Mathemtaics in the Scientific Milieu

M.S. Raghunathan
madabusi@gmail.com

Centre for Excellence in Basic Sciences

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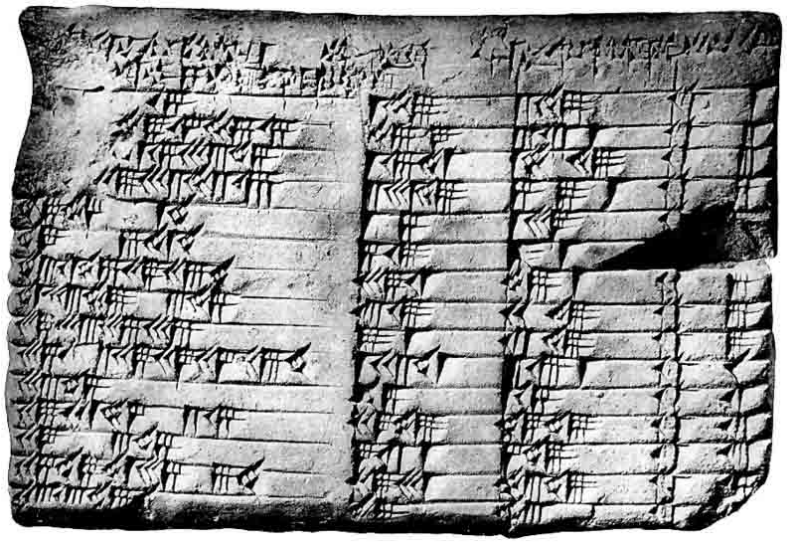
1. Pythagorean triplets from Babylon



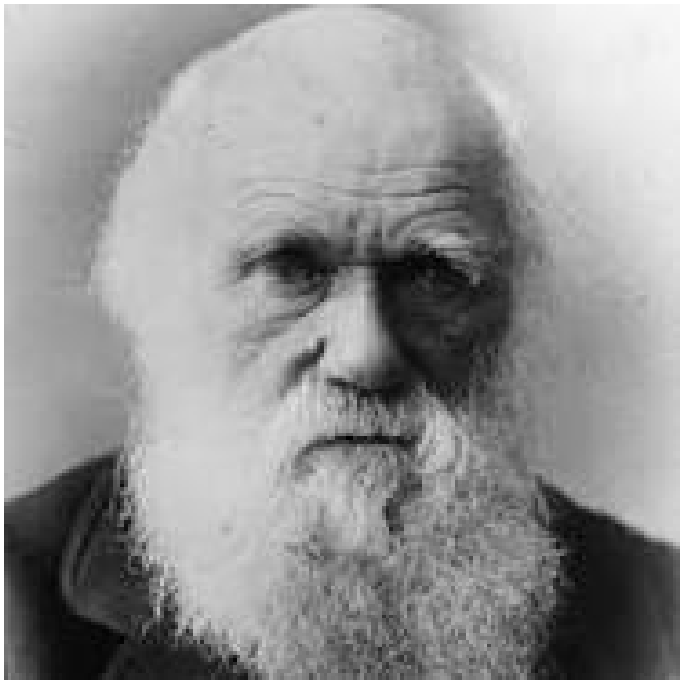
This partly broken clay tablet "Plimpton 322" measuring approximately $13cm \times 9cm \times 2cm$ belongs in a collection bequeathed to Columbia University by New York publisher George Arthur Plimpton. The tablet is from Senkereh, a site in southern Iraq. It lists 15 Pythagorean triples.

2. The book of nature

Galileo Galilei
(1564 - 1642)

"Philosophy [nature] is written in that great book which ever is before our eyes -- I mean the universe -- but we cannot understand it if we do not first learn the language and grasp the symbols in which it is written. The book is written in mathematical language, and the symbols are triangles, circles and other geometrical figures, without whose help it is impossible to comprehend a single word of it; without it one wanders in vain through a dark labyrinth."

