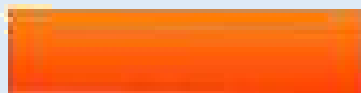
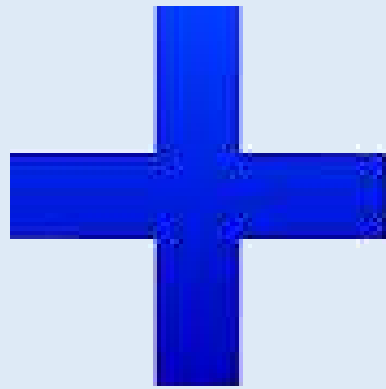


FIVE EASY
“TOP SECRET”
MATH TRICKS



INTRODUCTION

Each school year, my students are amazed at how easily I seem to do mental arithmetic. Mind you, I'm not squaring five digit numbers in my head like the great Dr. Art Benjamin! I'm just doing a few simple secrets.

Well. They're not really secrets. In fact, I don't know where I picked up these easy tricks, though I'm sure my high school teachers and college professors played a role.

CAVEATS...

These math tricks assume that you have mastered the basic arithmetic of whole numbers (\times , \div , $+$, $-$) from 3rd and 4th grade. Lack of automaticity in these foundation skills tends to make math tricks a moot practice. And if you need a calculator to execute the trick, you should just use the calculator to do the actual computation.

Without further ado...

I have included the five easiest secrets. Why these five? Two reasons. First, these are calculations that occur frequently, not just in math classes, but in everyday life. Second, they require the lowest level of computational proficiency to implement. Some are easier than others, but with practice, you'll be using them all with efficiency in dispatch!

1. Sum of the first n integers

EXAMPLE: What is the sum of the first ten consecutive counting numbers?

ANSWER: $1 + 2 + 3 + 4 + \dots + 9 + 10 = 55$.

How it's done!

STEP 1: Add the first and last number.

$$1 + 10 = 11$$

STEP 2: Determine how many sum pairs there are by dividing the highest number by two.

In the example, there are 5 pairs of numbers, because $10 \div 2 = 5$. So there are 5 pairs of numbers, and each pair adds up to 11. So, $5 \times 11 = 55$

Now you try!

PRACTICE: What is the sum of the first 20 consecutive counting numbers?

ANSWER: Did you get 210?

2. How to square a number that ends in 5

EXAMPLE: What is 35^2 ?

ANSWER: 1225

How it's done!

STEP 1: Multiple the first digit times itself plus 1.

$3 \times (3 + 1)$ or 3×4 is 12.

STEP 2: The answer will always end in 25.

1225

Now you try!

PRACTICE: What is 55^2 ?

ANSWER: Did you get 3025?

3. How to multiply by 11

EXAMPLE: What is 16×11 ?

ANSWER: 176

How it's done!

STEP 1: We will list the digits of the answer from right to left. Start by listing the rightmost digit, **6** of the 16.

6

STEP 2: Add the digit just listed, the **6**, with the digit to its left.

76, $1 + 6 = 7$

STEP 3: List the final digit, the 1.

176

Now you try!

PRACTICE: What is 42×11 ?

ANSWER: Did you get 462?

ADVANCED

When you multiply 11 by a number whose adjacent digits add up to more than 10, you must carry.

EXAMPLE: What is 39×11 ?

- | | |
|--|-----|
| 1. List the 9. | 9 |
| 2. Add $9 + 3$. List the 2; carry the 1. | 29 |
| 3. Before listing the 3, add the 1 to it that you carried. | 429 |

4. How to multiple numbers 1 through 10 by 9

EXAMPLE: What is 8×9 ?

ANSWER: 72

How it's done!

STEP 1: The answer will always be a two-digit number.

STEP 2: The first number, the 7, is one less than the multiplier of 8.

7

STEP 3: The second number is the one that makes the sum of the digits equal 9! $7 + 2 = 9$

72

Now you try!

PRACTICE: What is 6×9 ?

ANSWER: Did you get 54? (5 is one less than 6, and $5 + 4 = 9$)

5. How to multiply two-digit numbers when the first digits are the same and the sum of the second two is 10

EXAMPLE: What is 41×49 ?

ANSWER: 2009

How it's done!

STEP 1: Verify that both numbers have the same first digit, 4, and that the second digits add up to 10.

$$9 + 1 = 10$$

STEP 2: Multiply the first digit by itself plus 1.

$$4 \times (4 + 1) = 4 \times 5 = \mathbf{20}.$$

STEP 3: Multiply the last two digits. Write as a two digit answer.

$$1 \times 9 = \mathbf{09}$$

STEP 4: Write the two numbers.

2009

Now you try!

PRACTICE: What is 58×52 ?

ANSWER: Did you get 3016?

BONUS: How to multiply up to 19×19

EXAMPLE: What is 15×12 ?

ANSWER: 180

How it's done!

STEP 1: Add the one's place digit from the smaller number to the larger number.

$$15 + 2 = 17$$

STEP 2: Add a zero on the end.

$$170$$

STEP 3: Multiply the one's place digits of the two numbers.

$$5 \times 2 = 10$$

STEP 4: Add the result of **STEP 3** to the result from **STEP 2**.

$$170 + 10 = 180!$$