SECONDARY WORKSHOP

GUIDELINES FOR DISCUSSION

Topic 1: The common secondary 1 and 2 syllabus

1.1 What is the rationale for having a common syllabus at this level?

1.2 Identify the topics which are common to both the B and C syllabuses of the GCE.

1.3 Identify the topics which are relevant to the B syllabus but not to the C syllabus.

1.4 Identify the topics which are relevant to the C syllabus but not to the B syllabus.

1.5 How should the topics which are not common to the B and C syllabuses be taught so that all pupils will benefit irrespective of whether they will be eventually following the B or C syllabus?

1.6 Identify topics that you want to be left out, giving your reasons.

1.7 Identify new topics that you want to include, giving your reasons.

1.8 Is there any evidence to show that our pupils have become less skilful in basic computational work as a result of the new syllabus? If so, what is the remedy?

Topic 2: GCE syllabus B versus syllabus C

2.1 Identify the main topics of the B and C syllabuses which overlap.

2.2 Identify the topics which are found in the B syllabus, but not in the C syllabus.

2.3 Identify the topics which are found in the C syllabus but not in the B syllabus.

2.4 What are the advantages of the C syllabus over syllabus B?

2.5 Are there any disadvantages in following syllabus B? If so, how can these be overcome?

2.6 Is there any evidence to support the view that the C syllabus is not suitable for weaker pupils?

2.7 What are the difficulties encountered in teaching the C syllabus?

2.8 Identify the topics in the C syllabus which pose problems in learning and teaching?

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary 1 mathematics

3.1 What minimum basic knowledge of mathematics need the primary school leavers know, bearing in mind the view that the present primary mathematics syllabus is considered by some teachers to be too heavily loaded?

3.2 What are the important topics we expect primary six leavers to know?

3.3 To what depth do we expect them to know in

3.3.1 algebra

3.3.2 geometry

3.3.3 graphs?

3.4 In the following arithmetical topics, how much knowledge and skills do we expect a primary school leaver to have?

3.4.1 the four operations

3.4.2 fractions

3.4.3 decimals

3.4.4 percentages

3.4.5 rates

3.4.6 word problems

3.5 What are the common difficulties an average secondary 1 pupil encounters?

Topic 4: The folly of learning without reasoning

4.1 Are there areas of mathematics that can be learnt without reasoning? If so, list them.

4.2 Does rote learning lead to speedier calculation and problem-solving?

4.3 How would you ensure that pupils do not merely learn rules or formulas by heart without understanding?

4.4 How much importance would you attach to drill and practice in the learning of mathematics?

Topic 5: Evaluation - testing and homework

5.1 Our teachers have been cautioned not to teach for testing. How can tests be designed to teach?

5.2 What are the main objectives of setting homework in mathematics and how should marking of homework be organised so that these objectives are achieved?

5.3 Should all the homework set be marked? What part of the homework need not be marked?

5.4 Should pupils use one or more exercise books or a file for doing homework? What are the advantages and disadvantages?

5.5 How can a proper record of homework set and marked be maintained?

5.6 How should the homework be evaluated so that it provides the teacher with information for corrective teaching?

5.7 Should the assessment of tests/homework be given any weightage in the terminal and final examinations?

WORKSHOP REPORTS

GROUP F

Chairman : Mr. Yeoh Yee Sing (1st day)
Miss Kan Sou Tin (2nd day)

Rapporteur : Mr Nga Been Huon

Topic 1: The common secondary 1 and 2 syllabus

1.1 (a) A common syllabus would bring about a greater uniformity in instruction.

(b) It would be desirable if all students will eventually read syllabus C

(c) It is time that some of the relatively new concept of mathematics (such as set theory, statistics) were introduced.

(d) The common syllabus is not necessarily modern mathematics; rather the inclusion of certain modern topics has made it a better syllabus

(e) The sending of students to technical schools where Syllabus C was offered was used as a reason for the common syllabus, but this is no longer valid.

(f) The modern topics in the common syllabus call for more reasoning and a better grasp of concepts and this makes the learning more challenging, more interesting and more meaningful. It is desirable if these topics could be introduced even as early as primary one or two

(g) The modern topics also encourage new and varied approaches and methods with emphasis on the understanding of concepts rather than on rote learning and drill.

(h) While the common syllabus is wide in coverage

it must be borne in mind that the syllabus, in its entirety, is tailored for the "high-flyers." It is not imperative that every pupil irrespective of his learning ability must cover the whole syllabus.

1.5 (a) Teachers teaching pupils who will eventually proceed to do syllabus B should not leave out modern topics, as these topics are relevant and useful to everyday life (e.g. binary system in the understanding of digital computers and Venn diagrams/charts/graphs in the representation and solution of problems).
It is possible to arrange visits to the Computer Centre at Monk's Hill or at the Finance Ministry.