3. Mathematics: inevitable guide or unexpected help?



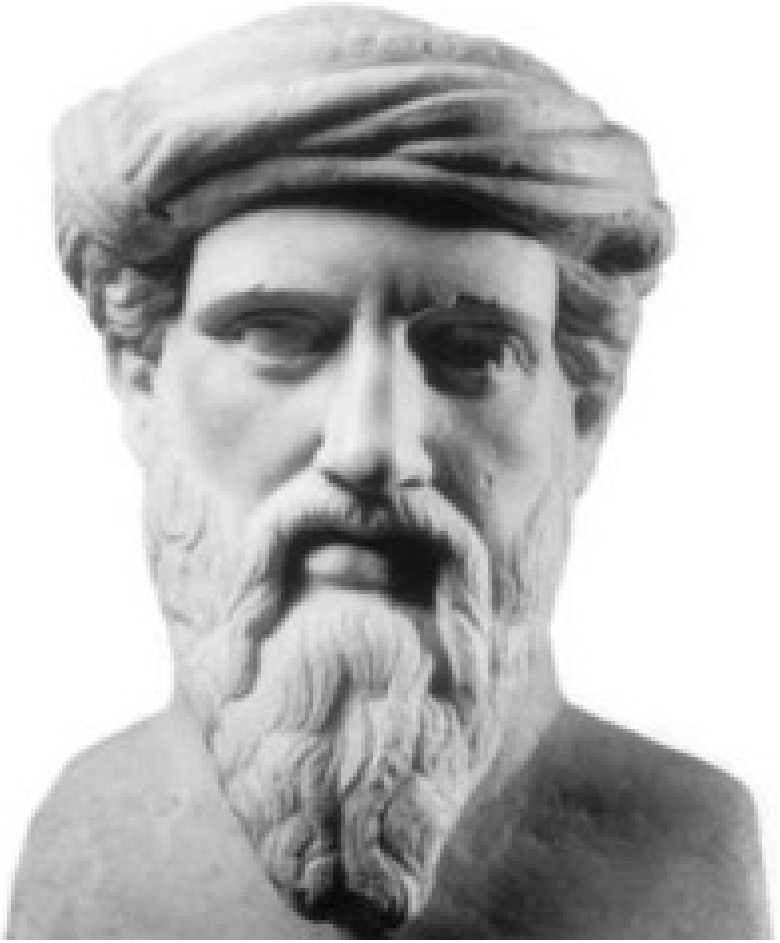
CHARLES DARWIN
(1809-1882)

EUGENE WIGNER
(1902-1995)

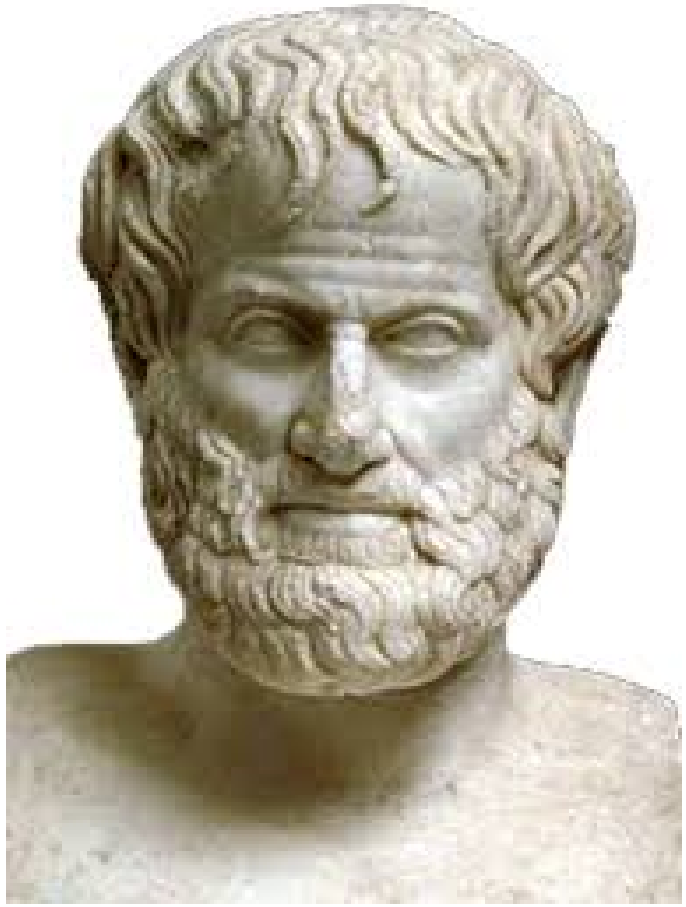
Darwin: "Every new discovery is mathematical in form because there is no other guidance we can have.

