Conferences on Mathematics

December 17-20, 2003 Bangalore, India
First Joint International Meeting between the American Mathematical Society (AMS) and various Indian Mathematical Societies
June 18-21, 2003 Seville, Spain
First Joint International Meeting between the American Mathematical Society (AMS) and the Real Sociedad Matematica Espanola (RSME)
May 13-15, 2004 University of Houston, Houston, Texas

Sixth International Joint Meeting of the AMS and the Sociedad Matemática Mexicana (SMM)
Associate secretary: John L. Bryant

June 16-19, 2005 Mainz, Germany

Joint International Meeting with the Deutsche Mathematiker_Vereinigung (DMV) and the Osterreichische Mathematische Gesellschaft (OMG)
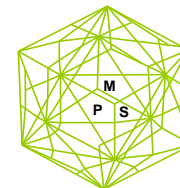Associate secretary: Susan J. Friedlander

Pakistan Mathematical Society

- State of Mathematics in Pakistan - *B.A. Saleemi*

- A proposal for improvement of Ph.D. programs in Mathematics in Pakistan - *Qaiser Mushtaq*

- Mathematics News

- Conferences

1. Invite suggestions for the improvement and rectification of all the prevailing systems with reference to mathematics.
2. Make an in-depth study of the causes obstructing the growth of mathematics education.
3. Recommend remedial measures to accelerate research and development in mathematics.
4. Propose a national policy on mathematics.
5. Represent the mathematical community in discussions with federal agencies and policy makers.
6. Peer review the conduct of mathematical institutions in the country.
7. Prepare an annual report on the NCM's activities and goals;
8. Prepare an annual summary of federal funding in mathematics over the preceding year.

Once the NCM comes into existence, all the existing bodies, committees on mathematics should immediately cease to exist and operate. It is proposed that in future, all matters relevant to mathematical research and education be referred to the NCM. It should be authorized to create subcommittees for specific tasks. Furthermore, no proposal or recommendation on mathematics should be entertained unless it is channeled through NCM. It should be provided sufficient funds to carry on its academic activities at the national as well as international level.

State of Mathematics in Pakistan
" In every special doctrine of nature, only so much science proper can be found as there is mathematics in it."

Kant, Metaphysical Foundations
of Natural Sciences

History of sciences unequivocally substantiates the fact that all the epoch-making discoveries in science have their foundations in mathematics and mathematical thinking. Calculus (invented independently by Newton and Leibnitz) put the macrophysics of Newton on an unimpeachable footing, Hermitian operators on a Hilbert space with their spectral theory served as the eventual underpinning of the formal structure of quantum mechanics, the edifice of Einstein's general theory of relativity was raised on Riemannian manifold and tensor calculus, while logic, sets, functions became the necessary wherewithal to construct Alan Turing's computational machines. To elaborate the interrelationship between mathematics and the sciences more authoritatively, following passage from "Mathematician by John Von Neuman" is quoted:

"Most people, mathematicians and others will agree that mathematics is not an empirical science, or at least that it is practiced in a manner which differs in several decisive respects from the techniques of the empirical sciences. And, yet, its development is very closely linked with the natural sciences. One of its main branches, geometry, actually started as a natural, empirical science. Some of the best inspirations of modern mathematics clearly originated in the natural sciences. The methods of mathematics pervade and dominate the "theoretical" divisions of the natural sciences. In modern empirical sciences it has become more and more a major criterion of success whether they have become accessible to the mathematical method or to the mathematical methods of physics. Indeed throughout the natural sciences an unbroken chain of successive pseudomorphoses, all of them pressing towards mathematics, and almost identified with the scientific progress, has become more and more evident. Biology becomes increasingly pervaded by chemistry and physics, chemistry by experimental and theoretical physics and physics by very mathematical forms of theoretical physics."