(b) It is felt that teachers should put more stress on the understanding of concepts and their applications to everyday life than on drilling the pupils in solving standard types of problems; for example, arrangement should be given to the use of graphs and charts to represent situations in geography, economics, trade and so on. The teaching of vectors may be related to the movements of ships, aeroplanes, cars etc.

(c) In both the modern and traditional topics pupil participation should be stressed wherever possible. Pupils should learn the way to obtain results and should use their common sense to decide whether an approach is right or wrong.

(d) It is felt that, owing to the inclusion of modern topics, the coverage of the syllabus has increased considerably. This should not deter the teacher from doing justice to the modern topics. Should he be faced with difficulty in covering all the topics in modern mathematics he should refer the problem to the principal and explain

the situation to the pupils.

(e) Traditional topics should continue to be taught by the more formal traditional methods.

1.6 It is generally felt that the syllabus is overloaded and that conscientious teachers trying to cover the whole syllabus may unwittingly do more harm than good . It is therefore decided that

(i) bicimals, simple bicimal-decimal conversions, addition and subtraction of bicimals, which are of little relevance and usefulness, should be left out;

(ii) the teaching of conversion of recurring and non-recurring decimals to proper fractions should be left out but recurring and non-recurring decimals should be taught with an eye on its usefulness to numerical analysis and its relation to rational and irrational numbers, (i.e. the topic may be retained but the stress should be on concept).

1.8 (a) There are enough topics in the common syllabus to train pupils in the basic computational skills. Generally these skills are adequate for later use. In fact over-drilling in computational work becomes mechanical and can be a waste of time.

(b) The concept in the teaching of computational skills should be emphasised to the extent that pupils are able to make rough estimates or to decide on the degree of accuracy required while using calculating machines. However a certain amount of drilling in skill is also necessary.

Topic 2: GCE syllabus B versus syllabus C

2.6 (a) It is generally felt that the C syllabus is

suitable for weaker pupils. It is relevant and applicable to everyday experience. The modern topics call for reasoning and understanding of basic concepts, thus making it more interesting and meaningful.

(b) Certain schools have indicated that their pupils do better since changing over to the C syllabus. With more than 50% of the schools now following the C syllabus the overall result is slightly better than when all the schools followed the B syllabus.

(c) Misgivings on the part of certain schools at the initial stage is due to the following reasons:

(i) Inadequate manpower of the right calibre ;

(ii) Syllabus C covers much more ground than syllabus B ;

(iii) Slowness in adjusting to the new situation.

(d) Statistics show that the percentage pass of pupils doing syllabus C is higher than that of pupils following syllabus B.

(e) More and more pupils, including weak ones, are now following syllabus C.

(f) As the teaching of syllabus C is considered overloaded it is recommended that the following topics, which are not in the Cambridge G.C.E. O level syllabus C, be left out

(i) in Sec. 3 - use of slide rule

(ii) in Sec. 4 - sequences of numbers, arithmetical and geometrical progressions; definition of a group and simple examples of groups, the idea of a field, finite arithmetic, basic laws of operation in the algebra of sets; intuitive topology, Euler formula; mean

deviation and standard deviation of a frequency distribution.

2.7 (a) The C syllabus is a relatively new one and needs a little time to get used to.

(b) The new text-books contain numerous misprints and errors.

(c) There is a lack of reference books for the modern topics.

(d) A teachers' library or a reference library of mathematics books would be a great help.

(e) Mathematics magazines and journals may be obtained through being members of mathematical societies.

(f) Courses on modern mathematics organised by local mathematical societies have been helpful.

(g) A request was made for a list of good textbooks and reference materials which should be circulated among the schools, so that these books could be acquired for the school libraries.

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary 1 mathematics

3.1 & 3.4 (a) Knowledge of the four operations including a thorough knowledge of long multiplication and long division, and checking of results by reverse processes are absolutely necessary.

(b) Pupils must master the four operations on simple fractions and decimals.

(c) Pupils should be able to express a quantity as a percentage of another. The ability to solve problems related to percentage is not required.

(d) While the knowledge of uniform or average rate

is expected of pupils, that of variable rate is not required.

(e) Pupils should be able to solve simple and straightforward problems. In solving problems, as long as the necessary steps are shown, brief statements should be sufficient. Mathematical symbols may be used and a 'tabular' form of statements should suffice.

3.3 (a) Regarding algebra, the four operations on like terms should be mastered while operations on negative terms should be left out. Brackets should also be left out.

