⚡ Vedic Maths Magic Tricks ⚡

Chapter 9: Squares of Numbers Near the Base

1. The Vedic Sutra & Core Principles

The square of any number close to a theoretical base ($10, 100, 1000, \dots$) can be calculated instantly using the Vedic Sutra **"Yavadunam"** (*"Whatever the extent of its deficiency/surplus, lessen/increase it by that amount and set up the square of that deficiency/surplus"*).

📜 Key Formulas & Rules

1. **All from 9 and the last from 10:** Used to easily find complements/deficiencies.
2. **Golden RHS Rule:** **Number of digits on RHS MUST equal the number of Zeros in the Base!**

- If RHS has *fewer* digits $\rightarrow$ Pad with leading zero(s).
- If RHS has *extra* digits $\rightarrow$ Carry forward the extra left digit to LHS!

2. Case-1: Numbers Below the Base

Formula: (Number - Deficiency) / (Square of Deficiency)

📌 Eg-1: Find 96^2

(Base = 100 → 2 Zeros, Deficiency = 100 - 96 = 4)

LHS	RHS (2 DIGITS)
(96 - 4)	4^2
92	16

∴ 96^2 = **9216**

📌 Eg-2: Find 88^2 (Carrying Extra Digit)

(Base = 100, Deficiency = 12)

LHS	RHS (NEED 2 DIGITS)
(88 - 12)	$12^2 = 144$
76	1 / 44 (Carry 1)

LHS = 76 + 1 = 77 | RHS = 44 ➔ ∴ 88^2 = 7744

📌 Eg-3: Find 995^2 (Zero-Padding) (Base = 1000 → 3 Zeros, Deficiency = 5)

LHS	RHS (NEED 3 DIGITS)
(995 - 5) = 990	$5^2 = 25$ → 025 (Pad 0)

∴ 995^2 = **990025**

3. Case-2: Numbers Above the Base

Formula: (Number + Surplus) / (Square of Surplus)

📌 Eg-1: Find 103^2 (Base = 100 → 2 Zeros, Surplus = 3)

LHS	RHS (NEED 2 DIGITS)
(103 + 3) = 106	$3^2 = 9$ → 09 (Pad 0)

∴ 103^2 = **10609**

📌 Eg-2: Find 112^2 (Carrying Extra Digit) (Base = 100, Surplus = 12)

LHS	RHS (NEED 2 DIGITS)
(112 + 12) = 124	$12^2 = 144$ → 1 / 44 (Carry 1)

LHS = 124 + 1 = 125 | RHS = 44 ➔ ∴ 112^2 = **12544**

📌 Eg-3: Find 1013^2 (Base = 1000 → 3 Zeros, Surplus = 13)

LHS	RHS (NEED 3 DIGITS)
(1013 + 13) = 1026	13^2 = 169

∴ 1013^2 = **1026169**

4. Chapter 9 Exercises & Solutions

Find the square of the following numbers:

#	Problem	Base / Diff	LHS Working	RHS Working	Final Answer
1	**94^2**	B=100, D=6	94 - 6 = 88	6^2 = 36	**8836**
2	**97^2**	B=100, D=3	97 - 3 = 94	3^2 = 09 (pad)	**9409**
3	**89^2**	B=100, D=11	89 - 11 = 78 + 1 = 79	11^2 = 1/21 (carry 1)	**7921**
4	**992^2**	B=1000, D=8	992 - 8 = 984	8^2 = 064 (pad 0)	**984064**
5	**104^2**	B=100, S=4	104 + 4 = 108	4^2 = 16	**10816**
6	**113^2**	B=100, S=13	113 + 13 = 126 + 1 = 127	13^2 = 1/69 (carry 1)	**12769**
7	**111^2**	B=100, S=11	111 + 11 = 122 + 1 = 123	11^2 = 1/21 (carry 1)	**12321**
8	**1022^2**	B=1000, S=22	1022 + 22 = 1044	22^2 = 484	**1044484**

💡 Summary Checklist for Base Squaring

1. **Identify Base & Difference:** Check whether the number is below (Deficiency) or above (Surplus) the base.
2. **Calculate LHS:** Subtraction for deficiency ($N - D$), Addition for surplus ($N + S$).
3. **Calculate RHS:** Square the deficiency (D^2) or surplus (S^2).
4. **Adjust RHS Length:** Match digits to zeros in the base (add leading zeros or carry overflow to LHS).