

## Mathematics as a Career Path

by Gonit Sora - Saturday, July 16, 2011

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Mathematics as a career choice has been picking up among the students of India since the last couple of years. But sadly, very few students are aware fully of the scope they have to study in India. Most go for the local colleges and Universities in their neighbourhood. In this article we shall discuss the avenues that are open to students after they pass their 12<sup>th</sup> class in India.

India has a rich tradition in math since time immemorial, and this has led to the establishments of various centres of learning in math and related sciences. In the present day too, there are various institutes offering math education and research of world repute in India. Typically the road to an education in math starts after passing the 12<sup>th</sup> class in India. A student then has the opportunity to either opt for a BSc degree or an Integrated MSc degree or a BS degree or an Integrated MS degree.

The two best places in India offering a Bachelor's degree in math are the Indian Statistical Institute (ISI), Bangalore and the Chennai Mathematical Institute (CMI), Chennai. ISI offers a B.Math degree, and admissions are held after a tough screening test in various centres of India held in late May each year (in Assam, Guwahati and Tezpur are centres) followed by a personal interview at Bangalore. CMI offers a BSc degree in Mathematics and Computer Science and another in Mathematics and Physics, admissions to which is through a written test held in various centres of India (in Assam, Guwahati and Silchar are centres) in late May each year, which may be followed up by an interview later. Both ISI and CMI also admit students who have qualified in the Indian National Mathematical Olympiad (INMO). For ISI they also have to attend an interview in Bengaluru. For ISI, the interview takes place at Bengaluru. Added to that CMI also admits students who have qualified in the Indian National Olympiad in Informatics (INOI) and Indian National Physics Olympiad (INPhO). The INMO is held every year on the first Sunday of February. But to appear in the INMO, one has to pass the Regional Mathematical Olympiad (RMO) which is held in various centres throughout India in December every year. Similarly to appear in INPhO one has to pass National Standard Exam in Physics (NSEP) and for INOI one has to pass either of Zonal Computing Olympiad (ZCO) or Zonal Informatics Olympiad (ZIO).

A student can also opt for a BS degree in math, which is a 4 year course. At present the two best places in India for a BS degree are the Indian Institute of Technology (IIT), Kanpur and the Indian Institute of Science (IISc), Bangalore. IIT admits students via the JEE Advanced held every year in April-May. While IISc admits students via the JEE Mains, JEE Advanced and Kishore Vaigyanik Protsahan Yojana (KVPY). The KVPY is held every year in November for students in classes 11th, 12th and UG 1st year.

A student can also opt for an integrated BS-MS dual degree course in math offered at the Indian Institutes of Science and Education Research (IISERs) which is a 5 year course. The IISERs are located in Pune, Mohali, Kolkata, Bhopal, Tirupati and Trivandrum. There is one planned IISER in Nagaland as well. The IISERs admit students via KVPY, JEE Advanced. One may also apply via marks in board exams and then writing the IISER entrance exam which is held in mid July in the six IISERs. The marks in board exams depends on the INSPIRE cutoff for the respective boards. More details about this can be found [here](#).

Apart from the IISERs, such a course is also offered at the National Institute for Science Education and Research (NISER), Bhubaneswar and Centre for Basic Sciences (CBS), Mumbai. Both NISER and CBS admits students through the National Entrance Screening Test (NEST) held every year in early June.

After the BSc/BMath/BS degrees a student has the opportunity to get an MSc or an MS degree from the many places in India and abroad. They can also apply for an Integrated MSc-PhD degree offered at some places in India. Ideally the best places in India for a Masters degree in math are mentioned below:

- CMI, through admission test held in late May
- ISI, Kolkata or Bengaluru through admission test held in late May

For Integrated MSc-PhD programmes the best places are:

- Tata Institute of Fundamental Research (TIFR), Mumbai and Bangalore admits through a written test held in May and followed by an interview
- IISc, Joint Admission Test for M.Sc. (JAM) followed by an interview at IISc
- The Institute of Mathematical Sciences (IMSc), Chennai admits through the National Board of Higher Mathematics (NBHM) exam followed by an interview
- Harish Chandra Research Institute (HRI), Allahabad admits through the NBHM exam followed by an interview
- IISERs (Pune, Mohali, Trivandrum, Bhopal, Kolkata, Tirupati) also has a good Integrated MS-PhD course and they admit students either via their own exams or NBHM

If a student wants to opt for an Integrated MSc in math then the best place in India is the University of Hyderabad, which admits students through a written test held in early June. Various other central universities also have the Integrated programme, amongst them the best curriculum after the University of Hyderabad is at the Pondicherry University and Tezpur University. In recent years, many new Central Universities have also started this course. Additionally, some of the IITs have such courses as well, like IIT Kharagpur. The admission for this course is through IIT JEE.

In addition to the institutes mentioned above, there are several other good institutes which offer Bachelors level courses. For instance, one could also study at the Institute of Mathematics and Application (IMA), Bhubaneswar, the University of Delhi (in several world class colleges like St. Stephen's College, Kirori Mal College, etc.), several NITs have Integrated MSc courses (this information can be found in the JEE Mains brochure for example), etc.

After a Masters degree, a student can pursue a PhD. The best places in India to get a PhD in math are TIFR, IMSc and HRI. Normally these institutes (except TIFR which has its own exam) accept students who have cleared either NBHM or the CSIR JRF exam followed by an interview. Students who have

been awarded INSPIRE Fellowships by the Department of Science and Technology (DST), GoI may also be called for interviews at these institutes. Apart from these, CMI, ISI, IISc, IISERs and NISER also has a very highly ranked PhD programme.

Students studying at all the above institutes are paid fellowships of Rs.5000 for the Bachelors students (provided they clear a certain threshold percentage in their 12th boards exams), Rs.5000-Rs.7000 to the Masters Students by the DST and around Rs. 26000-Rs. 31000 for the PhD students. In CMI PhD students are paid Rs. 26000-28000 for PhD and Rs. 9000 for M.Sc.

*[This article was slightly modified on 14th of March, 2015 and substantially modified on 8th October, 2018 and 11th November, 2020.]*

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