MULTIPLICATION OF 3-DIGIT NUMBERS (100-999):

EXAMPLE 1:

783×654 =?

GIVEN:

N₁ = 783; N₂ = 654

SOLUTION

STEP 1: One’s digit of the product is obtained by multiplying the one’s digits of N₁ and N₂

\[
\text{One’s digit of product} = [\text{One’s digit of } N₁ \times \text{One’s digit of } N₂]
\]

\[
= [3\times4]
\]

\[
= 12
\]

‘1’ is taken as carry to the Step 2 i.e., C₁ = 1

\[
\begin{array}{c}
7 \quad 8 \quad 3 \\
\times \quad 6 \quad 5 \quad 4 \\
\_ \quad \_ \quad \_ \quad 2
\end{array}
\]

STEP 2:

\[
\text{Ten’s digit of product} = [\text{Ten’s digit of } N₁ \times \text{One’s digit of } N₂] +
\]

\[
[\text{One’s digit of } N₁ \times \text{Ten’s digit of } N₂] + C₁
\]

\[
= [8\times4] + [3\times5] + 1
\]
\[
\begin{align*}
32 + 15 + 1 &= 48 \\
\text{‘4’ is taken as the carry to Step 3 i.e., } C_2 &= 4
\end{align*}
\]

\[
\begin{array}{ccc}
7 & 8 & 3 \\
\times & 6 & 5 & 4 \\
\_ & \_ & \_ & 2
\end{array}
\quad
\begin{array}{ccc}
7 & 8 & 3 \\
\times & 6 & 5 & 4 \\
\_ & \_ & \_ & 2
\end{array}
\]

Add the Products of the above 2-steps. At the end of Step 2 we have
\[
\begin{align*}
7 & 8 & 3 \\
\times & 6 & 5 & 4 \\
\_ & \_ & \_ & 8 2
\end{align*}
\]

STEP 3:

To calculate the hundredth digit of the product
\[
\begin{align*}
&= \text{Hundredth digit of } N_1 \times \text{One's digit of } N_2 + \text{[Ten's digit of } N_1 \times \text{Ten's digit of } N_2] \\
&+ \text{[One's digit of } N_1 \times \text{Hundredth digit of } N_2] + C_2 \\
&= [7\times4] + [8\times5] + [3\times6] + 4 \\
&= [28] + [40] + [18] + 4 \\
&= 90
\end{align*}
\]

Here, ‘9’ is taken has carry i.e., \( C_3 = 9 \)
Adding the products of above 3 steps we get

\[
\begin{array}{c}
\text{7 8 3} \\
\times \text{6 5 4} \\
\hline
\text{0 8 2}
\end{array}
\]

STEP 4:

To calculate the thousand digit of the product

\[
= [\text{Hundredth digit of } N_1 \times \text{Ten's digit of } N_2] + [\text{Ten's digit of } N_1 \times \text{Hundredth digit of } N_2] + C_3
\]

\[
= [7 \times 5] + [8 \times 6] + 9
\]

\[
= [35] + [48] + 9
\]

\[
= 92
\]

Here, ‘9’ is taken has carry i.e., \( C_4 = 9 \)
Add the Products of the above 2-steps. At the end of Step 4 we have

\[
\begin{array}{c}
7 & 8 & 3 \\
\times & 6 & 5 & 4 \\
\hline
2 & 0 & 8 & 2
\end{array}
\]

STEP 5:

To calculate the remaining digit of the product

\[
= \text{[Hundredth digit of } N_1 \times \text{Hundredth digit of } N_2] + C_4
\]

\[
= [7 \times 6] + 9
\]

\[
= [42] + 9
\]

\[
= 51
\]

Therefore, 783 × 654 = 512082