Wigner: Mathematics is unreasonably effective in natural sciences.

4. Pythagoras and Aristotle



PYTHAGORAS (570 - 495 BCE)



ARISTOTLE (384 - 322 BCE)

5. The Queen of Sciences

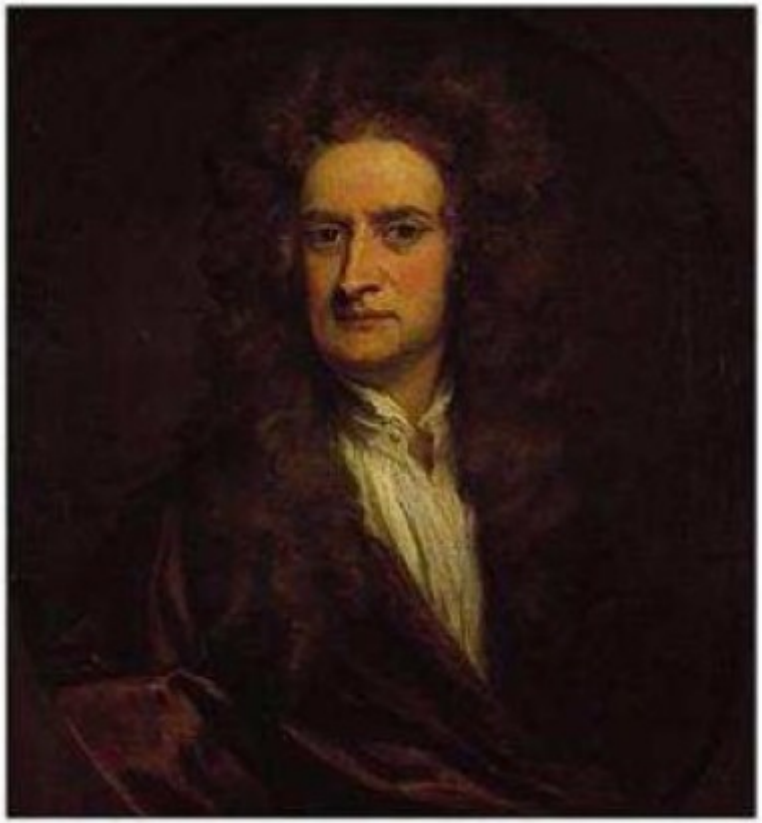
CARL FRIEDRICH GAUSS
(1777-1855)
Mathematics is the Queen of Sciences and Number Theory, the Queen of Mathematics

6. The Crest of the Peacock

यथा शिखा मयूराणां नागानां मणयो यथा।
तथा वेदाङ्गशास्त्राणां गणितं मूर्धनि स्थितम्।।

(As are the crests on the heads of peacocks,
As are the gems on the heads of serpents,
So is mathematics at the helm of sciences.)