(b) Regarding geometry, the pupils should have the knowledge of corresponding and alternate angles etc., the ability to do simple constructions and to apply geometrical properties to simple riders.

(c) Primary school leavers should master all the topics concerning graphs, tables, charts and classification of data as stated in the primary syllabus.

Topic 4: The folly of learning without reasoning

4.1 Yes, but this should only be limited to the learning of mechanical computational skills and the memorising of formulae, rules and standard procedures.

4.2 Yes, especially in relation to calculations and the solution of standard types of problems.

4.3 Problems could be set which cannot be solved by direct application of formulae or by going through specified steps. Avoid stereotyped problems, and set problems with a little 'twist'.

4.4 Drill and practice may only be used after the necessary concept has been understood or after the pupils have seen the pattern. Drill and practice can help effectively in the process of consolidation and committing to memory.

Topic 5: Evaluation - testing and homework

5.1 Well constructed multiple choice test questions, with one correct answer and general wrong answers, will guide pupils towards the right responses. Less formal and shorter tests should be given regularly as a feedback on pupils' progress and as a check on pupils' understanding or as a guide for future teaching emphasis.

5.2 to 5.6 (a) Homework is absolutely essential as classwork done is far from adequate. However, care must be taken to see that too much pressure is not put on pupils so as to drive them to copying or to resort to other dishonest means of getting their assignment done in time. Do not give too much homework and do not be too strict about deadlines for the submission of homework.

(b) The amount of homework to be marked is much more than any teacher can handle, though some marking should be done. The teacher should differentiate between the pupils who need special attention and those who do their work faithfully and are quite capable of looking after themselves. Homework from the former group should be marked by the teacher while that from the latter group could be circulated among the pupils and marked by themselves. Occasionally the teacher should still mark all the scripts. An alternative is to mark certain questions

and give extra questions to be done by pupils on their own.

(c) It is essential that a record of all homework done should be kept. This is to ensure that pupils do not neglect their homework and to enable the teacher to assess each pupil's progress.

GROUP G

Chairman : Mr. Ho Juan Beng

Rapporteur : Mr. Tan Whuang Nam

Topic 2: GCE syllabus B versus syllabus C

2.1 to 2.3*

1.4 (a) In doing syllabus C, students are encouraged to think mathematically.

(b) There is a greater emphasis on the understanding of mathematical concepts in syllabus C.

(c) Syllabus C prepares students for the study of higher mathematics, for example, at Junior Colleges.

(d) In our modern society, it is found that syllabus C is definitely more useful than syllabus B.

(e) Syllabus C is superior to syllabus B because syllabus C has a wider application in the technical and technological fields.

(f) The only disadvantage is that parents of the "older generation" may not be able to help their children in mathematics.

2.5 Reference was made to the learning of geometrical proof which had little or no relevance to everyday situations.

2.6 Although it is difficult to pin-point any evidence in support of the view that syllabus C is not suitable for weaker pupils, however syllabus C contains far too many topics for weaker pupils to cope with. Besides, weaker pupils find difficulty in understanding some of the

* Reports on these topics are omitted due to limited space - Ed.

mathematical concepts found in syllabus C, e.g. linear programming .
It was felt that weaker students would have a better chance of passing the GCE "O" level examination if they took syllabus B instead, since there were fewer topics to be covered in syllabus B.

Topic 1: The common secondary 1 and 2 syllabus

1.1 Mr. Lian Sek Lin gave a brief explanation of the rationale for having a common syllabus at Sec. 1 and 2 level.

1.2 to 1.4*.

1.5 With regard to how topics not common to the B and C syllabuses should be taught, it was felt that all topics in syllabus B should be taught first since these were a natural follow-up of what has been taught in the primary school.
It was also suggested that the question as to which topics should be left out would depend on the type of students. Whatever decisions taken by the teacher in respect of the choice of topics to be taught should be made with the interest of the students in mind and for their benefit.

1.6 The topics that should be left out should be the difficult ones. These vary with the type of students we teach and therefore it is hard to list them. The upper secondary students normally encounter difficulty in the following topics:-
linear Programming, vectors, transformation using matrices.

* Reports on these sections are omitted due to limited space - Ed.

It was also suggested that difficult topics in Syllabus C should be optional to the better students.

1.7 The group felt that no new topics should be added to syllabus C as the load on the student was already quite heavy.

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary one mathematics

3.1 to 3.4 The group felt that primary school leavers needed to have the following minimum basic knowledge of mathematics (ref: Primary Mathematics Syllabus Flow Chart 1976) : Whole numbers - 1 to 15 & 19; Measurement - 1 to 6; Area/Volume - 1 to 6, 8 & 9; Graphs - 1 to 8; Fractions - 1 to 15; Decimals - 1 to 13; Geometry - 1 to 6, 8, 9 & 10 (leave out riders) also 11 (leave out riders) & 12 (leave out riders); Averages - 1 & 2; Ratio/Proportions - 1 ; Percentages - 1 to 4; Algebra - 1 & 2.