On the other hand, the somewhat snobbish claim that mathematics is a self-contained science drawing inspiration from itself is a falsification of the history of mathematics. In fact, whenever the mathematical methods become traditional and jejune, the empirical ideas arising in physical sciences supply the necessary vitality to rejuvenate the mathematical thought processes. Thus the significant mathematical advances and scientific advances are closely interwoven and their roles in nurturing science culture are complementary. It is also unmistakably clear that mathematics is as important as, if not more than, any scientific discipline could be.

In Pakistan, the last two decades have witnessed a lamentable decline in the standard of education, in general, and mathematics and the sciences in particular. The predominant reason for this dismal state of mathematics and the sciences, is the vainglorious policy adopted by the people at the helm of affairs and endorsed by the coterie of their handpicked mathematicians and scientists. More often than not, mathematics has been relegated to the last slot among the sciences. The approach of putting the cart before the horse has indeed stunted the growth of mathematics and consequently of science. We are fully conscious of the paramount importance of digital computers, and indeed are inundated with advertising hyperbole from the most diverse quarters about all the wonders that the information technology will accomplish. Without specifying precisely our national objectives and without realizing our peculiar national limitations *vis-à-vis* literacy rate, scientific and technological advancement etc., we have embarked on IT-related projects which will ultimately not only hamper the advancement of mathematics and the sciences but will also cause a colossal loss to the already over constrained national exchequer. How come the Internet facility to the illiterate people of far-flung villages will narrow down the horizon of their illiteracy? What will be the contribution of the exorbitantly costly Pak-SatII towards the science education and technological advancement? Since our economy is already in shambles and Pakistan is in debt up to its neck, it is sheer callousness to indulge in this type of luxury

Conclusion

Mathematics should be assigned its due place in the education of science and technology. Practicing genuine mathematicians should be inducted in the National Research Council, Pakistan Science

RAISON D'ETRE FOR THE NATIONAL COMMITTEE FOR MATHEMATICS

Unfortunately the present state of mathematics in Pakistan is appallingly lamentable and merits urgent remedial measures for its rectification. It is an apodictic fact that one of the principal causes immeasurably detrimental to mathematics education has been due mainly to the neglect and misinformation by some who have simulated to be the exponents of mathematics through their sheer political maneuverings.

The above-mentioned circumstantial evidence and facts necessitate the presence and existence of a mathematical body at the national level. So the Pakistan Mathematical Society proposes to build a well-defined partnership with the government on a permanent basis. Establishing a National Committee for Mathematics (NCM) under the auspices of the Higher Education Commission (HEC) could do this.

The NCM shall function under the supervision of the Chairman, Pakistan National Commission on Science and be privileged to have the patronage of the Ministry of Education and the Higher Education Commission.

COMPOSITION

The NCM could have the following composition:

1. President, or a nominee of Pakistan Mathematical Society Chairman
2. Secretary, Pakistan Mathematical Society Secretary
3. A mathematician from each province nominated by the mathematical society of the province
4. Two mathematicians nominated by the HEC
5. A nominee of the Pakistan Engineering Council
6. A nominee of the Pakistan Academy of Sciences
7. A nominee of the Ministry of S&T, preferably an I.T. specialist
8. A nominee of the Ministry of Education

OBJECTIVES

The NMC should be a live organization for mathematics so that it is readily available to all who are related to and concerned with it. It

PROPOSAL FOR THE ESTABLISHMENT
OF
NATIONAL COMMITTEE FOR MATHEMATICS

By the Pakistan Mathematical Society, 23rd February 2002

PROLOGUE

This is an irrefutable verdict of the history of sciences that a nation's level of advancement in Science and Technology is strictly conditioned by the quantum of its research in mathematics. No epoch-making theory in the sciences can hold good unless it is testimonialized by mathematics. Notwithstanding, mathematics cannot make significant advances without an appropriate well-timed inspiration arising from the physical sciences.

