prime = Only 2 factors (1 and itself)
* Primes under 50:  
  2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

📌 **Trick to check if a number is prime**:  
Check divisibility up to √n.

Example: 29  
√29 ≈ 5.3 → check divisibility from 2 to 5  
Not divisible → Prime ✅

**🔹 7. Last Digit Trick (Unit Digit)**

**Q: What is unit digit of 71037^{103}7103?**

Cyclic pattern of 7: 7, 9, 3, 1 → repeats every 4  
103 mod 4 = 3 → 3rd element = **3**

**✅ Summary Sheet (Quick Revision)**

| **Topic** | **Trick/Tip Example** |
| --- | --- |
| Divisibility by 9 | Sum of digits divisible by 9 |
| HCF × LCM | = Product of 2 numbers |
| Remainder Shortcut | Sum of digits → divide |
| Prime Number | Check till √n |
| Unit Digit Power | Use cycle pattern |

**📚 Practice Task for Today**

1. Solve 20 questions from IndiaBix Number System
2. Write all **prime numbers up to 100** and revise divisibility rules.