

Guidelines on Catering for Learner Diversity and Creating Space in Senior Secondary Mathematics

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Foreword

In tandem with the recommendation on optimising the curricula and assessments of the four senior secondary (SS) core subjects set out in the review report of the Task Force on Review of School Curriculum (the Task Force) released in 2020¹, the committees on the four SS core subjects under the Curriculum Development Council (CDC) and the Hong Kong Examinations and Assessment Authority (HKEAA) formulated measures to optimise the respective curricula and assessments of the subjects, thereby creating space for students and catering for learner diversity. In view of the fact that the optimising measures for SS Mathematics do not involve any changes to the current curriculum and the design of the Hong Kong Diploma of Secondary Education (HKDSE) Examination for the subject, the CDC prepared the *Guidelines* to provide schools with recommendations on how to better utilise the flexibility in the existing design of the SS Mathematics curriculum framework to cater for learner diversity. Schools are encouraged to plan their school-based SS Mathematics curriculum, taking into consideration their students' abilities, interests and aspirations to address learner diversity and create space for them. For details of the current SS Mathematics curriculum, please refer to the *Mathematics Curriculum and Assessment Guide (Secondary 4 - 6)*.

Views and suggestions on the *Guidelines* are welcome and may be sent to:

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¹ *Final Report of the Task Force on Review of School Curriculum: Optimise the curriculum for the future, Foster whole-person development and diverse talents* (2020).

1. Background

The Task Force was set up by the Education Bureau (EDB) in November 2017 to holistically review the primary and secondary curricula to enhance students' capability to learn and nurture in them the values and qualities essential for the 21st century, thereby preparing them to meet future challenges and the needs of society. The Task Force submitted its review report to the EDB in September 2020 with six directional recommendations². The EDB accepted the directional recommendations set out in the report in December 2020, which include optimising the curricula and assessments of the four SS core subjects to create space for students as well as to cater for their diverse interests, abilities and aspirations. The EDB then collected suggestions and views from the school sector on the proposals to optimise the four SS core subjects through a school questionnaire survey and different channels. The relevant committees under the CDC and the HKEAA followed up and put forward proposals to optimise the respective subjects. After thorough examination and deliberation, the CDC and HKEAA Public Examinations Board endorsed the optimising proposals and made suggestions to the EDB. The optimising proposals were accepted by the EDB and released in April 2021.

Mathematics, as a core subject at the SS level, plays a crucial role in nurturing students' mathematical literacy to meet the challenges in a technology-oriented and information-rich society. In response to students' different learning needs, the framework of the current SS Mathematics curriculum has already provided flexibility for catering for learner diversity. The current curriculum comprises the Compulsory Part and the Extended Part. The Compulsory Part provides essential mathematical knowledge and skills to meet the needs of students in pursuing different pathways, while the Extended Part offers a choice of Module 1 (M1) (Calculus and Statistics) or Module 2 (M2) (Algebra and Calculus) to meet the needs of students who require more mathematical knowledge and skills for their future studies and careers. Besides, the content in the Compulsory Part is categorised into Foundation Topics and Non-foundation Topics. Foundation Topics comprise a set of fundamental knowledge and skills that all students should strive to learn, while Non-foundation Topics provide a wider range of content in terms of breadth and depth for schools to adjust the learning content according to their students' needs.

The Task Force in its review report recommended the enhanced utilisation of the

² (i) Reinforcing the importance of whole-person development, (ii) According higher priority to values education, (iii) Creating space and catering for learner diversity, (iv) Further promoting Applied Learning, (v) Enhancing the flexibility in university admissions, and (vi) Strengthening STEM education

aforementioned demarcation between Foundation Topics and Non-foundation Topics of the Compulsory Part of the current Mathematics curriculum to cater for learner diversity. Observation of the implementation of the SS Mathematics curriculum since the launch of the New Academic Structure has also shown that there is room for enhancement in the use of the existing flexibility of the Mathematics curriculum framework to cater for learner diversity, as well as the arrangements for Mathematics lessons within the regular school timetable.