Since the developments of mathematics and Science and Technology are closely interwoven, it can, therefore, be safely inferred that a science policy cannot be balanced if its composition does not contain the relevant ingredients, namely, mathematics, sciences, engineering, etc. in the right proportion of their importance.

> Nothing is more important to our nation's prospects than the ability to create and make use of knowledge. As a nation, we face significant national and international challenges. Exceptional opportunities for rapid progress in meeting these challenges are emerging at the leading edge of research.

Our ability to move rapidly across new frontiers of knowledge not only depends critically on discovery and innovation, but also on building a globally competitive, diverse workforce with mathematical, scientific, engineering, and technological skills that are the best in the world.

Science Foundation etc. Reasonable funding should be allocated to enhance the research activity in mathematics via seminars, exchange programs, visiting professorships, postdoctoral fellowships etc. To check further brain drain and encourage the talented young mathematicians "Rarity Allowance" may be added to their perks to enhance their creative activity.

The Perfect Graph Conjecture solved!

A team of four mathematicians, Maria Chudnovsky, Neil Robertson, Paul Seymour, and Robin Thomas, has solved a 40 year old problem known as the Perfect Graph Conjecture. The solution began with work sponsored by AIM in the winter of 2000. The conjecture was considered by many to be the most significant unsolved problem in graph theory. Its solution, and the techniques involved in the proof, will have applications to both practical and theoretical questions involving graphs.

A proposal for improvement of Ph.D. program in mathematics in Pakistan

Background

Due to the lack of proper planning for research, since 1947 we have only had about 60 to 70 doctorates in mathematics in a country of 140 million people. Up to now, only about 35 Ph.D.s in mathematics have been produced locally. The first Ph.D. in mathematics was produced 24 years after the birth of Pakistan. Quaid-i-Azam University was hardly four years old when it produced Pakistan's first Ph.D. in mathematics in 1971. The production of 28 doctorates in mathematics by Quaid-i-Azam University in about 36 years is highly unimpressive by international standards. Due to lack of incentives, inadequate support facilities and the absence of an appropriate mathematical environment, the production of doctorates in mathematics has been rather less than what it shall have been otherwise.

Analysis

But it is not the number only; there is more to it if one is to review the situation critically for improvement and rectification. Out of the 17 mathematics doctorate producers, most of these have left Pakistan for greener pastures or they have abandoned producing Ph.D.s. The locally produced Ph.D.s according to the Mathematics Subject Classification 2000 (MSC-2000), lie mostly in the following 5 categories:

M.SC.-2000 #16	Associative Rings and Algebras,
M.SC.-2000 #20	Group Theory and Generalizations,
M.SC.-2000 #46	Functional Analysis,
M.SC.-2000 #70	Mechanics, and
M.SC.-2000 #83	Relativity and Gravitational Theory.

Invariably the students who register themselves for Ph.D. degree in mathematics are M.Phil. degree holders from the same university. Out of the total number of Ph.D.s produced so far, one thesis has been written on a topic in statistics, seventeen theses have been written on topics in applied mathematics and twelve theses on topics in pure mathematics.

The government has been promoting this idea of "indigenisation', namely, that the Ph.D.s already in the country will produce Ph.D.s locally. But since we do not have enough number of experts in

Participating in the discussion later on, Professor M.Sarwar Kamran expressed his concern over the situation and stressed on the need for persuading the government to formulate new policies to enhance mathematical research in the country and recognize the efforts of the dedicated mathematicians. He said that unless efforts are made to improve the situation, many young mathematicians trying to develop research careers in this subject would be discouraged.

In the end, the participants formed a committee of senior mathematicians with a mandate to see the Chairmen of the Higher Education Commission, the Pakistan Council of Science & Technology in particular and heads of other relevant organizations in general for these purposes.

