Dear Sir

Volume 6, No. 1 of the Mathematical Medley has awakened my interest again in geometrical problems, and this time, it is on the trisection of an angle as presented by Dr. Chew in his article. I have tabulated a range of values of angles that can be trisected by this method...

Now this method is trigonometric in nature and not by the use of straight edge and compasses. I would like to request for a geometrical solution of Equation (2):

$$m/n = a(4a^2 - 3b^2)/b^3 .$$

Although modern mathematics is useful in the general form of analysis, there are some shortcomings of modern mathematics when it comes to generalisations of equations derived from trigonometric forms similar to equation (2).

A.D. Villanueva
Pappacon engineers & associates

Dear Sir

In any process of teaching there are the students and the teachers, both play important roles. If we as teachers want to improve the standard of modern mathematics teaching at 'O' level, we need to be better equipped. We need to know much more than 'O' level mathematics. Many of its concepts lie above 'O' level perhaps at 'A' level or undergraduate level.

Maybe many of us were trained before the 'coming' of modern mathematics. The Ministry of Education has conducted courses to enable teachers to teach modern mathematics at 'O' level. This is good. But I would like to suggest that some courses at a more advanced level be made available to teachers; for example, courses in mathematical logic, foundation of mathematics, Boolean algebra, group theory, linear algebra. Maybe the Ministry of Education could conduct such courses with the help of the Singapore Mathematical Society. I do believe that if the Ministry conducts these courses many teachers will attend even if such courses carry no incentives (promotion, allowance, etc).

Sad to say, advanced courses are not available in Singapore except for those given to full-time students at the University of Singapore and Nanyang University. In general, it is impossible for us teachers to take up full-time study again. A university degree, however, does not necessarily make one knowledgeable enough to teach well, even after one year of teacher training. The availability of advanced courses will help us better ourselves.

Regular discussion and seminars among teachers will help us learn from each other's experience. There is a great interest among teachers in such seminars and discussion. For example, the recent symposium on mathematical education organised by the Singapore Mathematical Society with the cooperation of the Ministry of Education, Nanyang University and University of Singapore on 30 and 31 May 1977 attracted a significant number of mathematics teachers from schools of all levels. It was a pity that this seminar was conducted over a wide range of topics during too short a time. It would have been more beneficial if it was conducted to cover specific topics and more time was made available.

Perhaps one-day seminars on some topics of modern mathematics could be organised every three months. Such seminars would generate an exchange of ideas and experience and also of teaching materials. Invited lectures on the methodology of teaching in modern mathematics would be enriching. There is no doubt that there is a lack of such useful discussion in Singapore.

A problem worth mentioning is the shortage of mathematics teachers in schools. As long as this shortage exists, relief teachers and teachers who are not sufficiently qualified to teach mathematics will be asked to teach mathematics. Obviously, good results cannot be achieved by such course of action. This is a problem with no easy solution.

It is encouraging that many textbooks on modern mathematics are written by local authors and are used in schools. Though not necessarily excellent, these books are definitely more appropriate and relevant to our local environment. Some schools have used such books for several years, and some teachers have aired their complaints on their deficiencies, such as a lack of variety of examples, bad explanation in some chapters, bad notations, etc. Maybe these teachers should write to the authors on their experience in using these books so that revised and improved editions could be published. The experience of teachers will certainly be invaluable to local authors.

Some teachers of modern mathematics are interested in mere problem solving at the expense of the concept behind the problem. This attitude may not be beneficial to students who go on to 'A' level. In general, a problem solving attitude enable students to solve similar problems, while a 'conceptual' approach enhances the overall understanding and enables students to deal with a wider class of problems. The only time when a problem solving approach is preferable to a conceptual approach is when we have exceptionally weak students who find extreme difficulty in understanding certain concepts. However, the problem with the conceptual approach is that it is time consuming. With proper planning, it is possible to complete the syllabus using the conceptual approach. For students who leave school after 'O' level, the conceptual approach will be more beneficial in life.

A 'unity' approach (by which we mean mathematics is approached as a unity) is preferred to a 'sectional' approach (by which we mean mathematics is considered as being divided into sections such as geometry, algebra, analysis, etc). Students who adopt a 'sectional' approach to mathematics often think that what they learn in one area is of little or no use in another. This is erroneous. For example, a concept in geometry is often very helpful in algebra or analysis. At the advanced level especially, mathematics is viewed as a unity.

One advantage in teaching modern mathematics is that, in general, it is easy to make the session lively and interesting by a proper choice of examples. For instance, my 'A' level students found it interesting to know that 'It is false that roses are red and violets are blue' is logically equivalent to 'Roses are not red or violets are not blue'. They have also found it interesting to draw Venn diagrams and to observe patterns of symmetry.

At the moment about half of the secondary schools in Singapore are using Syllabus B and the other half using Syllabus C in mathematics at 'O' level. Perhaps it is time for the Ministry of Education to set a deadline for the adoption of Syllabus C by all schools, in five years' time say. There are many indications (locally and abroad) that Syllabus C is superior to Syllabus B. A common syllabus will make it more effective to train mathematics teachers and will also create a market for books of modern mathematics, thereby encouraging local authors to write new books or improve their old books.

In some schools where both syllabi are taught, awkward situations are created in which friends belonging to different classes find difficulty in discussing mathematics. There is also the unhappy situation in which a student who finishes 'O' level wishes to take 'A' level mathematics (syllabus B) or Further Mathematics but finds that he knows nothing about modern mathematics. Sometimes a teacher has to conduct remedial classes for such students. This causes much unhappiness among teachers and students.

Finally we need to remind ourselves that mathematics is not taught for the first time in secondary schools but rather in primary schools. Mathematics in secondary school is a continuation of mathematics in primary school. If we want to improve the standard of mathematics teaching in secondary schools, we need to improve the standard of mathematics teaching in primary schools.

Oey Liang Hien
National Junior College