In view of this, to better cater for learner diversity and create space in SS Mathematics, the committees on Mathematics under the CDC and HKEAA put forward optimising measures for SS Mathematics to strengthen curriculum differentiation, so as to allow students of different abilities, interests and aspirations to study different combinations of the Compulsory Part and the Extended Part of Mathematics while keeping the current curriculum and the design of the HKDSE Examination for Mathematics unchanged. The measures were endorsed by the CDC and HKEAA Public Examinations Board and accepted by the EDB. They are effective from Secondary 4 in the 2021/22 school year. The following parts of the *Guidelines* will further elucidate the rationale and school-based curriculum planning for catering for learner diversity and creating space for students in SS Mathematics. Schools are advised to adopt the recommendations in the *Guidelines* in accordance with their own school contexts and students' needs and characteristics.

2. Catering for Learner Diversity and Creating Space

2.1 Rationale

The optimising measures of SS Mathematics for catering for learner diversity and creating space is part of a holistic optimisation initiative to be implemented in the four SS core subjects. Schools are advised to review and plan the curricula of the four core subjects in a holistic manner in accordance with the school contexts and students' learning and developmental needs. Regarding SS Mathematics, as mentioned in the previous section, the current curriculum framework has already provided flexibility to cater for learner diversity. To better cater for learner diversity and create space for students, schools are recommended to:

- plan their school-based SS Mathematics curriculum in accordance with the school contexts and learning needs of students to fully nurture students' mathematical literacy based on their abilities, interests and aspirations;
- make better use of the current demarcation between Foundation Topics and Non-foundation Topics of the Compulsory Part, and arrange students with different mathematical abilities, interests and aspirations to study different combinations of the Compulsory Part and the Extended Part of SS Mathematics based on the school contexts; and
- offer lessons of M1 and M2 of the Extended Part in the regular school timetable. If lessons of the Extended Part are arranged outside the regular school timetable, the prolonged lesson time will increase the burden of teachers and students and affect the learning and teaching effectiveness. Further, it will also be unfavourable to students' participation in co-curricular activities and Other Learning Experiences (OLE), and affect the whole-person development of students.

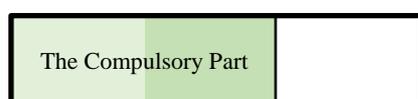
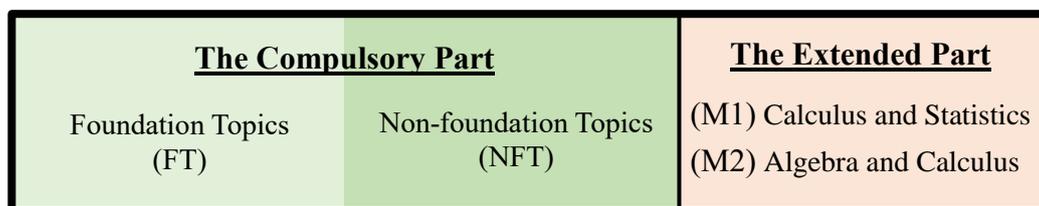
In arranging students with different mathematical abilities, interests and aspirations to study different combinations of the Compulsory Part and the Extended Part of SS Mathematics, schools should note the following recommendations:

Students	Learning content to take	Release of 50 hours of lesson time
1. General students	The whole Compulsory Part	Not applicable
2. Students who have keen interest in Mathematics or need more mathematical knowledge and skills for their future studies and careers	The whole Compulsory Part together with M1 or M2 of the Extended Part	Not applicable
3. Students who have the inclination to pursue further studies on subjects not related to mathematics	Foundation Topics and part of the Non-foundation Topics of the Compulsory Part	May consider releasing up to 50 hours of lesson time over the three years
4. Students who need more time to focus on the more foundational learning content	Foundation Topics and part of the Non-foundation Topics of the Compulsory Part	Not applicable