7. Playing on the Seashore

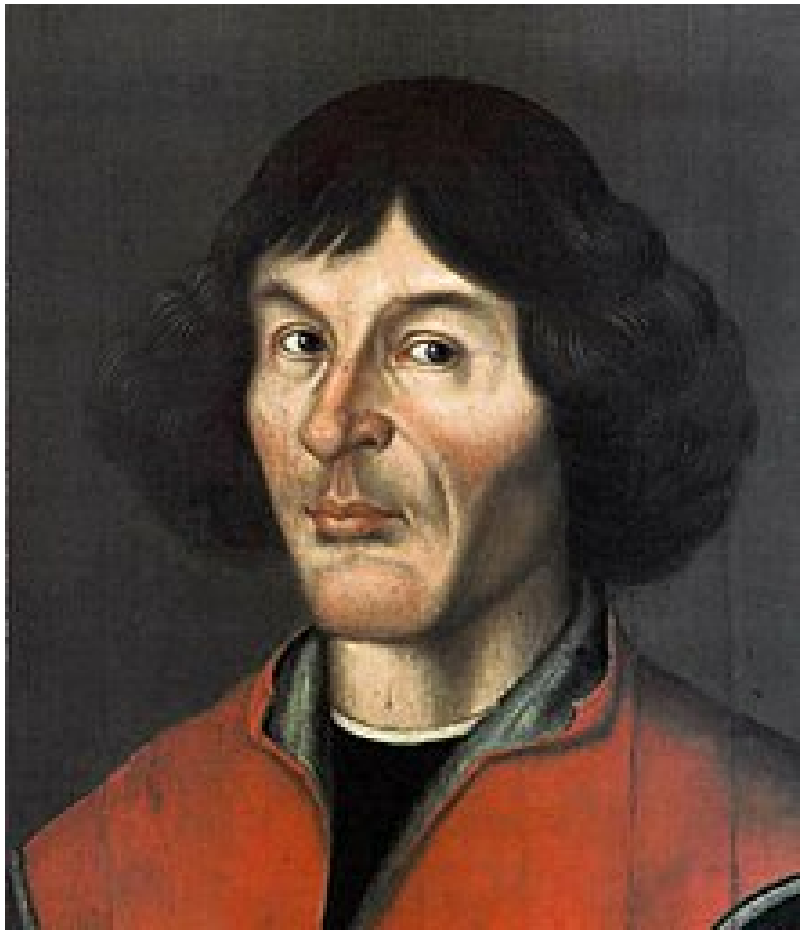


Isaac Newton (1643 - 1727)

"I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me".

8. EARTH vs SUN

CLAUDIUS PTOLEMY
(100 - 160 CE)



NOCOLAUS COPERNICUS
(1473 - 1543 CE)

9. A diatribe against science

JOHN KEATS
(1795 - 1821)

Do not all charms fly
At the mere touch of cold philosophy?
There was an awful rainbow once in heaven:
We know her woof, her texture; she is given
In the dull catalogue of common things.
Philosophy will clip an angel's wings'
Conquer all mysteries by rule and line,
Empty the haunted air, and gnomed mine -
Unweave a rainbow ..."

from 'LAMIA'

10. Another beholder

ALEXANDER POPE

(1688-1744)

“God said ‘Let Newton be’ and all was light.”

11. A thing of beauty

above: An illustration of a scene in the Greek myth "Endimyon" by the painter Francesco Solimena (1657-1747).
"A thing of beauty is a joy forever" is the opening line of Keats poem.

12. "Joy forever"

Bust of Euclid (left). A fragment of a papyrus manuscript of Elements (in Greek) discovered in Oxyrhynchus, Egypt. It has been dated to 75-125 CE.

13. Market Place or God?

LEOPOLD KRONECKER
(1823-1891)
"God made integers, all else is the work of man."

14. The place value system

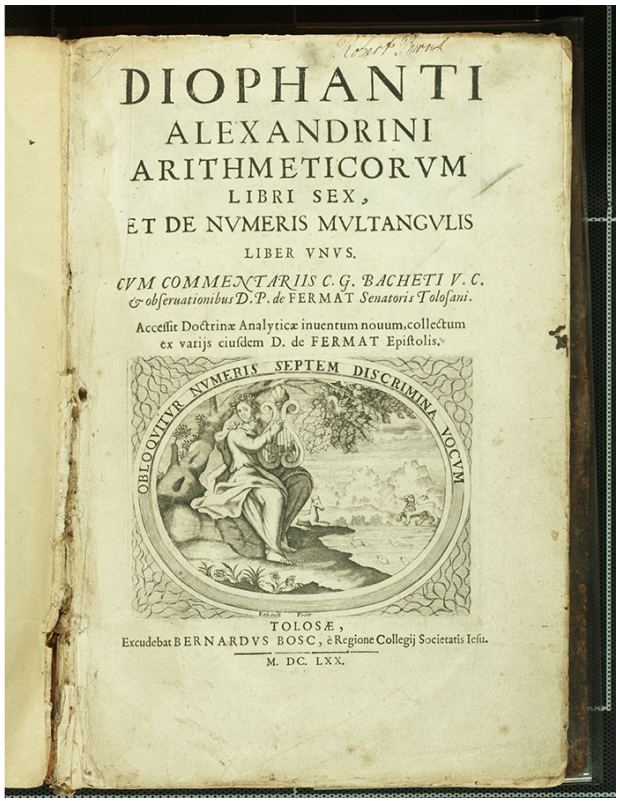
$$\text{Bhodhisattva} = 10^{372183838819776444413065976878496481 28}$$

Theorem

Given an integer $N > 0$ there are uniquely determined integers $r \geq 0$ and $\{a_i | 1 \leq i \leq r\}$ with $0 \leq a_i \leq 9$ and $a_r \neq 0$ such that $N = \sum_{0 \leq i \leq r} a_i \cdot 10^i$.

