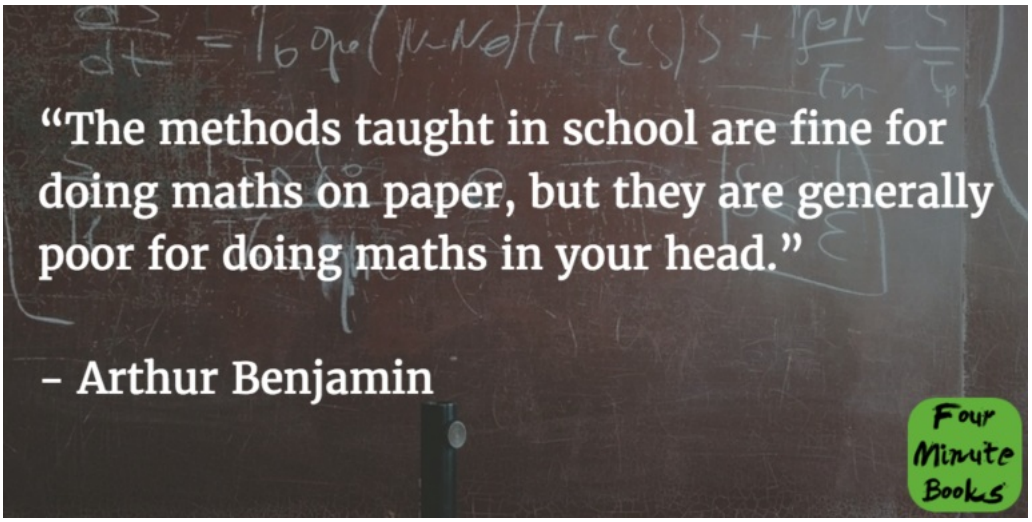
The Magic Of Math Summary

1-Sentence-Summary: *The Magic of Math shows you not only the power, but also the beauty of mathematics, unlike you've ever seen it in school and with practical, real-world applications.*

Read in: 4 minutes

Favorite quote from the author:



Did you enjoy math in school? Or hate it? I did both. Anything with numbers, I used to be pretty good at. But as soon as geometry entered the picture, I was out. I hated drawing circles and triangles. In my senior year in high school, my math grades jumped wildly up and down between the extremes. I'd get 15 points on one test (the maximum in Germany, equal to an A+) and 4 on the next (equal to a D-).

In retrospect, I should've aced all of those classes, because the real treatment began in college. Imaginary numbers, Fourier transformations, polar coordinates and a bunch of other topics I can't for the life of me explain how I passed the tests in.

Nowadays, most younger people I meet can barely make a rough estimate of their grocery bill before they go to the cashier, let alone quickly multiply numbers in their head – and that scares me. It also makes me sad, because in reality, math isn't so bad – especially the math that's useful in real life!

Arthur Benjamin is here to help change that. His written this book to help re-ignite a love and admiration for math.

Here are 3 lessons to show you *The Magic of Math*:

1. Spotting numerical patterns is great mental training and can make your life a lot easier.
2. Use magic math tricks to impress your friends and practice mental math.

3. The beauty of math is that unlike any other science, things can be proven with absolute certainty.

Ready to become a mathemagician? Let's crunch the numbers!

Lesson 1: Try to spot numerical patterns to make your life easier and train your brain.

When Arthur was little he loved playing around with numbers. One day, when he tried to see which of the pairs of numbers that, when added together, equal 20, would give him the biggest number when multiplied, he noticed something.

Of course if you do this exercise and go through the pairs, like:

7 * 13 = 91

8 * 12 = 96

9 * 11 = 99

10 * 10 = 100

you'll quickly see that 10 * 10 gives you the biggest result. But if you go back through those numbers and measure the distance of each to 100, something interesting emerges. For 100, the difference is 0, for 99 it's 1, for 96 it's 4 and for 91 it's 9.

Put these in order: 0,1,4,9. Notice anything? These are the first few square numbers!