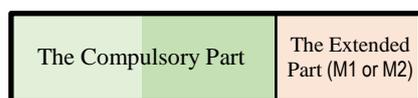
For general students, they are recommended to study the whole Compulsory Part. As for students who have keen interest in Mathematics or need more mathematical knowledge and skills for their future studies and careers, schools should encourage them to study M1 or M2 of the Extended Part in addition to the Compulsory Part. For students who have the inclination to pursue further studies on subjects not related to mathematics (non-mathematics-inclined students), schools may allow them to study only part of the Non-foundation Topics and use the lesson time released (up to 50 hours over the three years) to focus on the study of other subjects or participate in OLE. For those who need more time to focus on the more foundational learning content, they may study only part of the Non-foundation Topics and spend the time saved on others to allow them to better focus on those topics (including Non-foundation Topics) they can manage, consolidate what they have learnt, deepen their understanding and achieve better results in Mathematics. If students have the ability and needs to study the entire Compulsory Part, they should not be arranged to study only part of the Non-foundation Topics. Schools should plan the learning content of Mathematics for different SS classes according to their students' needs. However, since school contexts vary, arrangements in a school **may not necessarily include all the scenarios in the above table.**

The following diagram illustrates the above recommendations on catering for learner diversity and creating space:

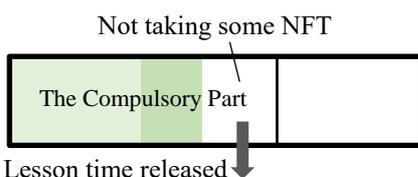
Senior Secondary Mathematics



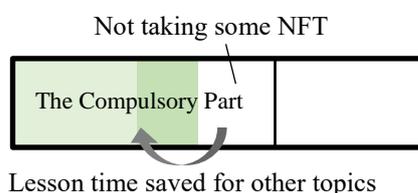
1. General students: studying the whole Compulsory Part



2. Students who have keen interest in Mathematics or need more mathematical knowledge and skills: studying M1 or M2 together with the Compulsory Part



3. Non-mathematics-inclined students: studying FT and part of NFT and using the lesson time released (up to 50 hours over the three years) to focus on the study of other subjects or participate in OLE



4. Students who need more time to focus on the more foundational learning content: studying FT and part of NFT, and spending the time saved on learning FT and the other topics

The above-mentioned arrangement of releasing 50 hours of lesson time is only for those students whose interests and aspirations are not in mathematics so that they may use the space released from studying only part of the Non-foundation Topics (up to 50 hours over the three years) to focus on those subjects which are aligned with their developmental directions, or to participate in OLE.

When students and parents consider whether to take the whole Non-foundation Topics and need more concrete reference, they may wish to note that *a good mastery of Foundation Topics of the Compulsory Part is sufficient for candidates who perform well in the HKDSE Examination to attain up to Level 4 in the Compulsory Part.* This information, which reflects the real situation under the current assessment design

(instead of being a new arrangement), provides students and parents with a more concrete idea about the proportion of Foundation Topics and Non-foundation Topics in the curriculum content and public assessment. The purpose of providing such information is not to encourage students to study only the Foundation Topics, or to set Level 4 as their target. Schools should offer the study of all or part of the Non-foundation Topics in accordance with students' needs.

Schools are reminded that as the optimising measures of the four SS core subjects implemented from the 2021/22 school year involve no changes to the assessment design of the HKDSE Examination of the Compulsory Part and Extended Part of Mathematics, the level of difficulty, format and length of related papers of the examination **remain unchanged**. For more information on the public assessment of SS Mathematics, please refer to Chapter 5 of the *Mathematics Curriculum and Assessment Guide (Secondary 4 - 6)*, and the related webpage of HKEAA (https://www.hkeaa.edu.hk/en/hkdse/assessment/subject_information/).

2.2 School-based Planning

While arranging students with different mathematical abilities, interests and aspirations to study different combinations of the Compulsory Part and the Extended Part of SS Mathematics, schools may adopt **block-timetabling** and **grouping** to arrange students into different classes / groups to take different combinations of the Compulsory Part and the Extended Part, i.e. Foundation Topics with part of Non-foundation Topics, the whole Compulsory Part, and the Compulsory Part plus M1 / M2, within the regular school timetable. Schools may note the following main points:

