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Here's Why The 'Rule Of 72' Is Such A Great Math Hack

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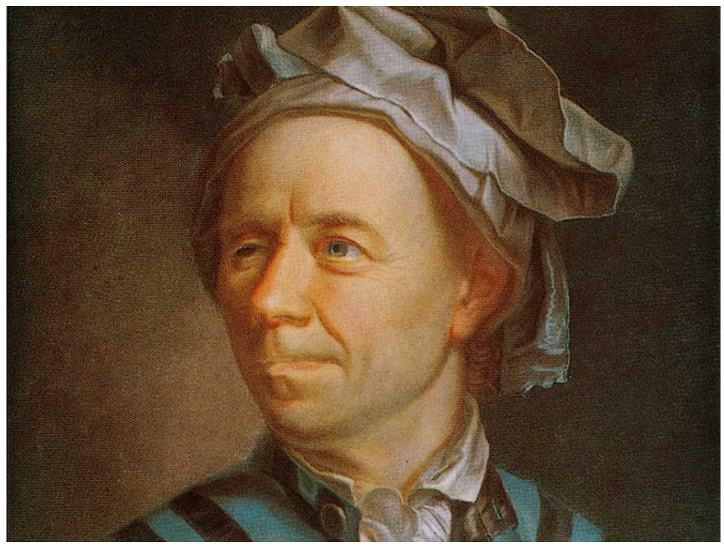
We recently posted a list of handy math tricks, and among them is a quick way to estimate how long it will take to double an investment with a given rate of return.



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Leonhard Euler.

That trick is the rule of 72: Take your interest rate, and divide it into 72.

For example: If you expect a 6% average annual return, the doubling time will be 72/6 = 12 years.

That's much easier than trying to reverse engineer some complicated compound interest formula.

Why It Works

The reason this works comes from the basic formula for the future value of an investment receiving compound interest continuously.

If you have an initial investment principal of P, and an annual interest rate r, then after t years your investment will have a value of Pe^{rt}, where e is Euler's number, an irrational number that shows up all over the place in mathematics.

We're interested in figuring out how long it will take for an investment to double with a given interest rate, so we want to know how long it will take for our investment to grow from P to $2P$. In other words, we want to solve the equation $2P = Pe^{rt}$ for the time t.

First, assuming our principal P is not zero, we can cancel out the Ps on both sides of the equation, giving us $2 = e^{rt}$.

Now, we have to get rid of the exponential function on the right hand side. Fortunately, the natural logarithm function, usually written as "ln," can do this for us by definition: Logarithms are the inverses of exponential functions, and the natural logarithm "undoes" an exponential function with a base of e. This gives us $\ln(2) = \ln(e^{rt}) = rt$.

Because we're solving for time, we can divide both sides of the equation by our interest rate r, which gives us our result of $t = \ln(2)/r$.

ln(2) is an irrational number, but if we plug this into a calculator, we get ln(2) = 0.693147... which we can round off and say that ln(2) is about 0.69.

Because interest is usually given as a percent rate, multiplying 0.69 by 100 gives us 69, and so for a percent interest rate r, our doubling time should be about $69/r$.

Sixty-nine, however, is not a particularly convenient number. The only numbers that evenly divide into 69 are 1, 3, and 23, so if we have an interest rate other than 1%, 3%, or 23%, that division gets awkward.

Instead, because we're just coming up with a quick mental estimate, we can use either 70 or 72, and we can evenly divide any whole number rate up to 10% into one or the other of those and get a pretty close estimate of our doubling time.

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