3.5 (a) Secondary one pupils generally experience difficulty in comprehending word-problems. This is not only a language problem faced by those in the Chinese stream but also a mathematical one as English stream pupils experience the same difficulty.

(b) Many secondary one pupils have no concept of the mathematical unit. For instance, they cannot tell the difference between the area of a surface and the volume of a solid. They are confused over the concept of area and volume. To remedy this situation, it was suggested that teachers should adopt a practical approach in teaching these units.

Topic 4: The folly of learning without reasoning

4.1 The possible areas of mathematics that can be learned without reasoning are multiplication tables and mathematical formulae. Although this may not be satisfactory many secondary school pupils are doing it.

4.2 The group did not believe that rote learning would lead to speedier calculation and problem-solving.

4.3 Lower secondary school pupils should be encouraged to carry out experimental mathematics, e.g. they could find out the area of a surface or the volume of a container experimentally and derive their own formulae. Such methods will enable them to understand formulae better and use them in the correct way.

4.4 (a) Drill and practice in the learning of mathematics are important; however, the group felt that it was not possible to quantify the importance attached to these two aspects of learning.

(b) Reference was made to the constant use of logarithm tables in connection with problems involving the four arithmetical operations found in sums and problems. It was argued that since log. tables were seldom used by adults after they had completed their school career, there should not be too much emphasis on problems involving the four basic operations which required the use of log. tables.

Topic 5: Evaluation - testing and homework

5.2 The main objectives of setting homework are:

(a) To find out whether students understand what has been taught;

(b) To give more practice to students using the skills taught;

(c) To stimulate thinking and arouse a deeper interest in their mathematical work.

5.3 Some members felt that homework set need not be marked while others advocated that only some of the homework, namely mechanical sums, need not be marked. However, it was agreed that work involving the use of mathematical concepts should be checked by the teacher.

5.4 Most pupils use exercise books for doing homework because it is easier for the teachers to check the work done. The only disadvantage is that pupils may lose their exercise books. It was pointed out that Pre-U pupils generally make use of a file because it is more convenient.

GROUP H

Chairman : Mr. Seah Kee Soon

Rapporteur : Mrs. Alice John

Topic 1: The common secondary 1 & 2 syllabus

1.1 The common secondary 1 & 2 syllabus gives pupils minimum mathematical competence to cope with problems in everyday life. It lays the foundation for Sec. 3 & 4 G.C.E. B or C syllabus. Teachers can find out whether pupils are more suited for B or C syllabus depending on their performance using the Sec. 1 & 2 syllabus.

1.2 to 1.4*

1.5 Start with the common syllabus in Sec. 1, then go on to the C syllabus. If possible, stream the pupils according to B or C syllabus.

1.6 (a) Bicimals should be left out for weaker pupils.

(b) Angles, properties of the circle and tangent should be done in Sec. 3.

(c) Ideas of vectors should be optional.

1.7 Simple problems on simultaneous and simple equations should be included.

1.8 Yes. In the new syllabus less stress is laid on computational arithmetic. There are too many topics to be covered and as a result there is less time for computational arithmetic. The remedies suggested are

(a) Mathematics periods should be spread out preferably with one period per day so that more work can

* Reports on these sections are omitted due to limited space - Ed.

be achieved.

(b) One extra period should be added to the existing 5 periods a week for mathematics. Thus more time could be set aside for mental arithmetic and mechanical skills.

Topic 2: GCE syllabus B versus syllabus C

2.1 to 2.3*

2.4 The advantages of taking syllabus C over B are

(a) More mathematical facts are learnt.

(b) No proofs of theorems are required and instead there are more applications of theorems.

(c) The objective questions in Paper I of the examination are simple.

(d) Syllabus C is better for brighter students as they can score marks more easily.

(e) Syllabus C is a good foundation for Additional Mathematics.

2.5 Pre-U classes find difficulty if they have taken syllabus B. These pupils must take Additional Mathematics to overcome this difficulty.

2.6 Yes, they cannot comprehend what is required. The symbols are confusing and the language barrier to clear understanding has to be overcome.

2.7 The difficulties encountered in teaching the C syllabus are

(a) There are not enough text-books and not enough

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examples for written exercises .

(b) The syllabus cover a wide area and teachers find difficulty in trying to complete the syllabus.