- In accordance with the school contexts, schools could decide whether or not and at which year level to offer classes / groups for non-mathematics-inclined students or those who need more time to focus on the more foundational learning content;
- The advantage of block-timetabling and grouping is that the lessons are conducted in parallel. Schools may consider individual S4 or S5 students' learning progress and other school-based criteria, and arrange them to move from one group to another as appropriate;
- Regarding the arrangement of M1 / M2 lessons of the Extended Part in the regular school timetable, if schools plan to add an additional common block for elective subjects through the optimisation of the four SS core subjects, the schools may place M1 / M2 lessons **in the common block**. Schools may also make use of the

lesson time released by the optimising measures of the four SS core subjects to allow students in some classes to take the Compulsory Part together with M1 or M2 of Mathematics in lesson time **outside the common block for elective subjects**; and

- When handling the grouping arrangements in Mathematics, schools may adopt mechanisms similar to their existing ones for handling selection of SS subjects and grouping of students within subjects by taking into consideration the views of students and parents, the number of students with different needs, student performance in internal assessments, their learning needs in other subjects, etc.

Through the grouping arrangements in Mathematics, schools may arrange learning and teaching in accordance with students' aptitudes and abilities to increase the flexibility of learning and teaching and optimise students' results in learning mathematics.

Regarding the grouping arrangements for the lessons of the Compulsory Part and the timetabling arrangements for the inclusion of M1 / M2 lessons of the Extended Part within the regular school timetable, schools may refer to the **examples of timetabling arrangements** in the **Appendix**. The examples demonstrate some common timetabling arrangements for schools' reference, including both the examples of arranging lessons of the Extended Part inside and outside the common block for elective subjects. Schools may adjust the details of arrangements in the examples according to their school contexts and the overall school planning in practice to formulate the most appropriate timetables and flexible grouping arrangements to cater for learner diversity and create space.

2.3 Conclusion

To complement the optimisation of the four SS core subjects, this set of *Guidelines* aims to provide schools with recommendations on curriculum planning and timetabling of SS Mathematics to better cater for students' different learning needs in SS Mathematics. Schools should adopt appropriate grouping arrangements for lessons of the Compulsory Part and place the lessons of the Extended Part within the regular school timetable to provide students of different abilities, interests and aspirations with appropriate learning arrangements in Mathematics which match their diverse paths of development. For other aspects of catering for learner diversity in SS Mathematics, please refer to Chapters 4 and 5 of *Mathematics Curriculum and Assessment Guide (Secondary 4 - 6)*.

When updating the curriculum planning and timetabling of SS Mathematics, schools should also communicate closely with parents to provide them with a clear picture of the arrangements for catering for learner diversity and creating space in SS Mathematics, and how these arrangements could better meet the learning needs and development of students for a more tailored learning in mathematics.

