

Calculation

In 1614 the Scottish laird **John Napier** introduced a form of natural logarithms as an aid to mathematical calculation, being designed to replace lengthy calculations involving multiplications and divisions by easier ones using additions and subtractions. Being awkward to use, they were soon supplanted by Henry Briggs's simpler logarithms to base 10, whose use proved an enormous boon to astronomers and navigators. The equation $e^{\ln N} = N$, featured on the Nicaraguan stamp, appeared much later, and information about it appeared on the back of the stamp.

Later, the Slovenian mathematician and physicist **Jurij Vega** published a celebrated compendium of logarithms, as

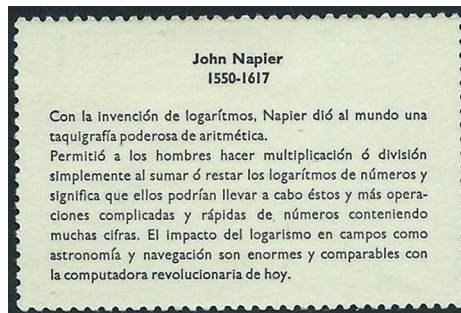
well as 7-figure and 10-figure logarithm tables that ran to several hundred editions. He also calculated π to 140 decimal places.

The invention of logarithms quickly led to the development of instruments based on a logarithmic scale. Most notable among these was the **slide rule**, versions of which first appeared around 1630 and which was widely used for more than 300 years until the advent of the pocket calculator.

The first mechanical calculating machines appeared in the 17th century. In 1623 an early machine was described by **William Schickard** in letters to Johannes Kepler. Later calculating machines were constructed by Blaise Pascal and Gottfried Wilhelm Leibniz. Pascal's machine (the **Pascaline**) was operated by cogged wheels and could add and subtract numbers, whereas Leibniz's calculating machine could also multiply and divide. Neither machine worked efficiently in practice.



“Napier’s law”



Back of Napier stamp



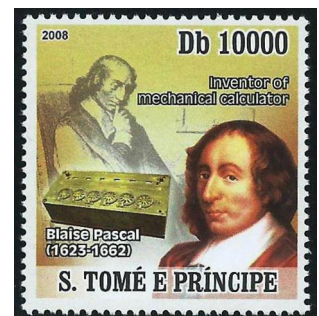
Jurij Vega



Slide rule



Schickard's machine



Pascaline

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