Did necessity lead to this theorem or was it an aesthetic drive that did?

15. An old lamp lit anew


DIOPHANTI
ALEXANDRINI
ARITHMETICORVM
LIBRI SEX,
ET DE NVMERIS MVLTANGVLIS
LIBER VNVS.
CVM COMMENTARIIS C. G. BACHETI V. C.
& obſervationibus D. P. de FERMAT Senatoris Toloſani.
Acceſſit Doctrinæ Analyticæ inuentum nouum, collectum
ex varijs eiuſdem D. de FERMAT Epiſtolis.
OBLOQVITVR NVMERIS SEPTEM DISCRIMINA VOCVM
TOLOSÆ,
Excudebat BERNARDVS BOSC, è Regione Collegij Societatis Ieſu.
M. DC. LXX.

Left: Frontispiece of Diophantus' 'Aritmetica' with Fermat's comments.
Right:Pierre de Fermat (1607 -1665)

16. Beauty and Truth

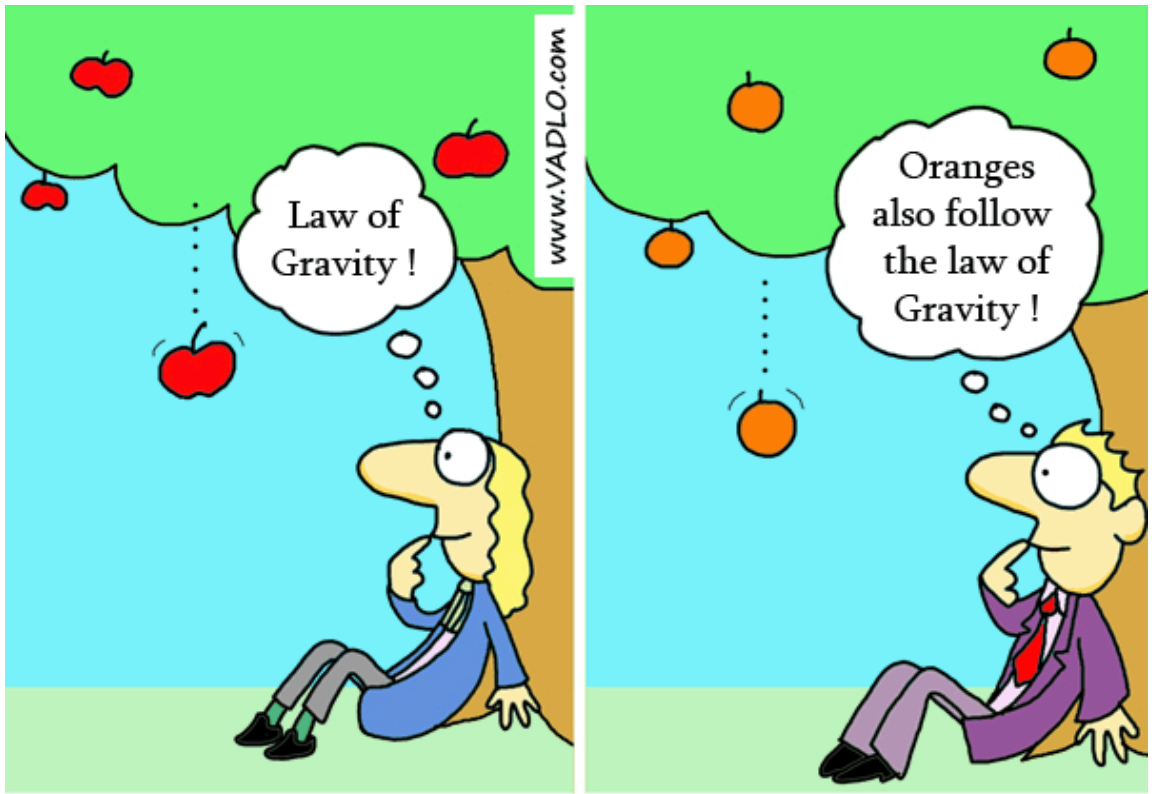
"Beauty is truth, truth beauty,that is all
Ye know on earth, and all ye need to know."
-From Keats's Ode on a Grecian Urn

17. Making a choice

Hermann Klaus Hugo Weyl (1885-1955)

"My work has always tried to unite the true with the beautiful and when I had to choose one or the other, I usually chose the beautiful."