(c) In some schools there are not enough teachers trained to do modern mathematics.

2.8 The topics in the C syllabus which pose problems are vectors, transformation using matrices, problems on linear programming and difficult problems on probability.

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary 1 mathematics

3.1 The minimum basic knowledge are the four operations, factors, L.C.M., simple interest (problems should not be too difficult), brackets, names of figures and solids e.g. quadrilateral, pentagon, cone, pyramid etc., volume of cuboid, constructions and accurate drawing, simple algebraic problems with guided statements, travel graphs and straight line graphs.

3.2 The important topics are the four operations, percentages, decimals, fractions; algebra - simple factorisation and equations; geometry - parallel lines, properties of triangles and parallelograms.

3.3 Algebra - manipulation of brackets, equations. Geometry - construction of angles, parallel lines, figures, triangles etc. Graph - travel graphs and also how to read scales.

3.4 (a) The four operations should be done thoroughly. It is recommended that the"decomposition method" of addition and subtraction be taught as in Chinese schools.

(b) The four rules of fractions should be learnt thoroughly.

(c) Pupils should have more practice on the conversion of fractions into decimals and decimals into fractions.

(d) Pupils should have knowledge of percentages including 100%.

(e) Simple problems on rates, if well mastered, are sufficient.

(f) Pupils in secondary schools find word problems difficult because of the language problem. This will continue to be a problem unless pupils improve in their English and are able to tackle simple problem on their own.

3.5 The P.S.L.E. examination does not require the writing of statements which is an area in which pupils find difficulty. Pupils tend to use the equal sign "=" without understanding its meaning.

Topic 4: The folly of learning without reasoning

4.1 The topics are multiplication tables and the sum of the angles of a triangle.

4.2 This is not necessarily so.

4.3 Teach pupils new topics by the discovery method. Concentrate on giving problems where formulae and rules can be applied, working out each problem differently.

4.4 We attach some importance to them. Pupils must be skilful in mechanical work, e.g. multiplication, etc. Since syllabus B places more emphasis on drill and practice, the weaker pupils doing syllabus B must have more opportunities for drill though drill and mechanical manipulation should not be overdone.

Topic 5: Evaluation - testing and homework

5.1 (a) Oral tests, mental sums and informal questioning

could be given.

(b) For written work we could have "open book test", where pupils could open their text-books and solve certain problems.

(c) Teachers should try to create mathematical problems to help them in their teaching. Clever pupils in trying to create their own mathematical problems would learn a great deal about mathematics.

5.2 The objectives of setting homework are

(a) To enable students to apply what has been learnt;

(b) To find out how much has been absorbed;

(c) To serve as a groundwork for the next lesson if the two topics are inter-related;

(d) To keep pupils off the street as they have to do their homework.

Simple exercises can be marked by the pupils in Sec. 1 to 3 by interchanging books. For pupils in Sec. 4 and Pre-U the teacher can put the correct solutions on the board and pupils can mark their own problems. Teachers must check the books, now and then, to see that homework is being done.

5.3 Problems given as preparation for new topics need not be marked. Otherwise, all homework should be marked either by pupils or by the teacher.

4 Both exercise books and file can be used. The group felt that 2 exercise books for daily work and a file for test-papers would be ideal. The advantages of using exercise books are as follows:

(a) Teachers can check whether correction of previous work is done.

(b) Pupils will not lose their exercises if they are done in books.

(c) Time is saved as exercises need not have to be filed.

The disadvantages are

(a) When long problems have to be tackled, teachers marking the assignments have to keep turning back and see what has gone before.

(b) Books tend to finish fast.

(c) The books are bulky for teacher to carry around.

(d) If 2 books are used there is no continuity of work.

The advantages of using files are

(a) They are easier for the teacher to carry.

(b) One file only is needed for all the work. There is continuity in the exercises in the file.

The disadvantages are

(a) If papers are not filed immediately they may be misplaced. Teachers too may lose the papers.

(b) Pupils may file exercises in the wrong order and this will be a disadvantage when it comes to revising.

5.5 Pupils should enter the date and topic for each exercise and the marks, if any, on the front page of their exercise books. Teachers should record all homework given in their record books.

5.6 When marking homework, pick out and underline the common mistakes and go over them in class. Pupils should be given more exercises to correct their mistakes.

5.7 Tests should be given weightage in the terminal

and final examinations. The group were divided in the opinion as to whether homework should be given weightage. Some felt that pupils could get help from home and tutors in their home-work and therefore giving this weightage would be unfair. Others felt that very weak pupils could be encouraged to do better if their homework were given some weightage when they were well done.

