

A MATHEMATICIAN

I find Mathematics an infinitely complex and mysterious world; exploring it is an addiction from which I hope never to be cured. In this I am a mathematician like all others. But, in addition, I have developed a second half, an other, who watches this mathematician with amazement, and is even more amazed that such a strange creature and such a strange activity have come into this world and persisted for thousands of years.

WHAT IS MATHEMATICS

Dictionary: Mathematics is the science of quantity and space

Addition: and the symbolism related to » » »

science of quantity = arithmetic

science of space = geometry

G.S. Pierce: Mathematics is the science of making necessary conclusions.

Where is the place for mathematics? Where does it exist; On the printed page, of course, and prior to printing, on tablets or on papyri. Here is a mathematical book - take it in your hand; you have a palpable record of mathematics as an intellectual endeavour. But first it must exist in people's minds, for a shelf of books does not create mathematics. Mathematics exists on taped lectures, in computer memories and printed circuits. Should we say that it resides in the genes of a sunflower plant if that plant brings forth seeds arranged in Bernoullian spirals and transmits mathematical information from generation to generation

Should we also say that mathematics exists on a wall if a lampshade casts a parabolic shadow on that wall? Or do we believe that all these are mere shadow manifestations of the real mathematics which, as some philosophers have asserted, exists eternally and independently of this actualized universe, independently of all possible actualizations of universe

THE MATHEMATICAL COMMUNITY

At the present time there is hardly a country in the world which is not creating new Mathematics. Even the emerging nations establish up-to-date university programs in Mathematics.

Membership list of AMS, MAA and S.I.A.M. of 1978 lists 30,000 names.

There is lively activity in the writing and publishing of books at all levels and some 1600 technical journals.

How Much MATHEMATICS IS KNOWN

The Mathematics books of Brown (a fine collection) are about 60,000 volumes.

There is a certain redundancy in the contents of these volumes and some omissions. Let us assume that these two balance each other out.

To this figure we should add an equal quantity of math. material in adjacent areas such as engineering, physics, astronomy, cartography. In this way we arrive at a total of 100,000 volumes.

Mathematics builds on itself. It is aggregative. Algebra builds on Arithmetic. Geometry builds on arithmetic and algebra. Calculus builds on all three. Topology is an offshoot of geometry, set theory and algebra.

Mathematics is often depicted as a mighty tree with its roots, trunk, branches and twigs labeled according to certain subdisciplines. It is a tree that grows in time.

As this occurs, what is old and true is retained - at least in principle. Everything that once was Mathematics remains mathematics - at least in principle. And so it would appear that the subject is a vast increasing organism with branch upon branch of theory and practice. The prior branch is prerequisite for the understanding of the subsequent branch. This serial dependence is in contrast to other disciplines such as art or music. One can like or "understand" modern art without being familiar with baroque art; one can create jazz without any grounding in 17th century madrigals.

How many mathematics books should the Ph.D candidate in Mathematics know? The average candidate will take about fourteen to eighteen semester courses of undergraduate mathematics and sixteen graduate courses. At one book per course and then doubling the answer for collateral reading we arrive at a figure of 60 to 80 volumes.

Thus we can think of our 60,000 books as an ocean

of knowledge, with an average depth of sixty or seventy books. Different locations and depths for different subspecialties

COMPUTERS

Ruler, Compass ----- → Computers

There used to be four. One in Philadelphia, one in Aberdeen, one in Cambridge and one in Washington. Then there were ten. Then two hundred. The last figure is 55,000

The 50 dollar hand held jobs pack more power than the hippopotamian hulks rusting in the Smithsonian (ENIACS, MARKS, SEACS, GOLEMS) Perhaps tomorrow the \$1.98 computers will flood the drug stores and become a throwaway object like a ~~plastic~~ plastic razor or a Kleenex.

Within the last few years computers have had a noticeable impact in the field of pure mathematics. This may be the result of a generation of mathematicians who learned computer programming in high school and to whom a computer terminal is as familiar as a telephone or a bicycle. One begins to see a change in mathematical research. There is greater interest in constructive or algorithmic results, and decreasing interest in purely existential or dialectical results that have little or no computational meaning.

500
\$55.000

MATHEMATICS AND EDUCATION

The scientist knows more about the humanities than the other way around. The scientist do read novels, essays, go to theater etc.

The humanist very seldom reads anything about science. The main reason is that the language of science with its substantial sublanguage of Mathematics poses a formidable barrier to the humanist.

Everyone knows that if you want to do physics or engineering, you had better be good at Mathematics. More and more people are finding that if you want to work in certain areas of economics or biology, you had better brush up on your mathematics. Mathematics has penetrated sociology, psychology, medicine and linguistics. Under the name of cliometry it has been infiltrating the field of history, much to the shock of old-timers. Why is this so? What gives Mathematics its power? What makes it work?

The Universe expresses itself naturally in the language of Mathematics. The force of gravity diminishes as the 2nd power of the distance; the planets go around the sun in ellipses;

Mathematics has evolved as the symbolic counterpart of the universe. It is no wonder that it works; that is exactly its reason for existence. The universe has imposed Mathematics upon humanity.

The ^{need for the} four arithmetic operations have their origins in trade. Addition to find a total, subtraction to strike a balance, multiplication for replication, division for equal partition

Barter \sim equivalence classes

The algorithms of arithmetic have been, in general, formed under the impact of business and are in constant flux. (Interest, compound interest, discount)

The theory of probability entered math. through \rightarrow gambling and now finds applications in the most elevated positions of theoretical science

The probabilistic notions of expectation and risk also came from gambling and later became essential in life insurance.

In Math. economics the principal tool is D.E. and other functional equations. Fixed point theory for existence of equilibria is important. Recently non standard Analysis has applications

Computer Science

BEAUTY

Beauty in art and music has been an object of discussion at least since the time of Plato and has been analyzed in terms of such concepts as order, proportion, balance, harmony, unity and clarity.