18.Impact Factor



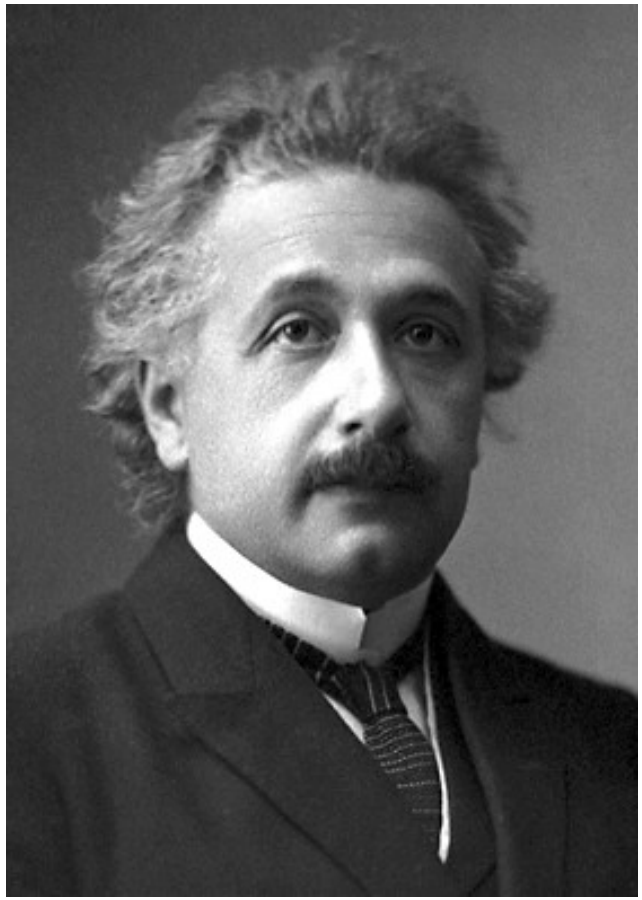
High Impact Paper | Low Impact Paper

HOW ABOUT COCONUTS!

19. Impact of science on the general public

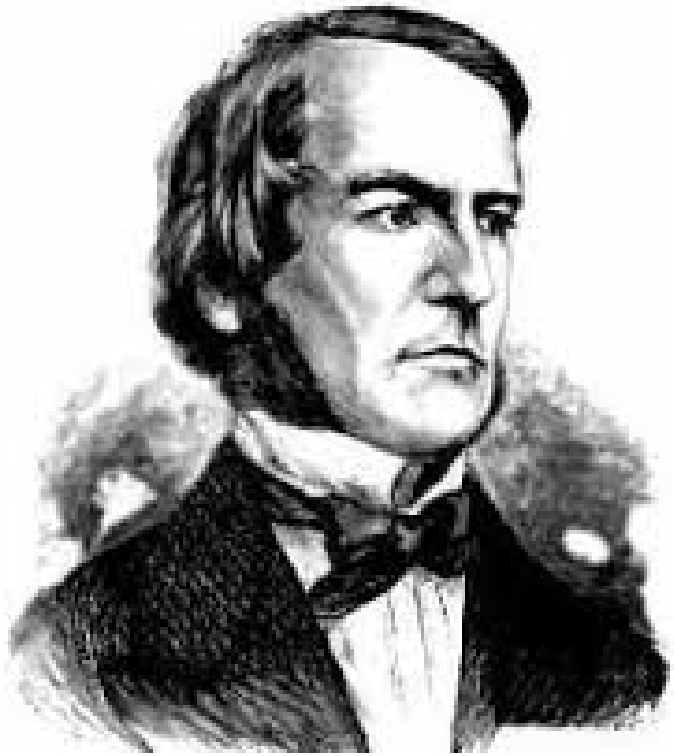
20.Einstein and Riemann

BERNHARD RIEMANN (1826 - 1866)



ALBERT EINSTEIN (1879 - 1953)