GROUP I

Chairman : Mrs. Tan Jin Siew

Rapporteur : Miss Yeo Geok Choo

Topic 1: The common secondary 1 and 2 syllabus

1.1 The rationale for having a common syllabus at this level is the presence of a body of basic knowledge useful to both secondary 3 and 4 students. If students should opt for the B syllabus at Sec. 3 level the difficulties involved in both teaching and learning are minimized. Furthermore, it is easier from the administration point of view, if there is a common syllabus. As generalization takes place before specialization, it is best to expose the students to the C syllabus first, since at their age they are generally not in a position to judge what is best for themselves.

1.2 to 1.4 It was suggested that these sections be omitted from the discussion as the topics could be identified from the syllabuses.

1.5 It was generally agreed that all topics should be taught so that the option could remain open for the B or C syllabus. Topics covered need not be done in depth and in the case of the C syllabus, teachers could give the simpler problems. Teachers should assess the abilities of their students first. They could teach more to better students and less to weaker ones. Better students could concentrate on the C syllabus while weaker could concentrate on the B syllabus. Different textbooks could be used together. The order of the text need not be followed.

1.6 The topics to be left out are "bicimals", which is not in the G.C.E. O Level syllabus, and "idea of closure", which students find difficulty in understanding.

1.7 None were suggested.

1.8 There is no concrete evidence to show that students have become less skilful in basic computational work. However, some teachers said there was such a deficiency and as a remedy they suggested that all workings should be shown.

Topic 2: G.C.E. syllabus B versus sullabus C

2.1 to 2.3 The participants again suggested that these sections be omitted from the discussion for the same reasons as before.

2.4 The C syllabus deals with more practical topics, e.g. linear programming and sets (grouping things in everyday life). It emphasizes understanding rather than memory work.

2.5 The main disadvantage of the B syllabus is that it emphasizes memory work, e.g. theorems on geometry.

2.6 There is no clear evidence to support the view that the C syllabus is not suitable for weaker pupils as very often this syllabus is not offered to them because of the lack of qualified teachers.

2.7 The difficulties encountered in teaching the C syllabus are

(a) The lack of trained teachers.

(b) An acute shortage of textbooks.

(c) A limited reference to supplement teaching.

(d) A shortage of exercises and testing materials.

(e) Teachers lack the experience and skill to teach.

(f) Insufficient visual aids.

(g) The concepts are abstract and therefore difficult for students to grasp.

(h) Most teachers are not convinced of the rationale for following the syllabus and are psychologically not ready for it.

(i) Parents are also partly to be blamed, e.g. when a student cannot solve a problem he approaches his parents for help and when they cannot solve it, the student becomes psychologically affected and afraid of the C syllabus.

2.8 The topics in the C syllabus which pose problems are linear programming where the difficulty lies in setting up the inequality, vectors in navigation, and operators where teachers encounter difficulty in presenting the concept and students find difficulty in understanding it.

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary 1 mathematics?

3.1 & 3.2 The Chairman mentioned the following topics as the minimum basic requirements needed by the primary school leavers, the four operations, decimals, simple proportions, percentage, measurement, areas and volumes, number systems, fractions and averages.
Participants were not able to comment as they are Sec. 3 & 4 and Pre-U teachers.

3.3 The Chairman commented that in algebra the students should realize that a, b, c etc. represent numbers. They should be able to

simplify expressions, do substitutions and solve linear equations. In geometry, students should be able to use compasses and should be able to interpret graphs.

3.4 A primary school leaver must know the four operations very well. In fact they must have sufficient knowledge of all the topics listed.

3.5 In certain schools the students find almost all the topics listed in 3.4 difficult. In other schools, only the very weak students find difficulties in these topics while the average students do not. However, it was mentioned that students find difficulty in writing statements in problems. This could be due to the language problem. There is also a poor understanding of concepts which could be due to learning without reasoning.

Topic 4: The folly of learning without reasoning

4.1 There was a general disagreement about learning without reasoning. However, the Chairman listed a few topics that could be learnt without reasoning. They are areas (rectangle, circle, square, etc.), matrices and multiplication tables.

4.2 Yes, it does.

4.3 Teachers could provide challenging problems, give everyday examples and place more emphasis on practical work, e.g. in trigonometry, weights, measurements and probability. Teachers could also use teaching aids.

4.4 There was general agreement that much importance should be attached to drill and practice in the learning of mathematics.

Topic 5 : Evaluation - testing and homework

5.1 Tests should be designed so that structured questions or questions that are made up of parts, each part leading to the next, should be given. Questions should not be set in a stereotyped fashion. Objective tests with alternative solutions that require some thought should be given. This would enable teachers to know which areas the students do not understand.

