

➤ Multiplication of 5, 25, 125

- *Multiplication of 5*

1• *Multiply numerator by 10*

2• *Divide Number by 2*

- $5 \times 18 = 90$

Or

$$18/2 = 9 \times 10 = 90$$

- $36 \times 5 = 180$

Or

$$36/2 = 18 \times 10 = 180$$

- $1364 \times 5 = 6820$

Or

$$1364/2 = 682 \times 10 = 6820$$

- $17 \times 5 = 85$

Or

$$17/2 = 8.5 \times 10 = 85$$

- *Multiplication of 25*

1• *Multiply numerator by 100*

2• *Divide Number by 4*

- $36 \times 25 = 900$

Or

$$36/4 = 9 \times 100 = 900$$

- $120 \times 25 = 3,000$

Or

$$120/4 = 30 \times 100 = 3,000$$

- $1364 \times 25 = 34100$

Or

$$1364/4 = 341 \times 100 = 34,100$$

- *Multiplication of 125*

1. *Multiply numerator by 1000*

2. *Divide Number by 8*

- $36 \times 125 = 4,500$

Or

$$36/8 = 4.5 \times 1000 = 4500$$

- $120 \times 125 = 15,000$

Or

$$120/8 = 15 \times 1000 = 15000$$

- $400 \times 125 = 50,000$

Or

$$400/8 = 50 \times 1000 = 50000$$

➤ Square of a Number

Duplex Method

Find Duplex of single digit, two digit, three digit, 4 digit and so on:-

$$\text{Duplex for } 2 = 2^2 = 4$$

$$\text{Duplex for } 13 = 2 * 1 * 3 = 6$$

$$\text{Duplex for } 245 = 2 * 2 * 5 + 4^2 = 10 + 16 = 26$$

$$D \text{ for } 135 = 2 * 1 * 5 + 3^2 = 10 + 9 = 19$$

$$D \text{ for } 103 = 2 * 1 * 3 + 0^2 = 6 + 0 = 6$$

$$D \text{ for } 1342 = 2 * 1 * 2 + 2 * 3 * 4 = 4 + 24 = 28$$

$$D \text{ for } 23564 = 2 * 2 * 4 + 2 * 3 * 6 + 5^2 = 16 + 36 + 25 = 77$$

Example:-

$$\begin{aligned} 28^2 &= \text{Duplex of } 2 / \text{Duplex of } 28 / \text{Duplex of } 8 \text{ (start from RHS like } 8/28/2) \\ &= 4 / 32 / 64 \end{aligned}$$

= 784 (Start writing from right hand side with 4 and carry 6 to 32, then write 8 and carry 3 to 4, ultimately, you get the answer)

Example:-

$$\begin{aligned} 44^2 &= \text{Duplex of } 4 / \text{Duplex of } 44 / \text{Duplex of } 4 \text{ (start from RHS like } 4/44/4) \\ &= 16 / 32 / 16 \end{aligned}$$

= 1936 (Start write from rhs with 6 and carry 1 to 32, then write 3 and carry 3 to 16 = 19, ultimately, 1936)

Example:-

$$\begin{aligned} 62^2 &= \text{Duplex of } 6 / \text{Duplex of } 62 / \text{Duplex of } 2 \text{ (start from RHS like } 2/62/6) \\ &= 36 / 24 / 4 \end{aligned}$$

= 3844 (Start write from rhs with 4 and then write 4 and carry 2 to 36 = 38, ultimately, 3844 the answer)

Example:-

$207^2 =$ D for 2 / D for 20 / D for 207 / D for 07 / D for 7 (start from RHS)

$$= 4 / 0 / 28 / 0 / 49$$

$= 42849$ (Start writing from right hand side with 9 and carry 4 to 0, then write 8 and carry 2 to 0, and write 2; in last write 4 ultimately, you get the answer)

Example:-

$897^2 =$ D for 8 / D for 89 / D for 897 / D for 97 / D for 7

$$= 64 / 144 / 112 + 81 / 126 / 49$$

$= 804609$ (Start RHS write 9, carry 4 to $126 = 130$, write 0 carry 13 to $193 = 206$, write 6 carry 20 to $89 = 109$, write 9 and carry 20 to $64 = 80$)