21. Boole and Shannon



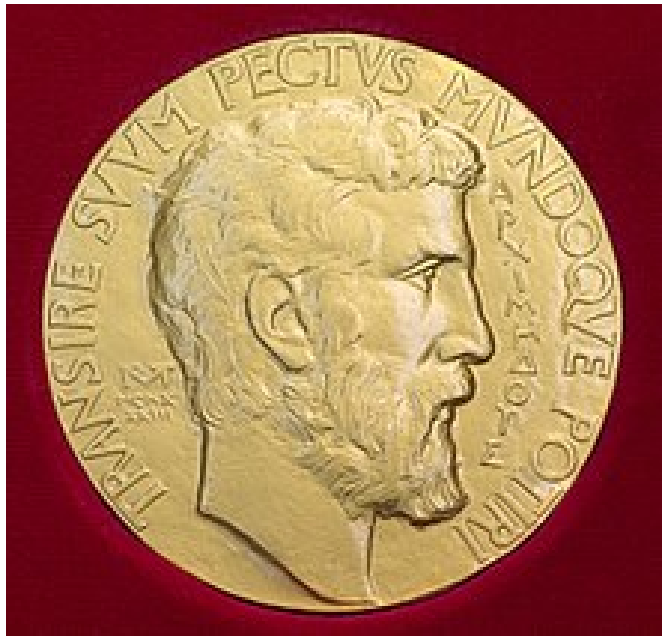
GEORGE BOOLE
(1815 - 1864)

CLAUDE SHANNON
(1916 - 2001)

22. An exception

SRINIVASA RAMNUJAN
(1928- 2015)

23. The highest honour

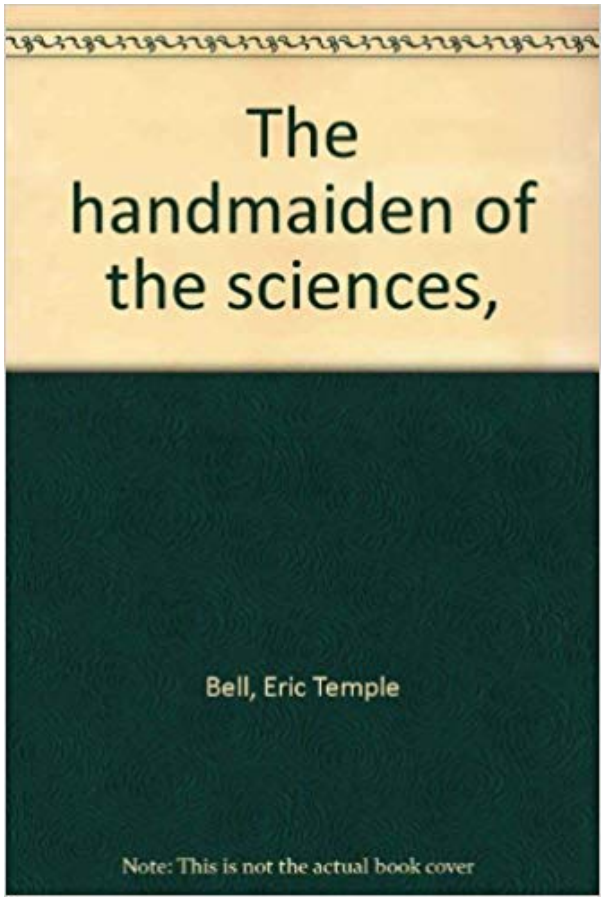


Obverse sides of the Nobel (left) and Fields (right) medals. The name of the awardee is embossed on the other side