5.2 & 5.3 The main objectives of setting homework is to provide practice for the students and to find out whether they have understood the lessons. Teachers should mark the homework with comments. In the case of weak classes, all problems must be marked. Because of the heavy marking work-load some teachers suggested that for Pre-U classes there can be group marking where the teacher would mark the book of a particular pupil and the others in the group check their solutions with his. Another suggestion was that, in the case of the secondary classes, all problems need not be marked. The pupils could be told to put an asterisk sign against those problems whose solutions they are not sure of, so that the teacher would mark these problems thoroughly. The teacher need not go through those without asterisks, since the students are sure of the solutions.

5.4 It was agreed that students should use two exercise books . The secondary school students should not use files as they are not matured enough to maintain a proper record of their work. They would probably lose the papers. Pre-University students may use files so that problems on the same topic may be placed

together. The use of two exercise books would enable the students to have a book to do their problems while the other is being marked by the teacher. The disadvantage in the use of two exercise books is that problems on the same topic would not be in the same book.

5.5 It is not necessary to maintain a record of homework set and marked as the teachers would know the classes well enough.

5.6 If students cannot do problems on a certain topic, this means the teacher would have to re-teach the class, or if the problems are not well done, then the teacher would have to discuss them again. Marks should not be given to homework problems.

5.7 There was no general agreement on this. Some teachers suggested that 20% of the terminal and final examination marks should be from the tests or homework. Others disagreed because they felt that common tests would have to be given and these were not possible in their schools. Besides, this would lead to mini examinations creating tensions among students.

GROUP J

Chairman : Mr. Sin Kwai Meng

Rapporteur : Mr. Lee Thiam Lock

The workshop began with the Chairman's outline of the objectives of the first day's discussion.

The objectives were:-

a. To enable teachers to be more familiar with syllabuses for both upper and lower secondary levels.

b. To discuss how the syllabus could be adjusted for weak pupils.

Bearing the two objectives in mind the group went on to discuss the topics, the common secondary 1 and 2 syllabus and the GCE syllabus B versus syllabus C. The Chairman suggested that Topic 2 should be discussed first as this would facilitate the discussion of Topic 1 and the group agreed to this arrangement.

Topic 2: GCE syllabus B versus syllabus C

2.1 to 2.3 It was felt that items 2.1 to 2.3 should be discussed together, as many of the topics in syllabus B were found to be in syllabus C.

Topics found in syllabus C only - sets, vectors, matrices, number base, statistics, linear programming, motion geometry, probability, trigonometrical functions, area under a graph, coordinate geometry. Topics found in syllabus B only - formal geometrical proofs, geometrical constructions, contours.

2.4 The group was of the opinion that syllabus C would require an understanding of the basic mathematical concepts and their applications would compel pupils to think. Whereas in

syllabus B pupils could pass the examination without comprehending the ideas in the formulae taught.

2.5 In discussing the disadvantages, members concluded that in syllabus B no provisions were made to allow pupils to comprehend mathematical concepts. There was no necessity for pupils to learn the concepts to obtain results.

2.6 This item could not be discussed with fruitful results as the word 'evidence' should be replaced by the word 'observation'. Unless teachers had taught the same pupils in syllabus B and then syllabus C, it was not possible to draw the conclusion that C syllabus was not suitable for weaker pupils.

2.7 Members of the group listed the following difficulties:-

(a) Some teachers were not competent to teach syllabus C.

(b) Some were 'forced' to teach the subject because of the shortage of modern mathematics teachers.

(c) Pupils could not comprehend questions due to poor command of the English language.

(d) Not one particular series of mathematics books explained all the mathematical concepts well or gave suitable exercises. Other mathematics books had to be consulted.

2.8 Where problems of learning and teaching the topics were concerned, members felt that they could not be identified as they would depend on the types of pupils whom the teachers teach. The more intelligent pupils would pose no problem but the weaker pupils would have many difficulties, particularly the grasping of concepts and the language problem.

Topic 1: The common secondary 1 and 2 syllabus

1.1 Members concurred that the common syllabus for Sec. 1 & 2 was prepared so that pupils could later follow syllabus B or C without much difficulty.

1.2 to 1.4 Topics found in C syllabus only - sets, number base, motion geometry, statistics, inequalities, laws of arithmetic. Topics found in B syllabus only - logarithms.

1.5 The Chairman pointed out the following topics that would be beneficial to pupils irrespective of the syllabus followed.

(a) The number base should be taught so that pupils could understand better the place value.

(b) Inequalities are also important to pupils doing syllabus B.

(c) Teachers who are preparing pupils for syllabus B should still discuss some topics of syllabus C. They may reduce the number of problems to be given to these pupils for practice so that more time can be spent on manipulative skill.

