Multiplying 2-Digit Numbers

Multiplying a 2-digit number by a 2-digit number is *again* based on distributive property.

Let's look at **25 × 34**. To take 25 times a number we can find 20 times the number and 5 times the number, and then add those two, just like 25 times a carrot would be the same as 20 times a carrot AND 5 times a carrot. So 25 × 34 = 20 × 34 + 5 × 34.

You know how to find 5 × 34 - multiply in columns.

Since 20 is 2 × 10, we find that 20 × 34 can be broken down as 10 × 2 × 34.
You know how to find 2 × 34, and 20 × 34 is just 10 times as much - you just tag a zero to the end of the result!

A simplified method
for finding ***25 × 34:***

First multiply
5 × 34

$$\begin{array}{r} \overset{2}{3}4 \\ \times\ \ 5 \\ \hline 170 \end{array}$$

Then find
20 × 34.

$$\begin{array}{r} 34 \\ \times\ \ 2 \\ \hline 68 \end{array}$$

Then add.

$$\begin{array}{r} 170 \\ +\ 680 \\ \hline 850 \end{array}$$

Since you really need the result
for 20 × 34, you need to add
an extra zero to the answer
- which is therefore 680.

Alternatively you can find **20 × 34** this way:

First put down that extra zero that goes to the end.

$$\begin{array}{r} 34 \\ \times\ 20 \\ \hline 0 \end{array}$$

Then multiply as if you were doing 2 × 34 (go 2 × 4, then 2 × 3).
The digits just get scooted one place because the zero is already there.

$$\begin{array}{r} 34 \\ \times\ 20 \\ \hline 680 \end{array}$$

Another example: **30 × 58**.

First put down that extra zero that goes to the end.

$$\begin{array}{r} 58 \\ \times\ 30 \\ \hline 0 \end{array}$$

Then multiply as if you were doing 3 × 58 (go 3 × 8, carry, then 3 × 5 + 2).

$$\begin{array}{r} \overset{2}{5}8 \\ \times\ 30 \\ \hline 1740 \end{array}$$

Study more examples. Note you have three separate calculations to do.

34 × 16

First do **4 × 16.**	Then do **30 × 16**. Don't forget the extra zero.	Then add.
$\begin{array}{r} {\scriptstyle 2} \\ 16 \\ \times\ 4 \\ \hline 64 \end{array}$	$\begin{array}{r} {\scriptstyle 1\ 2} \\ 16 \\ \times\ 30 \\ \hline 480 \end{array}$	$\begin{array}{r} 64 \\ +\ 480 \\ \hline 544 \end{array}$

29 × 35

First do **9 × 35**	Then do **20 × 35**. Remember the extra zero.	Then add.
$\begin{array}{r} {\scriptstyle 4} \\ 35 \\ \times\ 9 \\ \hline 315 \end{array}$	$\begin{array}{r} {\scriptstyle 1} \\ 35 \\ \times\ 20 \\ \hline 700 \end{array}$	$\begin{array}{r} 315 \\ +\ 700 \\ \hline 1015 \end{array}$

The traditional form of the algorithm

The way presented above takes three separate calculations on paper. In the usual, traditional way all three calculations appear together.

67 × 54

$\begin{array}{r} {\scriptstyle 2} \\ 54 \\ \times\ 67 \\ \hline 378 \end{array}$	$\begin{array}{r} {\scriptstyle 3\ \cancel{2}} \\ 54 \\ \times\ 67 \\ \hline 378 \\ 3240 \end{array}$	$\begin{array}{r} 54 \\ \times\ 67 \\ \hline 378 \\ +\ 3240 \\ \hline 3618 \end{array}$
First multiply **7 × 54**. (Pretend the 6 of the 67 is not there.)	Then multiply **60 × 54** - but put the result digits on the line underneath the 378. Place the extra zero at the end. Then multiply by 6 (pretending the 7 is not there).	Then add.

Study these examples, too. Note the extra zero placed at the end of the second line!

First do **5 × 34**	Then do **20 × 34**.	Then add.
$\begin{array}{r} {\scriptstyle 2} \\ 34 \\ \times\ 25 \\ \hline 170 \end{array}$	$\begin{array}{r} 34 \\ \times\ 25 \\ \hline 170 \\ 680 \end{array}$	$\begin{array}{r} 34 \\ \times\ 25 \\ \hline 170 \\ +\ 680 \\ \hline 850 \end{array}$

First do **4 × 63.**	Then do **90 × 63**.	Then add.
$\begin{array}{r} {\scriptstyle 1} \\ 63 \\ \times\ 94 \\ \hline 252 \end{array}$	$\begin{array}{r} {\scriptstyle 2} \\ 63 \\ \times\ 94 \\ \hline 252 \\ 5670 \end{array}$	$\begin{array}{r} 63 \\ \times\ 94 \\ \hline 252 \\ +\ 5670 \\ \hline 5922 \end{array}$