

# Some Math All Investors Should Know



I have listed 6 numbers or math concepts, knowledge of which will make you a better investor.

## The Rule of 72

Einstein called compound interest “the eighth wonder of the world”. A simple way to estimate how long it will take an amount being compounded to double is the “Rule of 72”: divide the interest rate into 72. Money compounded at 4% annually will double in 18 years. If compounded at 9%, it will double in 8 years. If compounded at 16%, it will double in  $4\frac{1}{2}$  years (It’s OK to day dream once and a while).

## The Pareto Principle: The 80:20 Rule

In 1896, Italian economist Vilfredo Pareto noted that 80% of the land in Italy was owned by 20% of the population. It is an axiom of business that 80% of the sales come from 20% of the customers.<sup>1</sup> When physicians had more control, 80% of your referrals would come from 20% of the referring physicians. Many natural phenomena have been shown empirically to follow such a distribution.

## Fibonacci Numbers

Although found in earlier Indian literature, the Fibonacci numbers are named after the Italian mathematician Leonardo of Pisa, later known as Fibonacci. It was initially used to calculate the growth of rabbit populations. Each number is the sum of the preceding two numbers, starting with 0 and 1.

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, . . .

The Fibonacci sequence has been shown to have many other applications in nature, such as the branching of a tree, the flowering of an artichoke, and the arrangement of a pine cone. It also has many further applications in mathematics, economics, and computer science.

## The Luhn Algorithm

Have you ever wondered why the machine knows instantly if your credit card number is legitimate?

The Luhn Algorithm is a “modulus 10” algorithm named after IBM scientist Hans Peter Luhn. It is a checksum formula used to validate a variety of identification numbers, such as credit cards and many government ID numbers. The formula verifies a number against its included check

digit, which is usually appended to a partial account number to generate the full number.

Any further discussion is far beyond my abilities. If interested, see Wikipedia.

## A 40% Chance

First of all, I am not talking about when probabilities do predict a 40% chance. In Texas Hold’em, the two hole cards are dealt face-down to the player, the 5 community cards are dealt face-up; 3 together as the flop, the next card is the turn, and the last card is the river (The colorful names add to the magnetism of the game). If a player’s hole cards are both of the same suit, say spades, and 2 of the 3 cards on the flop are spades, there is a cumulative 40% chance they will complete their flush, 5 cards in the same suit, a powerful hand.  $9/47 = 0.191$  chance of a spade on the turn, and  $9/46 = 0.196$  chance of a spade on the river. Total  $0.191 + 0.196 = 39.6\%$  chance.

What I am talking about is the forecaster who is trying to make a bold call without being too bold.<sup>2</sup> If they get it right, the can (will) crow. If they get it wrong, they will claim it wasn’t likely, just a strong possibility. You should beware of the advice of such self-proclaimed pundits in the future.

## Pascal’s Wager

In the 17th century, Blaise Pascal argued that a rational person should live as though God exists and believe in God. If God does not exist, such a person will have only a finite loss, such as some pleasure, whereas the gains can be infinite by an eternity in Heaven, and avoid the infinite losses of an eternity in Hell.

Pascal’s Wager is an example of making decisions under uncertainty. It is also a cautionary reminder to avoid situations where the potential for loss could be large or even never-ending, such as being a general partner, where you are potentially on the hook for everything.

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1. Koch RJ. *The 80/20 Principle*. Doubleday; 1998.
2. How pundits never get it wrong: call a 40% chance. *Wall Street J.* 2/28/2018.