A number of mathematicians expressed their dissatisfaction about the recently implemented "research productivity allowance" by the Ministry of Science & Technology. They lamented that the criterion used to judge a scientist's "productivity" is grossly defective. Dr Noor Mohammad pointed out that only a very small number of scientists have received this "productivity allowance" and that the majority from amongst those who have received it are unhappy about the category that they are classified in. There is therefore a need on the part of policy makers, said Dr Arshad Mahmood, to realize that academicians in our universities need and deserve a reasonable salary matching with their qualification that would allow them to live a comfortable life with dignity according to their status.

Professor B.A.Saleemi said that it will encourage those who are adequately qualified but could not get "productivity allowance" to earn more money by simply taking extra teaching assignments at private institutes or private universities. There are still many who will find it better to leave the country and work abroad, earning much more money without their "research productivity" being judged by a defective "formula". Professor Saleemi, while rejecting the impact factor, said that the government should not be ignorant of the adverse research environment that the limited number of mathematicians is working in. He said that the current situation is turning the "queen of all sciences into a servant of all sciences". He said that the evaluation of the qualities and excellence of mathematicians through impact factor and journal citation count is completely unfair and irrational. Research is difficult and at times quite frustrating. Since teaching has become more lucrative economically than doing research, the former has become more attractive than the latter. Thus, there is already a danger of shift in focus from research to teaching in our universities. Of greater concern are the reasons for this shift.

The members at the conference urged upon Professor Atta ur Rahman that he should convene a meeting with representatives of the mathematical community from all over the country and discuss with them the state of mathematics and ways to improve it. The participants at the conference emphasised that the Pakistan Council of Science & Technology and Higher Education Commission should involve in the policy-making process those mathematicians who represent the mathematical community instead of involving only a few sycophants who cannot give an independent and objective opinion.

mathematics in Pakistan who can produce doctorates, the result is that only that branch of mathematics will be researched and taught that these few Ph.D.s specialize in. It also has the following grave side effects.

1. Only a few branches of mathematics are promoted and patronized and this has naturally caused saturation.
2. Within each area of speciality, the research problems for Ph.D. theses lack variety. In most of the cases it has been basically the same mathematical problem in different theses.
3. There is a lack of independence and confidence by the up-coming young Ph.D. degree holders who shall be producing doctorates by now. Unfortunately 'marriages of convenience' have been taking place resulting in the name of 'collaboration' in genuine authorship of dissertations, theses and research papers.
4. Cults and nepotism have also emerged amongst the mathematical community and as a consequence, polarisation across the groups and tussle over vested interests.

The locally produced Ph.D.s largely lack the command over English as a language, writing power, general mathematical knowledge, scholarship, and independence. Hardly any one has ever produced a good research paper without co-authorship, even after several years of research experience.

Proposals

Students shall be sent abroad on a planned basis for Ph.D.s in areas not available in Pakistan. In this way they will get the exposure they need to understand the global essence of mathematics in the modern world. So as to be able to retain the Ph.D.s produced (for some time at least), this shall be done under a split programme. The students are to be registered at a Pakistani university and return to that university to be awarded the degree. If the university where they are sent does not conduct a comprehensive examination, arrangements would have to be made at the Pakistani university for conducting the examination. The special subjects would have to be set by examiners at the foreign university where the student

1. conducted the research, and the papers be sent to be marked there.

2. Every 2 years, 20 students shall be sent in areas to be specified by the National Committee for Mathematics.

3. In the next 2 years there shall be 4 students sent in each of the following areas: (i) Computational Mathematics; (ii) Differential Equations; (iii) Topology; (iv) Geometry; (v) Analysis; making a total of 20 students. The areas shall be specified more precisely once foreign universities have been contacted to arrange an agreement with them for training our students.

4. As to the eligibility condition to be appointed as a Ph.D. supervisor, one shall have at least 1 paper published every 2 years from the time of obtaining his Ph.D. The journals must be of good international standing and not be local journals.

5. A comprehensive directory of those experts who qualify to supervise Ph.D. scholars, with information about their precise areas of research (according to the MSC Secondary Classification), addresses, qualifications, and ranks shall be produced annually and shall be available in all the post-graduate institutions across the country. This directory shall be available on the Internet also.

