2004/2005 PGDE (Secondary)
PCM514 Teaching and Learning of Mathematics II
A Guide to Completing Task II for Group 6

Item 1 (5 marks)
Suppose you are tasked to set a one-hour 50-mark class test for secondary 3 express students testing the first three topics/chapters based on the given Scheme of Work (SOW).

What you are required to do:

✓ Complete the following table.

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of weeks (w)</th>
<th>Relative Weighting ( \sum_{w} w \times 100% )</th>
<th>Modification based on professional judgement</th>
<th>Rationale for modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solutions of quadratic equations</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Then prepare a Table of Specification (model TOS used for class exercise).

<table>
<thead>
<tr>
<th>SIO</th>
<th>Relative Weighting (%)</th>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic 1</td>
<td></td>
<td>6</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>SIO1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>SIO2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

✓ Calculate the total marks under Knowledge, Comprehension and Application and comment on the ratio (e.g. explain why you choose to make the paper more difficult or easier).
**Item 2**

(A) (6 marks)

Refer to Questions 3, 4, 5 & 6 in Part 2 of the Sec 3 Express Mid-Year Exam 2001 paper. Each question has several parts (a), (b), (c), etc. Some of the parts have sub-parts such as (i), (ii), etc.

What you are required to do:

- For each part (a), (b), (c), etc, of each of these 4 questions, do the following:
  - Identify the relevant specific instructional objectives (SIO);
  - Identify the cognitive level, justifying your classification.

You may want to use a table like the one below:

<table>
<thead>
<tr>
<th>Question No.</th>
<th>SIO</th>
<th>Cognitive Level</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (a)</td>
<td></td>
<td>K/C/A</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 (a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 (a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

You do not have to break down into sub-parts (i), (ii), etc. Simply discuss the cognitive level of each part collectively. However, if you prefer to discuss the cognitive level of each sub-part, it’s fine as well.
(B) (9 marks)

Refer to the following six specific instructional objectives (SIO’s) as stated in the GCE O Level Mathematics (4017) Syllabus.

(1) Students are able to construct equations from given situations (Topic 15)
(2) Students are able to calculate unknown angles and solve problems using geometrical properties (Topic 23)
(3) Students are able to calculate the mean, median and mode for individual data and distinguish between the purposes for which they are used (Topic 27)
(4) Students are able to use the sum and difference of two vectors to express given vectors in terms of two coplanar vectors (Topic 30)
(5) Students are able to continue a given number sequence, recognize patterns within and across different sequences and generalize to simple algebraic statements relating to such sequences (Topic 1)
(6) Students are able to solve trigonometrical problems in two dimensions including those involving angles of elevation and depression and bearings (Topic 26)

What you are required to do:

For each of SIO 1 & SIO 2,

a) Identify possible Test Item Objectives (TIO);
b) Choose one TIO among those identified in (a);
c) For the TIO chosen in (b), design a short-answer question (create an original item or modify one from past-year papers or textbooks) that meets the TIO;
d) Make sure that the question is mathematically correct;
e) If the question is not original, state clearly the source of the test item and describe clearly how it is modified.

For each of SIO 3 & 4, repeat (a) to (e) except that in (c) you design a structured question.

Likewise, for each of SIO 5 & 6, repeat (a) to (e) except that in (c) you design a long-answer/HOTS question.

One possible format:

SIO 1: Students are able to construct equations from given situations

Related test item objectives (TIO):
1
2 ..... 
....

Selected Test Item Objective: (say) TIO 2

Source of suitable test item: N98/II/8(a) ..... (Word process or scan the whole question)

Modified Test Item: ...

How it was modified: ...
(Repeat it for the other SIOs)

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AY2004/2005
**Item 3 (10 marks)**

What you are required to do:

First identify 2 stems (either modify suitable items in the given set of stems, get one from any source, stating clearly the source, or come out with you own). Call these two stems Stem 1 & Stem 2.

For each of Stem 1 & Stem 2,
- generate a LOTS question and a HOTS question for a Normal Academic class;
- generate a LOTS question and a HOTS question (preferably elementary mathematics) for an Express class;
- state, for each of these four questions, the SIO it is intended to test and provide a complete solution.

Possible format:

**Stem 1**

*For Normal Academic Class:*

Question 1 (LOTS), State SIO, Provide Complete Solution

Question 2 (HOTS), State SIO, Provide Complete Solution

*For Express Class:*

Question 1 (LOTS), State SIO, Provide Complete Solution

Question 2 (HOTS), State SIO, Provide Complete Solution

**Stem 2**

*For Normal Academic Class:*

Question 1 (LOTS), State SIO, Provide Complete Solution

Question 2 (HOTS), State SIO, Provide Complete Solution

*For Express Class:*

Question 1 (LOTS), State SIO, Provide Complete Solution

Question 2 (HOTS), State SIO, Provide Complete Solution
Item 4

(A) (6 marks)

What you are required to do:

Prepare the mark schemes (with complete solutions) for 4017/2 Mathematics Specimen Paper Questions 8, 9 & 10.

(B) (4 marks)

What you are required to do:

Mark the given students’ solutions to Questions 2, 3 & 4 in the handout based on the given mark schemes, modifying and improving the mark schemes in the process of marking.

Present your version of the improved mark scheme.

Remarks:
Use the recommended symbols and abbreviations in your mark schemes and in your marking where appropriate

Submission of Assignment

By 4pm, 18 Feb 05 (Thu)