Examples of Timetabling Arrangements

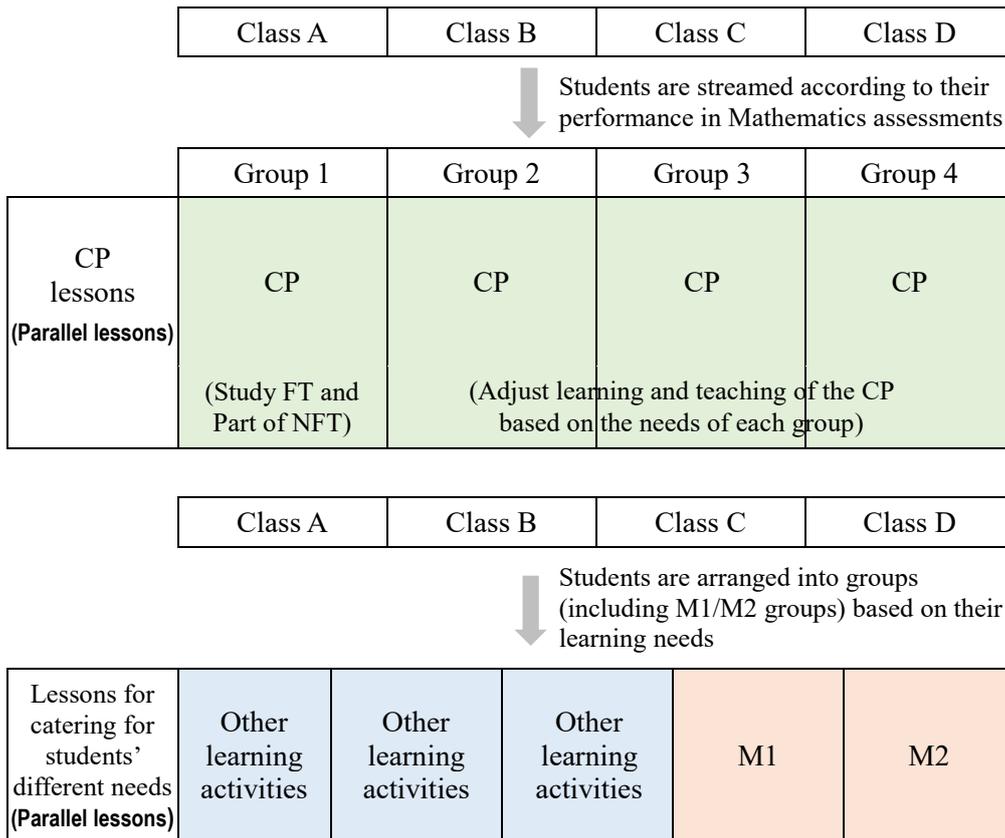
The following examples are intended to provide some common timetabling arrangements in SS Mathematics for schools' reference. The examples mainly include different scenarios involving considerations of “**whether to arrange parallel lessons**” and “**whether to involve the common blocks for elective subjects**”. Schools may adjust the details of arrangements in the examples according to their school contexts, students' needs, existing resources and space, and the overall school planning, so as to formulate appropriate timetables and flexible grouping arrangements for catering for learner diversity and creating space.

Example 1: Arranging parallel lessons and not involving the common blocks for elective subjects

(Please refer to the diagram on the next page)

Compulsory Part (CP): The CP lessons are arranged in the mode of parallel lessons (or called block-timetabling). Four classes of students are streamed into four groups based on their Mathematics assessment results so that students' learning needs can be better addressed in each group. For example, Group 1 is mainly for students who need more time to focus on the more foundational learning content, and would study Foundation Topics (FT) and some Non-foundation Topics (NFT) of the CP, while the rest of students are allocated to Group 2, 3, or 4. Schools could adjust learning and teaching of the CP in these groups according to students' needs.

Extended Part (EP): In tandem with the optimising measures of the four core subjects, schools can cater for learner diversity through setting up parallel lessons outside the common blocks for elective subjects and offering M1 and M2 of the EP for students who have keen interest in Mathematics or need more mathematical knowledge and skills for future studies and career pursuits. These students could be from Group 2, 3, or 4 for the CP. Other learning activities can also be offered in these parallel lessons, such as Applied Learning courses (if there is sufficient lesson time), enhancement classes for different subjects, OLE, etc., for students who do not take the EP.



Remarks for Example 1:

- Since this example does not involve the common blocks for elective subjects, schools offering different numbers of elective subjects may all make reference to this example.
- Schools may adjust the number of groups for the CP with due consideration to their resources and students' needs.
- If students are allocated to different classes based on their Mathematics assessment results, schools may also arrange the CP lessons in non-parallel mode.
- Schools may, based on their school contexts, decide whether to allocate students evenly into Groups 2 to 4 for the CP, or to differentiate students based on their performance in Mathematics assessments.

Example 2: Arranging non-parallel lessons and not involving common blocks for elective subjects

Compulsory Part: Schools allocate students with the ability and interest to study the EP to two of the classes (for example, based on student performance in Mathematics assessments and their willingness to take EP) while the rest of the students only take the CP. The CP lessons for all classes need not be arranged in parallel lessons. In the figure below, Classes C and D are made up of students who are mathematically inclined and suitable for taking both the CP and the EP, while students in Classes A and B are advisable to take the CP only. Schools may adjust the learning and teaching of the CP for each of Classes A to D based on students' needs.