➤ Special Cases

- *Square of 51 to 59 (1st Digit Adds to 10)*

$$(5A)^2 = 5^2 / 2 \times 5 \times A / A^2$$

$$= 25 / A * 10 / A^2$$

or

$$= (25 + A) / A^2$$

Example

$$51^2 = (25+1) / 1 = 2601$$

$$52^2 = (25+2) / 4 = 2704$$

$$53^2 = (25+3) / 9 = 2809$$

$$54^2 = (25+4) / 16 = 2916$$

$$55^2 = (25+5) / 25 = 3025$$

$$56^2 = (25+6) / 36 = 3136$$

$$57^2 = (25+7) / 49 = 3249$$

$$58^2 = (25+8) / 64 = 3364$$

$$59^2 = (25+9) / 81 = 3481$$

- *Square of number with unit digit as 5*

$$(A5)^2 = A (A+1) / 5^2$$

$$= A(A+1) / 25$$

Example

$$15^2 = 1 \times 2 / 25 = 225$$

$$25^2 = 2 \times 3 / 25 = 625$$

$$35^2 = 3 \times 4 / 25 = 1225$$

$$45^2 = 4 \times 5 / 25 = 2025$$

$$65^2 = 6 \times 7 / 25 = 4225$$

$$85^2 = 8 \times 9 / 25 = 7225$$


$$105^2 = 10 \times 11 / 25 = 11025$$

$$225^2 = 22 \times 23 / 25 = 50625$$

➤ Product of 2-digit numbers

- Product b/w any two numbers

1. 12×13

a. $\begin{array}{cc} 1 & 2 \\ 1 & 3 \end{array}$  $= 2 \times 3 = 6$

6

b. $\begin{array}{cc} 1 & 2 \\ 1 & 3 \end{array}$  $= 1 \times 3 + 1 \times 2 = 5$

= 5 6

c. $\begin{array}{cc} 1 & 2 \\ 1 & 3 \end{array}$  $= 1 \times 1 = 1$

= 1 5 6

$$2 \cdot 23 \times 46$$

$$\begin{array}{cc} \circ 2 & 3 \\ & \updownarrow \\ 4 & 6 \end{array} \quad = 6 \times 3 = 18$$

$$= {}_1 8$$

$$\begin{array}{cc} \circ 2 & 3 \\ \swarrow & \nearrow \\ 4 & 6 \end{array} \quad = 2 \times 6 + 3 \times 4 = 24 \text{ (carry '1' from previous 18)} = 25$$

$$= {}_2 5 8$$

$$\begin{array}{cc} \circ 2 & 3 \\ \updownarrow & \\ 4 & 6 \end{array} \quad = 2 \times 4 = 8 \text{ (carry 2 from previous 25)} = 10$$

$$= 1058$$

- Product b/w two number whose unit digit sum is 10 (With same 10s place)

$$1 \cdot 53 \cdot 57 = 3,021$$

53 and 57 are complementary numbers as the units places (3 and 7) add to 10 and the

Tens places is same (4 in both no's).

Such numbers can be multiplied in two simple steps:

Step 1: Multiply the units places = $3 \cdot 7 = 21$

Step 2: Multiply the tens place with the next integer = $5 \cdot 6 = 30$

Therefore, $53 \cdot 57 = 3,021$

2. $24 \times 26 = 624$

24 and 26 are complementary numbers as the units places (4 and 6) add to 10 and the

Tens places is same (2 in both no's).

Such numbers can be multiplied in two simple steps:

Step 1: *Multiply the units places = $4 \times 6 = 24$*

Step 2: *Multiply the tens place with the next integer = $2 \times 3 = 6$*

Therefore, $24 \times 26 = 624$

3. $71 \times 79 = 5,609$

71 and 79 are complementary numbers as the units places (1 and 9) add to 10 and the

tens places is same (7 in both no's).

Such numbers can be multiplied in two simple steps:

Step 1: *Multiply the units places = $1 \times 9 = 09$*

Step 2: *Multiply the tens place with the next integer = $7 \times 8 = 56$*

Therefore, $71 \times 79 = 5,609$

➤ Square root

- **The square root of 1849**

Square root of a perfect square can be obtained in 3 simple steps in about 3-5 seconds as follows:

Step 1: Units place of the given number (1849) is 9. Hence the square root ends in 3 or 7.

Step 2: Leave the last two digits of the given number (1849). The remaining part is 18 and the highest perfect square less than 18 is $16 = 4^2$. Hence the tens place of the final answer will be 4. So the two possible answers are 43 and 47.

Step 3: Both the possible answers (43 and 47) fall between 40 and 50. Square of 40 = 1600 and square of 50 = 2500

The given number 1849 is closer to 1600 when compared to 2500. Hence the answer has to be closer to 40. So the correct answer is 43 (closer to 40 when compared to the number 47)

- **What is the square root of 6241?**

Square root of a perfect square can be obtained in 3 simple steps in about 3-5 seconds as follows:

Step 1: Units place of the given number (6241) is 1. Hence the square root ends in 1 or 9.

Step 2: Leave the last two digits of the given number (6241). The remaining part is 62 and the highest perfect square less than 62 is $49 = 7^2$. Hence the tens place of the final answer will be 7. So the two possible answers are 71 and 79.

Step 3: Both the possible answers (71 and 79) fall between 70 and 80. Square of 80 = 6400 and square of 7 = 4900. The given number 6241 is closer to 6400 when compared to 4900. Hence the answer has to be closer to 80. So the correct answer is 79 (closer to 80 when compared to the number 70)