It was felt that bicimals should be excluded from the syllabus.

1.7 Members were of the opinion that the present syllabus was already too "crowded" to be included any more topics.

1.8 The observations made by the group were that pupils would have less skill in basic computational work if they were badly taught, and that there was no evidence that syllabus C would result in less skilful computational work.

At the conclusion of the first workshop session, it was generally agreed that syllabus C would demand on the part of the pupils language ability, whereas with syllabus B some skill in computational work would be required. On the whole syllabus C covered a wider field with more mathematics topics when compared with syllabus B. It was also observed that the questions set on syllabus B, taken as a whole, were more difficult.

Members of Group J were divided into three groups to discuss the last three topics of the guidelines. After forty minutes of group discussion, the whole group participated in deciding whether the points put forward by individual groups were acceptable as a whole.

The following report consists of the of the opinions and suggestions of Group J.

Topic 3: How much mathematical knowledge do we expect primary six leavers to have in order to follow secondary 1 mathematics

3.1 The minimum basic knowledge required are the four basic operations for whole numbers up to 3 digits, meaning of decimals, simple fractions, an idea of algebra, recognition and meaning of geometrical figures, use of instruments for basic constructions, the ability to draw and measure angles and line segments and to use compasses to draw circle, knowledge of the metric system in length and mass, an idea of area and volume, meaning of simple equations in algebra, fractorisation and into prime factors and L.C.M.

3.2 The following are the topics primary six leavers are expected to know: combining operations with brackets; scale drawing to locate points, to find perimeter; area and plans of geometrical figures; area and perimeter of a circle; area of square, rectangle and triangle; classifying

data into groups; constructing and reading line graphs; decimalisation of weights and measures; rate/ speed; ratio/proportion; problems involving discount, profit and loss, simple interest; substitution; simple linear equation.

3.3 As listed in the flow chart.

3.4.1 Skill in the four operations.

3.4.2 Should know three of the four operations in simple fractions i.e. excluding division.

3.4.3 Decimals as listed in the flow chart.

3.4.4 Percentages - to understand the meaning of percentages. Should be able to solve simple problems.

3.4.5 Rates - direct proportion with no fraction or percentage.

3.4.6 Problems - involving everyday situations.

3.5 (a) Lack of mathematical reasoning.

(b) Difficulty in using the equal sign.

(c) Inability to do basic geometrical constructions.

(d) Language weakness.

Topic 4: The folly of learning without reasoning

4.1 The areas that can be learnt without reasoning are memorising tables, differentiation, integration, statistics and histograms.

4.2 The answer is in the affirmative if the problem is of the standard type.

4.3 This could be done by the discovery method so that pupils will have a better understanding of proofs and concepts. The way of asking questions could be improved - questions asked should involve an understanding of concepts.

4.4 The group agreed that drill and practice were very important in the learning of mathematics. The meaning of the word 'drill' was discussed

and the members were of the opinion that it meant sufficient practice.

Topic 5: Evaluation - testing and homework

5.1 Tests could be designed to teach new topics. Members felt that such tests should be done orally, and should be short. These tests could be an introduction to the main topic. They could also be an indirect way of finding out pupils' knowledge. However, the question was considered vague by the group.

5.2 The main objective was to give pupils practice and to find out whether pupils understood the concepts. Homework was also a means of consolidating the facts learnt.

5.3 As to the marking of exercise books it was agreed that teachers should do sufficient marking of pupils' work. Teachers need not mark all the sums but they should see that pupils do their assignments. It was suggested that if more sums were given above what was normally required for homework the marking could be optional. However, spot checks on their work should be carried out.

5.4 It was felt that pupils should have at least two exercise books,as it would be easier to keep track of their homework. Pupils' work on foolscap paper could be kept neat and tidy, but the disadvantage of the file was the difficulty in keeping track of corrections. As for the exercise books the drawback was that they could be too bulky for teachers to carry around whereas a stack of foolscap papers was more convenient.

5.5 Members considered the recording of homework set and marked too time consuming. One way of making sure that pupils do all the sums was to make a note

in the exercise book e.g. a minus two if two sums were not done. This would allow the teacher to check whether pupils had done all the homework set. For common mistakes instead of making corrections, teachers could circle the errors made and go through them in class.

5.6 There should be no evaluation unless teachers can be sure it is the pupils' own work. Mistakes should be circled and used for corrective teaching. In the course of correction any glaring mistakes in English should also be corrected.

5.7 It was generally agreed that common tests but not homework should be given some weightage. Continual assessment was considered necessary to determine pupils' performance for the year. The consensus was that class tests should be given less weightage but should not be disregarded.