CHAPTER 1 INTRODUCTION

Mathematics pervades all aspects of life, whether at home, in civic life or in the workplace. It has been central to nearly all major scientific and technological advances. Also, many of the developments and decisions made in industry and commerce, the provision of social and community services as well as government policy and planning, rely to an extent on the use of mathematics.

It is important for our students to gain experience and build up the foundation skills and knowledge in mathematics that can facilitate their future development in various aspects. It is also important that our students are able to value mathematics and appreciate the beauty of mathematics after mathematics education in school. In the information explosion era, there are drastic changes both in our society and in the background of our students. It is vital that the curriculum should undergo continuous review and renewal in order to meet the needs of our students and the community.

In reviewing the mathematics curriculum, there are several principles to be followed. The needs of our students and the community are important considerations in developing the aims of the secondary school mathematics education. The worldwide trends of mathematics curriculum have also been taken into consideration in deciding the principles. This syllabus presented is a revised edition of the version published in 1985. It has been scheduled for implementation in schools with effect from September 2001 at Secondary 1.

Principles of Curriculum Design

The following principles are used to guide the evolution of the Aims and Objectives, the structure of the curriculum, and the identification of objectives in each module and unit in the syllabus.

- **Target-oriented**

To ensure that learners will spend their time and effort meaningfully and for maximum benefits, there must be a plan for them to work according to specific Learning Targets and Objectives which are geared towards the Aims and Objectives of the school mathematics curriculum. They are organized progressively across four Key Stages in primary and secondary schooling: Key Stage 1 (Primary 1 to 3), Key Stage 2 (Primary 4 to 6), Key Stage 3 (Secondary 1 to 3) and Key Stage 4 (Secondary 4 to 5).

The learning targets and objectives for Key Stages 1 and 2 can be found in Annex I. Continuing the learning in primary schooling, the overall Aims and Objectives for Key Stages 3 and 4 are stated in Chapter 2. The Learning Targets and Objectives for each dimension in

each learning stage are further elaborated in Chapter 4 to spell out the specific learning objectives for each learning area. All learning and assessment activities fulfil the learning objectives of that particular unit and are geared towards the maximum learning effectiveness for achieving the Aims and Objectives.

- **Catering for learner differences**

Upon the implementation of universal education in Hong Kong, a wider range of students gain access to secondary mathematics than have been in the past. The school mathematics curriculum should cater for the diversity of students' needs and for the wide spectrum of ability among them.

Besides the various ways of organizing students' activities in the class to cater for learner differences, the **Foundation Part** of the curriculum is identified. The Foundation Part is the essential part of the Syllabus which ALL students should strive to learn. Apart from the Foundation Part, teachers can judge for themselves the suitability and relevance of other topics in the Whole Syllabus for their own students. For more able students, teachers can adopt some **enrichment topics** at their discretion to extend these students' horizon and exposure in mathematics.

In order to provide further flexibility for teachers to organize the teaching sequences to meet individual teaching situations, the learning units and modules for each dimension are subdivided into **key stages** (KS), i.e. KS3 for S1-S3, KS4 for S4-S5. Teachers are free to design their school based mathematics curriculum for each year level with all learning areas suggested for each key stage in mind.

- **Relevance of study to students**

In order that mathematics learning efforts are effective, the knowledge and skills to be learnt should be determined by the activities deemed suitable for the age-group concerned. Great care is taken to ensure that the curriculum is organized with a cognitive developmental perspective. For instance, exposure to concrete objects and personal experience is planned to support abstract discussion as far as possible.

Students who find the study relevant to their experience will be motivated to learn the subject. Daily life applications are emphasized in the curriculum. Stories of historical development of mathematics knowledge are included to enable students to understand mathematics knowledge evolved from real-life problems and refined after years. A new module "**Further Applications**" which includes the application of mathematics in more complex real-life situations requires students to integrate their knowledge and skills from various disciplines to solve problems.

- **Impact of information technology**

The tools for solving mathematical problems change from time to time. The introduction of electronic calculators in 1980's has influenced the teaching of secondary school mathematics. There are different roles electronic calculators can play. A general worry among teachers and parents is that the unwise use of calculators by students would hamper their development of computational skills. With years of experience in the classrooms of various countries, the positive role that calculators could play in the mathematics learning is generally aware of.

Today we are confronted with a similar situation. The popularity of graphing calculators, the availability of computers and other information technology aids in the classrooms will have impact on the mathematics curriculum in terms of contents and strategies for teaching and learning of mathematics. There are ranges of ways in which information technology may be used in mathematics classes, including data analysis, simulation device, graphical presentation, symbolic manipulation and observing patterns. The appropriate use of information technology in the teaching and learning of mathematics becomes one of the emphases in the mathematics curriculum.

- **Fostering general abilities and skills**

Knowledge is expanding at an ever faster pace and new challenges are continually being posed by the rapid changes in technology and in the way society evolves. It is important that students need to develop their capabilities to learn how to learn, to think logically and creatively, to develop and use knowledge, to analyze and solve problems, to access information and process it effectively, and to communicate with others so that they can meet the challenges that confront them now and in the future. Acquiring mathematics knowledge has always been emphasized, but fostering these general abilities and skills are strongly advocated for all students in the revised curriculum.

In the curriculum, fundamental and intertwining ways of learning and using knowledge such as inquiring, communicating, reasoning, conceptualizing and problem-solving are considered important in mathematics education. On the one hand, students are expected to learn mathematics to enhance the development of these skills. On the other hand, students are expected to use these learning strategies to construct their mathematics knowledge. A variety of learning activities should be planned and geared towards the development of these general abilities and skills.