

MATH TRICKS TO MAKE YOUR LIFE EASIER

The worst part of going out to dinner with a group of friends is figuring out who owes what at the end of the night. All too often, once everyone's chipped in, there's either not enough money on the table, or way too much.

When trying to plan for retirement, or figure out whether to make an investment, one helpful thing to know is how long it will take to double your initial capital.

And when you're considering taking a new job with an annual salary, it might be useful to know how that salary compares with what you'd earn at a job with an hourly pay rate.

Some handy math tricks can help you figure out each of these situations quickly – and without having to resort to pulling out the calculator on your phone. We've assembled seven such tricks and talk a little about how they all work.

CONVERTING YOUR SALARY TO AN HOURLY FIGURE

The Trick: Take your salary, drop the last three zeros, and then divide by two.

Example: So if you earn \$40,000, you're left with \$20 an hour.

Maybe you're a salaried employee trying to figure out whether you should take that job that pays by the hour. This trick would certainly help.

This comes from making a couple of assumptions about your working hours and some quick observations about time. There are 52 weeks in a year, and so if you're working a 40 hour week for 50 of those weeks, you'll be working $40 \times 50 = 2,000$ hours in a year. Take your annual salary and divide by those 2,000 hours (equivalently, drop the last three zeros and divide by two), and voila, you get your hourly rate.

FIGURING OUT SALES TAX AND TIPS

The Trick: Assuming an approximately 9% sales tax, as in New York, if you take your pre-tax part of the bill, divide by four, and add this amount to the pre-tax part, you'll be leaving about a 16% tip. If you're feeling more generous, divide by three and add that amount instead, leaving about a 24% tip.

Example: Say your part of the pre-tax bill comes to \$18. If you want to leave a 16% tip, divide \$18 by four to get \$4.50. Add that to your \$18 pre-tax cost, and leave a total of \$22.50. If you want to leave a larger tip, divide \$18 by three to get \$6, and combine that with the pre-tax cost to leave a total of \$24.

Here's why this works: Dividing the pre-tax bill by four is the same as taking 25% of that amount. That's enough money to cover the 9% sales tax, with 16% leftover for the tip, because $25 - 9 = 16$. Similarly, dividing by three gives about 33% of the

pre-tax bill, covering the 9% sales tax and a 24% tip, because $33 - 9 = 24$.

Another trick is moving the decimal point one place to the left and multiplying by two to find 20% of the bill.

So, if the bill is \$18, the moving the decimal points gets you \$1.80. And multiplying it by two gets you \$3.60.

HOW LONG IT'LL TAKE TO DOUBLE YOUR INVESTMENT

The Rule of 72: Need an easy way to determine how long it will take to double your investment? Simply divide the number 72 by your projected growth rate.

Example: So, if you're getting a return of 9% per year, it will take about eight years for your investment to double in size, because $72/9 = 8$.

The rule of 72 comes from manipulating the basic mathematical formula for calculating compound interest. The exact number you need to divide your growth rate by is actually closer to 69, but 70 or 72 are frequently used for quick mental estimates, because most common single-digit rates of return will divide evenly into one of these.

HOW LONG IT'LL TAKE TO TRIPLE YOUR INVESTMENT

The Rule of 115: If you're more inclined to triple your investment, because you're not as risk averse (or perhaps your time horizon is just a tad bit further out), simply divide 115 or 110 by your growth rate. This will give you the amount of time it will take to triple your investment.

Example: So, if you're getting a return of 10% per year, it will take about 11 1/2 years for your investment to triple in size.

This works for basically the same reason the Rule of 72 works, except that we're aiming to triple rather than double our initial investment.

SQUARING NUMBERS IN YOUR HEAD

The Trick: Say you have a number, x , that you want to square.

First, find the difference between x and the nearest multiple of 10, and call that difference d .

Then, multiply $(x-d)$ and $(x+d)$. This should be much easier, because one of the numbers will be a multiple of 10 (based on how we defined d). After multiplying $(x-d)$ and $(x+d)$, just add d^2 , and you have your square.

Example: Say you want to find the square of 77. The closest multiple of 10 is 80, so d will be $80 - 77 = 3$. Then $77 + 3 = 80$, and $77 - 3 = 74$.

Multiplying these together is pretty straightforward: $74 \times 80 = 70 \times 80 + 4 \times 80 = 5,600 + 320 = 5920$. Add in the $3 \times 2 = 9$, and we get 5929 as our square of 77.

Once you get the hang of this method, it's a good bit quicker and easier than trying to attack 77 2 head on.

MULTIPLYING BY 11

The Trick: When multiplying a figure by 11, follow this pattern: leave the last and first digits alone, then sum each and every pair of digits next to each other (this makes the most sense when seen in example):

Examples: $4,281 \times 11$ becomes the following digits: (4)(4+2),(2+8)(8+1)(1) or 47,091.

When the sum of a pair is greater than 10, carry that digit to the next left pair (as seen above, where 2+8 was 10).

Let's try something harder. $9,621,576,521 \times 11$ becomes:

(9)(9+6),(6+2)(2+1)(1+5),(5+7)(7+6)(6+5),(5+2)(2+1)(1) or 105,837,341,731.

This is a neat trick of our base 10 place value system. Because $11 = 10 + 1$, multiplying a number by 11 is the same as multiplying that number by 10 and then adding it back to itself. Multiplying a number by 10 means we shift all our digits one place over to the left and stick a zero on the end, so when we add this to the original number, we get exactly the pairing up of digits that we saw.

ASSET ALLOCATION BY AGE

This one really isn't a math trick, so much as it is a rule of thumb...

The Trick: Don't have a financial planner to walk you through asset allocation? A simple way to find out is to subtract your age from the number 120; the number remaining is the percentage of your portfolio that should be in stocks.

Example: For instance, if you're 50, you should be keeping 70% of your holdings in stocks with the remaining 30 percent in fixed income products.

The basic idea here is that younger investors who have decades of working ahead of them can take on more risk than people closer to retirement.