

# Timeline of Mathematical & Technological Innovations in Finance



## Abacus

One of the oldest methods of calculation first seen during the Mesopotamian Era.



## Double-entry Bookkeeping

Franciscan Friar Luca Pacioli published a detailed description of the system to track debits and credits.

$$x = \text{Log}[y]$$

## Logarithms

Developed by John Napier, it was a function to analyze beyond algebraic methods.



## Probability

It is attributed to Cardano, de Fermat, and Pascal. It is the study of possible outcomes by problem points.



## Statistics

The origin of statistics is attributed to a publication by John Graunt. Originally used to analyze demographic and economic data.

$$\frac{dy}{dt} = f(y,t) \quad \frac{df(x)}{dx}$$

## Calculus

The term was traditionally referred to all mathematics. Sir Isaac Newton and Gottfried Wilhelm Leibniz are attributed to the foundation of calculus.



## Telegraph

It used static electricity for transmitting messages for long distance communication.



## Telephone

This invention was the first successful bi-directional transmission of clear speech by Alexander Graham Bell and Thomas Watson.



## ENIAC

First general purpose computer called Electronic Numerical Integrator And Computer.



## Computational Finance

It began after Harry Markowitz created the Modern Portfolio Theory. Many other financial quanta



## World Wide Web

Developed by Tim Berners-Lee, it was used to meet the demand of automatic information-sharing between university scientist and institutes around the world.

1642

## Pascaline

Originally called the "Arithmetic Machine" it was created by Blaise Pascal. He created this for his father who was a tax collector.

1967

## Pocketronic

The world's first handheld calculator was created by Texas Instruments and its output device was a paper tape.

1981

## Financial Calculator

The financial calculator is still used by finance students and financial analysts.

1880

## Accounting

It is still used in accounting for invoicing, personal finance for investments and banking, and businesses for daily sales.

1924

## Probability Theory

Logarithms are still used in probability theory and statistics making it an integral part of estimating financial risk.

Probability is used in risk assessment and in trade on financial markets.

It is currently used for data analysis and prediction in machine learning, data mining, and computing for financial algorithms.

1671

## Differential Equations

Sir Isaac Newton used derivatives to model the behavior of movement.

It used in finance to model the behavior of complex systems.

1676

## Derivatives

Sir Isaac Newton described it as the ultimate ratio of change.

Financial analysts use this to predict future trends in the stock market.

1926

## Stockticker

In finance, it was used for the stock market and eventually led to the stockticker for the stock market.

1973

## Mobile Phone

Currently used for wireless and mobile banking, investment transactions and monitoring for finances.

1981

## IBM Personal Computer

It was the standard computer which led to the computers of the 21st century. It was the most widely used for finance and business.

1952

## Modern Portfolio Theory

Created by Harry Markowitz for assessing risk and reward of a portfolio's assets in order to maximize expected return.

1961

## Capital Asset Pricing Model

Created by several individuals, and based upon Markowitz's Modern Portfolio Theory, to determine required rate of return of an asset.

1973

## Black-Scholes Model

It provided theoretical estimates of pricing European-style options.

1999

## High-frequency Trading

The SEC authorized high-frequency trading which allowed trades to take place within seconds of being submitted.

Sources: Wikipedia, Economic History Association, and respective platforms