Extended Part: The M1 and M2 lessons of the EP are conducted in the lessons designated for catering for learner diversity in each class under the optimisation of the four core subjects (arrangement of parallel lessons is not required). For Classes C and D, M1 and M2 are offered in those lessons respectively, with the CP and the EP taught by the same teacher. The teacher could then exercise more flexibility to adjust the lesson time and teaching sequence for the CP and the EP, thereby enhancing learning and teaching effectiveness.

Students are allocated to different classes based on their performance in Mathematics assessments and willingness to take the EP

	Class A	Class B	Class C	Class D
CP lessons (Non-parallel lessons)	CP (Adjust learning and teaching of the CP based on students' needs in each class)	CP	CP	CP
Lessons for catering for students' different needs (Non-parallel lessons)	Other learning activities	Other learning activities	M1	M2

(For Classes C and D, the same teacher is arranged to teach the CP and the EP)

Remarks for Example 2:

- Since this example does not involve the common blocks for elective subjects, schools offering different numbers of elective subjects may all make reference to this example.

- Schools may adjust the number of EP classes or split these classes into different groups with due consideration of school resources and students' needs. For example, **parallel lessons for the CP and the EP** may be arranged for Classes C and D, and these two classes **can be further divided into three groups, two of which can take M1 and M2 respectively**, and the remaining group can participate in other learning activities. On the other hand, the lessons of CP and other learning activities for Classes A and B can be arranged in non-parallel lessons.

	Non-parallel lessons		Parallel lessons		
	Class A	Class B	Class C	Class D	
CP lessons	CP (Adjust learning and teaching of the CP based on students' needs in each class)				
Lessons for catering for students' different needs	Other learning activities	Other learning activities	Other learning activities	M1	M2
	Non-parallel lessons		Parallel lessons		

- If school resources permit, **students who have the inclination to focus their learning on subjects not related to mathematics** (non-mathematics-inclined students) **may be placed in the same class** (such as Class A). If they intend to study less NFT, they can be **separated from the class to form another group** in all or some school years. By studying only part of NFT, they may use the lesson time released (up to 50 hours over the three years) for other learning activities.

	Class A	Class B	Class C	Class D
CP lessons (Non-parallel lessons)	CP	CP (Adjust learning and teaching of the CP based on students' needs in each class)		
Lessons for catering for students' different needs (Non-parallel lessons)	Other learning activities	Other learning activities	M1	M2

(Not studying part of NFT, and releasing the lesson time for other learning activities)

Example 3: Arranging parallel lessons or non-parallel lessons and involving a common block for elective subjects

Compulsory Part: Schools may arrange parallel lessons for the CP and stream students according to their performance in Mathematics assessments (refer to Example 1), or if students are already allocated to classes based on their learning needs in Mathematics, there is no need to arrange parallel lessons for the CP (refer to Example 2). No matter which of these two arrangements is adopted, schools may adjust learning and teaching in each class/group in accordance with students’ aptitudes and abilities, and make appropriate curriculum adaptation, for example, teaching only part of NFT for achieving a more flexible and effective use of lesson time.

Extended Part: Schools may allow students to choose to take an elective subject, M1/M2 of the EP, an Applied Learning course, etc., in one of the common blocks for elective subjects. As the lesson time required for the EP is usually less than that for elective subjects, schools may flexibly consider arranging other learning activities in the common block for students taking M1 and M2.

Students are allocated to **classes / groups** based on their performance in Mathematics assessments

	Class A/Group 1	Class B/Group 2	Class C/Group 3	Class D/Group 4
CP lessons (Parallel lessons for groups)	CP (Study FT and part of NFT)	CP (Adjust learning and teaching of the CP based on students' needs in each class/group)	CP	CP

Class A	Class B	Class C	Class D
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↓ Students choose to take an elective subject, an Applied Learning course or M1/M2 through school-based mechanism

one of the common blocks for elective subjects	Elective 1	Elective 2	Other learning activities	M1	M2	Applied Learning course
				Other learning activities	Other learning activities	

Other learning activities

Remarks for Example 3:

- Since this example involves a common block for elective subjects, it is applicable to schools that already have three common blocks for elective subjects in their timetables, or those which plan to add the third common block for elective subjects under the optimising measures for the core subjects.