6. Those eligible for admission in the Ph.D. programme shall have an M.Phil. degree or its equivalent in mathematics from a recognized university. A person working in a recognized college, university, or research organization and who has shown undoubted promise for research and holds B.S. or M.Sc. degree shall be considered eligible for the Ph.D. programme also.

7. The applicant shall pass GRE test. He/she shall not have third division through out his/her academic career. The applicant shall not be over 40 years of age.

Mathematicians form committee to meet Dr. Atta ur Rahman vis-à-vis deplorable state of mathematics in Pakistan

Islamabad: The state of mathematics is deteriorating in the country due to complete ignorance of the importance and the distinctive nature of the "queen of sciences" in devising the policy for the National Scientific and Technological Research and Development Fund in the country. The current scenario is endangering the future of mathematics and marginalizing mathematicians by completely disregarding the nature of their subject.

This was the consensus view of mathematicians who gathered in the Capital city at the Round-table Conference held in Holiday Inn on 4th November 2002 organised by the Pakistan Mathematical Society. Consensus was reached on complete rejection of the PCST's "impact factor and citations count" rating policy. Participants of the meeting decided to send proposals and recommendations to the government in the form of a resolution so that it may look into the matter and take steps to resolve the crisis being faced by all mathematicians in the country.

The future of mathematics in Pakistan is bleak if the current attitude of the "science reformers" and policy makers is not changed, said Professor Qaiser Mushtaq, President of the Pakistan Mathematics Society, in his inaugural speech at the Round-table Conference. He said that there are certain policies of the Ministry of Science and Technology, which do not suit mathematics. He said that the government lacks overview of the seriousness of the issue.

Giving details of the issue, he said that the particular nature and special distinctiveness of each branch of science has been completely ignored in devising the policy for the National Scientific and Technological Research and Development Fund in the country. He said that this policy would have a devastating effect on all branches of science in general and mathematics in particular. He expressed concern over the already deplorable state of mathematics in Pakistan, which is further deteriorating because of ignorance, negligence and misinformation about this very basic subject.

Just as with primes, the frequency of twin primes decreases as one progresses to higher numbers. But do they completely fizzle out beyond some very large number? No one knows the answer for certain, but Goldston's new theory significantly advances mathematicians' knowledge of how primes are distributed, and even shines some light on the hard-to-identify location of very large prime numbers.

Goldston's presentation on Friday, March 28, will come at a timely moment. Some of the world's leading mathematicians will be in Palo Alto for a brainstorming session on Algorithmic Number Theory. The conference, one of a series to be hosted by AIM over the next few years, was assembled to examine and possibly extend the recent breakthrough in primality testing announced last year by computer scientist Manindra Agrawal of the Indian Institute of Technology in Kanpur, and his students Neeraj Kayal and Nitin Saxena.

Organizers are hopeful that AIM's whiteboard will once again be the catalyst for further breakthroughs - some of which could have enormous relevance to the mathematics that powers secure internet transactions.

"This new work of Goldston and Yildirim is a breakthrough that mathematicians interested in prime numbers have been looking for over the last 80 years. There will be a number of important developments that will follow from this innovation," said Brian Conrey, Executive Director of AIM.

A technical description of Goldston's new work can be found at: http://aimath.org/goldston_tech.

8. A candidate desiring to seek admission shall apply for admission on a prescribed form for admission stating his/her area of research interest according to MSC 2000.

9. The minimum period of completion for Ph.D. degree shall be at least three years for those who hold M.Phil. degrees. A B.S. or M.Sc. degree holder shall spend one year extra and he/she shall complete the course of 24 credits before obtaining the full status of a Ph.D. scholar. The period shall be counted from retrospective effect, that is, the day a departmental approves his/her admission.

