01. Squaring Numbers.

A. Criss cross System

1.23^2

2×3, 2×3

$4 \quad 12 \quad 9$

$5 \quad 2 \quad 9$

B. Formula Method.

(i) $(a+b)^2 = a^2 + 2ab + b^2$.

* This applies to close to 10 (multiples).
  Eg: 10, 100, 1000 etc. or similar.

Eg 1: Find the square of 1009.

$1009^2 \rightarrow (1000+9)^2$.

$(1000+9)^2 = (1000)^2 + 2(1000)(9) + 9^2$

$= 1000000 + 18000 + 81$

$= 1018081$.

Eg 2: Find the square of 511.

$511^2 = (500+11)^2$

$(500+11)^2 = 500^2 + 2(500)(11) + 11^2$.

$= 250000 + 11000 + 121$.

$= 261121$

(ii) $(a-b)^2 = a^2 - 2ab + b^2$.

Eg 1: Find the square of 995

$995^2 = (1000-5)^2$

$(1000-5)^2 = 1000^2 - 2(1000)(5) + 5^2$.

$= 1000000 - 10000 + 25$

$= 990000 + 25$

$= 990025$

Eg 2 : Find the Square of 698.

$$698^2 = (700-2)^2$$

$$(700-2)^2 = 700^2 - 2(700)(2) + 2^2$$

$$= 490000 - 2800 + 4$$

$$= 487200 + 4$$

$$= 487204$$

(iii) $a^2 - b^2 = (a+b)(a-b)$.

$$a^2 = (a+b)(a-b) + b^2$$

* Somewhere between numbers.

Eg 1: Find the Square of 72

$$\Rightarrow 72^2 = (72+b)(72-b) + b^2$$

Now we have -b which is not known.

Apply / Assume 'b' - such that Further multiplication becomes easy

$b = 2$.

$$72^2 = (72+2)(72-2) + 2^2$$

$$= 74 \times 70 + 2^2$$

$$= (70+4) \times 70 + 2^2$$

$$= 4900 + 280 + 4$$

$$= 5184$$

Eg 2 : Find the Square of 53. $b = 3$

$53^2 = (50+3)(50-3) + 3^2$

$= 53$

$53^2 = (53+3)(53-3) + 3^2$

$= 56 \times 50 + 3^2$

$= 2800 + 9$

$= \underline{2809}$

Eg 3 : Find the Square of 67. $b = 3$

$67^2 = (67+3)(67-3) + 3^2$

$= 70 \times 64 + 9$

$= 4480 + 9$

$= \underline{4489}$ Less than 5.

Eg 4 : Find the Square of 107. $b = 7$

$107^2 = (107+7)(107-7) + 7^2$

$= 114 \times 100 + 49$

$= 11400 + 49$

$= \underline{11449}$

Eg 5 : Find the Square of 94. $b = 4$

$94^2 = (94+4)(94-4) + 4^2$

$= 98 \times 90 + 4^2$

$= (90+8) \times 90 + 4^2$

$= 8100 + 720 + 16$

$= 8820 + 16 = \underline{8836}$

$= \underline{8836}$

EXERCISE

PART A

Q 1. Find the squares of the following numbers using criss-cross system.

(1) 42

(2) 33.

(3) 115

PART B

Q 2. Find the squares using the formula $(a+b)^2$.

(1) 205

(2) 2005

(3) 4050.

Q 3. Find the squares using the formula $(a-b)^2$.

(1) 9991

(2) 9800.

(3) 1090.

Q 4. Find the squares using the formula (a^2-b^2).

(1) 82

(2) 49.

(3) 109

(4) 97.

1. Squaring of Numbers. 11, 22, 33 ... 99.

Eg1 : 11^2.

1 1 ^{2} (sq.)

S1: 01 01.

S2: 01 + 01. = 02.

0101
+ 02
.0121

Eg 2: 22^2.

2 2 (sq.)

04 04.
08
0484

Eg 3: 33^2.

09 09.

0909.
018
1089

Eg 4: 44

16 16.
032
1936

Eg 5: 55

2525
050
3025

Eg 6: 66

3636.
072
4356

Eg 7: 77

4949.
098
5929

Eg 8: 88

64 64
128
7744

Eg 9: 99

8181.
162
9801

02. Squaring Decimals

Eg: ① $0.54^2 = 0.54 \times 0.54$.

Square 54^2, put decimal at 4th digit.

$54^2 = 50^2 + 2(50)(4) + 16$

$= 2500 + 400 + 16$

$= 2916$

Ans: 0.2916

Eg ②: $0.72^2 = 0.72 \times 0.72$.

$72^2 = (70+2)^2 = 70^2 + 2 \times 70 \times 2 + 2^2$

$= 4900 + 280 + 4$

$= 0.5184$.

72^2.

$a^2 = (a+b)(a-b) + b^2$

$= (72+2)(72-2) + 4$

$= (74 \times 70) + 4$

$= 5180 + 4$.

$= .5184$

Eg ③: 4.3^2.

43^2 ... $a = 40$, $b = 3$.

$43^2 = (43+3)(43-3) + 3^2$

$= 46 \times 40 + 9$.

$= 1849$.

Eg 4: 7.8^2.

78^2.

$78^2 = (78+8)(78-8) + 8^2$.

$= 86 \times 70 + 64$

$= 6020 + 64$

$= 6084$