

Multiply a 3-Digit Number by 11

Overview: If you liked multiplying two-digit numbers by 11, chances are you're curious about what to do with a three-digit number, like 213. It's only one more step to figuring out the answer, making this trick equally as impressive as the two-digit version.

Materials

- Pencil
- Paper

Activity

If you haven't yet tried multiplying 11 by a two-digit number, stop and do that now. This lesson is a whole lot easier if you are already comfortable doing the two-digit multiplication of 11. Let's try a three-digit multiplication of 11.

What is 11×213 ?

Before we start, how many digits do you expect your answer to have? If you pretend the 11 is a 10 and multiply the 213 by 10, we get a four-digit number. That tells us that our answer must have four digits.

Your first task is to space the first and last digits apart, this time with two spaces between them like this: $2 \square\square 3$

Now we tackle this problem the same way we did the two-digit multiplication of 11's. The digit for the right box is found by adding the tens and ones together: $1 + 3 = 4$. Now we have: $2 \square 4 3$

The digit for the left box is found by adding the hundreds and the tens together: $2 + 1 = 3$.

We get: $11 \times 213 = \underline{2,343}$

Let's try another! Can you figure out $11 \times 124 = ?$

First, spread apart the first and last digit, and add your two boxes like this: $1 \square\square 4$

The digit for the right box is found by adding the tens and ones digits together: $2 + 4 = 6$ which makes it: $1 \square 6 4$

You can figure out the digit for the left box by adding the digits from the hundreds and the tens together like this: $1 + 2 = 3$.

Now we get the final answer of: $11 \times 124 = \underline{1364}$

Do you think you can figure out 11×444 without writing anything down? Try it now before turning the page.

If we were doing this on paper, first we'd write out $4\boxed{}\boxed{}4$

The right box's digit is found by adding the tens and ones digits together: $4 + 4 = 8$ to make $4\boxed{}84$

The digit in the left box is found by adding the hundreds and tens together: $4 + 4 = 8$

Did you get $11 \times 444 = \underline{4884}$? Great!

Let's try a slightly harder one: $11 \times 456 = ?$

First, write the first and last digit out like this: $4\boxed{}\boxed{}6$

The digit in the right box is found by adding the tens and ones digits together, which is: $5 + 6 = 11$. But oh, no! We can't put two digits in a box, remember? So what can we do?

Simple! Place the ones digit (1) in the box and carry the tens digit (which also happens to be a 1) one place up, like this: $4\boxed{}16$

The left box's digit is found by adding not only the hundreds and tens together, but also that carried over 1 to get: $4 + 5 + 1 = 10$. Uh-oh! Another two-digit answer.

So we have to carry the 1 one spot to the left and leave the zero in the left box. Adding the 1 to the hundreds digit gives $4 + 1 = 5$, so your final answer is:

Therefore, $11 \times 456 = \underline{5,016}$ (Whew!)

Now let's figure this one out: $11 \times 789 = ?$

First write $7\boxed{}\boxed{}9$

The digit for the right box is found by adding $8 + 9 = 17$. Place the 7 in the right box and carry 1 to the left box. Just put a little tick mark above the box so you can remember it's there.

The left box's digit is found by adding $7 + 8 + 1$ (carried forward) = 16. Put the 6 in the left box.

Add the 1 to the 7 to get 8.

Final answer: $11 \times 789 = \underline{8,679}$ *Ta-daa!*

Of course, once the word gets out that you are an absolute genius when it comes to multiplying three-digit numbers by 11, some big kid is going to challenge you with this one, so why not do it now?

See if you can figure out 11×999 before turning the page...

Did you get 10,989?

Here are the steps in case you need them:

First write (or think): $9\boxed{}\boxed{}9$

Now the digit for the right box is found by adding the ones and tens digits together: $9 + 9 = 18$. Write the 8 in the right box and carry the one 1 to the left box: $9\boxed{}89$

The digit for the left box is found by adding together the hundreds and tens together (which happens to all be the same number in this problem, but try to keep it straight): $9 + 9 = 18 + 1$ (carried forward) = 19. Write 9 in the left box.

The 1 is carried over to the leftmost digit (in the thousands place) and added to the 9 to get 10.

$11 \times 999 = 10,989!$

Now it's your turn! Work out the exercises below. (You'll find answers at the back of this book.)

Exercises

1. 11×163
2. 11×235
3. 11×345
4. 11×479
5. 11×659
6. 11×748
7. 11×997
8. 11×982
9. 11×873
10. 11×769

Answers to Exercises: Multiply 3 digit number by 11

1. 1793
2. 2585
3. 3795
4. 5269
5. 7249
6. 8228
7. 10967
8. 10802
9. 9603
10. 8459