10. There shall be a sole supervisor for the scholar. No supervisor shall have more than five Ph.D. scholars at a time.

11. A Ph.D. scholar must pass a comprehensive examination in no more than two attempts within the first year of his registration.

12. The Ph.D. thesis shall be sent abroad to three non-Pakistani scholars. At least two positive and no negative reports shall be a requirement to qualify for the final Oral Examination.

13. The oral examination shall be conducted by two examiners other than the supervisor. Upon suggestions for modifications/alterations, the thesis shall be accepted. The Oral Examination shall be a defence in public. However, only the examiners will have the authority to pass or fail the candidate.

14. Admissions in Ph.D. programmes shall be advertised twice a year. There shall be biannual progress reports clearly depicting the progress of the scholar. The reports shall also mention clearly the scholar's ability to read, speak and write English.

15. He shall give at least one seminar during the period of his/her last progress report. The seminar shall be in English and shall be on the main problem of his/her research problem.

16. Research publications from the thesis may have the supervisor as a co-author. No other person shall share authorship for the work, which is supposed to be substantially of the author of the thesis for the award of degree of Ph.D.

17. The maximum time limit for completing the degree shall not exceed six years. In only extraordinary circumstances shall a Ph.D. scholar be given the concession of another year and that shall also be given on the basis of a detailed supporting recommendation of the supervisor.

18. Each Ph.D. scholar shall be given scholarship equivalent to 17 grade. The scholarship shall be normally for three years. The supervisor shall be given a handsome amount per month per scholar as an honorarium.

19. The degree shall be withdrawn any time if it is found that the work contained in the thesis is plagiarized by the scholar.

20. The area of research shall be classified according to the MSC before supplicating for the award of the degree.

21. A fixed amount shall be earmarked for a Ph.D. scholar to spend at least two months in a foreign university at the end of his research work before the writing of his/her thesis.

22. It shall be the duty of the supervisor to direct and supervise the work of the student, but not to give him/her systematic instruction. The scholar shall possess a good general knowledge of the particular field of learning within which the subject of his/her thesis falls. He/she shall make a significant and substantial contribution in the field. The thesis shall be written in a lucid and scholarly manner, with a satisfactory abstract.

Mathematics News

San Jose State University Math Researcher Experiences Epiphany at American Institute Of Mathematics

Source: American Institute of Mathematics website
http://www.aimath.org/.

PALO ALTO, CA- March 21, 2003- Dan Goldston was standing in front of a whiteboard at the American Institute of Mathematics (AIM) last fall when a comment made by fellow mathematician Roger Heath-Brown sparked a brainwave. This inspiration enabled him to devise a completely new approach to a problem he had been researching for decades. Next week, Goldston will present the culmination of twenty years of research at the AIM-hosted workshop on Algorithmic Number Theory.

His paper, titled "Small Gaps Between Primes," and co-authored with Turkish mathematician Cem Yildirim, places mathematicians closer to the tantalizing goal of identifying the frequency and location of 'twin primes' - prime numbers that differ by two. Prime number research has long been the focus of gifted mathematicians. As early as the third century, B.C., the Greek mathematician Eratosthenes developed a way to systematically find the prime numbers. Since then, notable mathematicians such as Fermat (17th century), Riemann (1859), Hardy and Littlewood (1920s), and Bombieri and Davenport (1965) have contributed foundational theory on the pattern of prime numbers - numbers that cannot be divided by any number smaller than themselves (other than 1) without leaving a remainder. Small primes are relatively easy to determine; it's the large prime numbers with which mathematicians have been wrestling. The smallest prime numbers are 2, 3, 5, 7, 11, 13, 17 and 19. Since prime numbers are the building blocks of the integers (they can be multiplied to obtain all of the other integers), these small primes are familiar to elementary school students. Anyone with an interest in patterns may observe that primes occur in twins with a surprising regularity. For example: 11,13; 17, 19; 29, 31; 41, 43; 59, 61.