$0^2 = 0$

$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

and so on. Once Arthur spotted this pattern, calculating any square number became a lot easier. For example, instead of trying to calculate 13 * 13 in your head, you can instead switch it to 10*16, which gives you an easy 160. Now all you have to do is add the square number of the difference to the original number. Both 10 and 16 are 3 away from 13, so if you add $3^2 = 9$ to 160 you get the result: 169!

So 13 * 13 = 16 * 10 + 3^2 = 160 + 9 = 169. Neat, huh? Even better, this works for *all* square numbers.

Finding mathematical patterns will make your whole life a lot easier, so try to practice it whenever you get a chance.

Lesson 2: You can use mathemagics to impress your friends and practice mental math.

This might only work among your slightly nerdier friends, but it's also a great way to practice mental math. Have someone go through these five steps:

1. Think of two numbers from 1 to 10.
2. Add those together.
3. Multiply by 10.
4. Add the larger number of the two.
5. Subtract the smaller number of the two.
6. Have them tell you the result.

Here's how you can shock them by instantly telling them what their numbers were. Let's say your friend's number was 117.

1. Take the last digit of the number and add it to the preceding number. In this case it's 7 + 11 = 18.
2. Divide by 2 to get the larger number. Here it's 18 / 2 = 9.
3. Subtract the last digit of their answer to get the smaller number. Here, it comes out to 9 – 7 = 2.

Not sure if this works? Let's run through the five steps again to see if these numbers hold up!

1. The numbers are 2 and 9.
2. 2 + 9 = 11.
3. 11 * 10 = 110.
4. 110 + 9 = 119.
5. 119 – 2 = 117.

Boom! Pretty cool trick, huh? Sure, it's nothing more than a fun gimmick, but **doing math tricks like these on the regular will help you practice your mental math and add, multiply, divide, and subtract numbers a lot faster in your head** – something that'll come in handy when the cashier somehow screws up your grocery bill!

Lesson 3: Unlike any other science, theories in math can be proven with absolute certainty.

The reason math fascinates so many scientists is that **it's the only science where you can prove theories to be 100% true**. Doing so by setting up a series of equations is called a *proof*.

I remember doing those in college and thinking they were really tough, but mostly these just take an equation we know to be correct for some numbers and run through it with arbitrary variables to show it's still true if you put in *any* other number.

For example, you know that adding two even numbers will always result in another even number. But is that true for all even numbers?

If we define two random, even numbers *m* and *n*, we now have to try and prove that *m* + *n* is an even number too. All even numbers are multiples of 2, so we can say that *m = 2*k*, where k can be any integer (that is, a positive, whole number, like 13, 437, or 4). In the same way, *n* can be a multiple of another integer, so *n = 2*j.*

Substituting these in our *m* + *n* equation we get *m + n = 2*k + 2*j = 2*(k + j)*. But the sum of two integers is also an integer, and if all we do with the integer *(k + j)* is multiply it by 2, then it naturally becomes an even number and therefore, our proof is true for all integers!

Coming up with a proof is hard, but it saves years of effort by allowing scientists to be certain without having to do endless calculations, and that's what makes math a unique science. Kinda magical, isn't it?

The Magic of Math Review

I wish they'd used *The Magic of Math* in school, instead of all the boring textbooks that made kids run in fear as soon as the words algebra, Pythagoras or calculus fell. I highly recommend you take a look at this book and oh, watch Arthur's TED talk, it's hilarious!

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What else can you learn from the blinks?

- Why the number 9 is magic in many ways
- How one mathematician discovered an astounding series of numbers by thinking of immortal rabbits
- Why induction is the highest art of a mathematician
- What makes the number pi so mysterious
- How you can calculate the square root of -1
- Why math gets ever stranger as it approaches infinity

Who would I recommend The Magic Of Math summary to?

The 13 year old, who thinks math sucks, the 29 year old young professional, who's not as fast in mental math as she needs to be for her job, and anyone who likes magic.