24.JOHN NASH

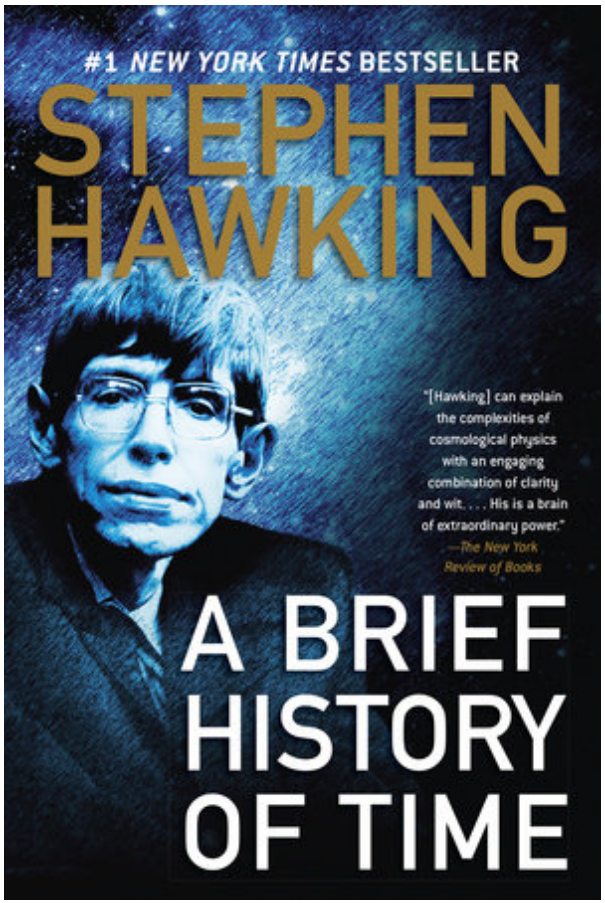
JOHN NASH (1928- 2015)

25.The handmaiden of the sciences



E T Bell has written a number of books aimed at the non-mathematician; they are books about mathematics and mathematicians, but do not seek to explain advanced mathematical concepts. This book tells the reader about mathematical interventions in diverse human endeavours.

26.Popular Science



Can a lay person get something out of this book beyond the snob-value of its presence on the book-shelf?

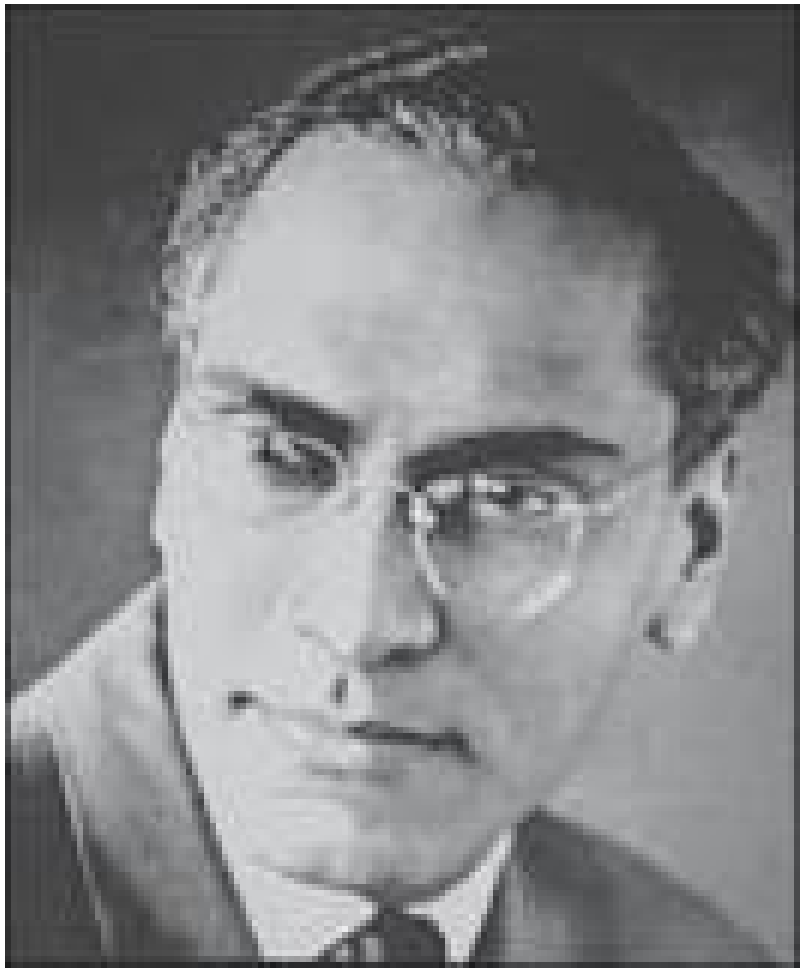
27. The cost of science

The total operating budget of the Large Hadron Collider at CERN runs to about 1 billion dollars per year.

28. Achievements in Mathematics

The Prasad in the title of the summer school is Dipendra Prasad of TIFR.

33. Chandrasekharan



KOMOROVOLU CHANDRASEKHARAN
(1920 - 2017)

THANK YOU FOR YOUR KIND ATTENTION