UNIVERSITY OF SWAZILAND
FACULTY OF EDUCATION
SUPPLEMENTARY EXAMINATION PAPER 2006

TITLE OF PAPER   : CURRICULUM IN MATHEMATICS

COURSE CODE   : EDC 281

STUDENTS   : B.ED II AND PGCE

TIME ALLOWED   : THREE (3) HOURS

INSTRUCTIONS   : ATTEMPT <u>FOUR</u> QUESTIONS
                                            EACH QUESTION IS WORTH 20 MKS

ADDITIONAL MATERIALS   : APPENDIX 1, 2 AND 3
                                            IGCSE SYLLABUS & BOOK 4

THIS PAPER CONTAINS **FIVE** PAGES. DO NOT OPEN UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

Answer four questions

Question 1
   a) Write a critique for the lesson plan given in appendix 1. [4]
   b) Prepare a corrected version of this lesson plan. [16]

Question 2
   a) An examination requires a student to solve the equation $2x^2 - 3x - 2 = 0$. One student presented the following solution: $x^2 - 1.5x - 1 = 0$
$$(x + 0.5)(x - 2) = 0$$
$$x = -0.5 \text{ or } x = 2$$
   Some teachers said the student should be given no marks while others felt the student deserved all marks. The group that was for giving all the marks argued that the student had shown a deeper grasp of the concept of factorizing and solving equations. The other group argued that the student copied from another student and substituted into brackets to get the answers. Imagine having to make the final decision in this discussion. What decision would you make and what arguments would you put forward to convince the teachers to accept your decision? [8]
   b) Identify the misconception(s) in each of the following solutions and state how they could be avoided during teaching. [12]
   i. $\dfrac{2}{3} \times 1\dfrac{1}{2} = \dfrac{2}{3} \times \dfrac{3}{2} = 0$
   ii. $3x + 4 = 12$
$$3x = 8$$
$$x = 2.2$$
   iii. $2x - (5x - 4y + 2)$
$$2x - 5x + y - 2$$
$$-3x - 1$$

Question 3
   a) Give explanations and examples of the **four** sub-categories of knowledge in Bloom's taxonomy. [12]
   b) Write **four** objectives in which the sub-category is translation. [8]

Question 4
Appendix 2 includes a copy of aims and objectives of the IGCSE mathematics syllabus and an IGCSE past examination question.
   a) How would you, in your teaching, cater for each the aims marked with ticks? [10]
   b) Which of the objectives does the question given test? [10]

Question 5
Motivation is essential in the learning of any subject.
   a) Name the **two** types of motivation and state the strengths of each one. [6]
   b) State, with explanation of each, **seven** strategies you could use in your teaching to improve your students' motivation. [14]

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APPENDIX 1

Lesson Plan

Name: Thabsile Dlomo
ID No.: 143789
Class: 4B
Date: 18-02-2005
Time: 0900-0930h
Subject: Mathematics
Topic: The Circle
Sub-Topic: Chords

Lesson Objectives
At the end of the lesson pupils should be able to:
1) *Define the terms as used in the circle*
2) *Calculate the perpendicular distance of a chord from the centre*
3) *Show by means of a proof that equal chords in a circle are of equal distance from the centre*

Materials
- *A pair of compasses*
- *Straight edge*
- *Coloured chalk*

Resources
- *Mathematics text book*
- *Teacher's guide*

Time	Stage	Teacher's Activity	Students' Activity
15 minutes	Introduction	Definition of terms relevant to sub-topic.	Listening
15 minutes	Presentation	Performs calculations, proofs and attends to questions	Listening and asking questions
10 minutes	Conclusion	Gives summary and asks students some questions. Gives students some exercises. Also gives clarity where needed.	Attempt to solve problems in the exercise.

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The aims of the curriculum are the same for all students. The aims are set out below and describe the educational purposes of a course in Mathematics for the IGCSE examination. They are not listed in order of priority.

The aims are to enable students to:

1. develop their mathematical knowledge and oral, written and practical skills in a way which encourages confidence and provides satisfaction and enjoyment;

2. read mathematics, and write and talk about the subject in a variety of ways;

3. develop a feel for number, carry out calculations and understand the significance of the results obtained;

4. apply mathematics in everyday situations and develop an understanding of the part which mathematics plays in the world around them;

5. solve problems, present the solutions clearly, check and interpret the results;

6. develop an understanding of mathematical principles;

7. recognise when and how a situation may be represented mathematically, identify and interpret relevant factors and, where necessary, select an appropriate mathematical method to solve the problem;

8. use mathematics as a means of communication with emphasis on the use of clear expression;

9. develop an ability to apply mathematics in other subjects, particularly science and technology;

10. develop the abilities to reason logically, to classify, to generalise and to prove;

11. appreciate patterns and relationships in mathematics;

12. produce and appreciate imaginative and creative work arising from mathematical ideas;

13. develop their mathematical abilities by considering problems and conducting individual and co-operative enquiry and experiment, including extended pieces of work of a practical and investigative kind;

14. appreciate the interdependence of different branches of mathematics;

15. acquire a foundation appropriate to their further study of mathematics and of other disciplines.

ASSESSMENT OBJECTIVES

The abilities to be assessed in the IGCSE Mathematics examination cover a single assessment objective, technique with application. The examination will test the ability of candidates to:

1. organise, interpret and present information accurately in written, tabular, graphical and diagrammatic forms;

2. perform calculations by suitable methods;

3. use an electronic calculator;

4. understand systems of measurement in everyday use and make use of them in the solution of problems;

5. estimate, approximate and work to degrees of accuracy appropriate to the context;

6. use mathematical and other instruments to measure and to draw to an acceptable degree of accuracy;

7. interpret, transform and make appropriate use of mathematical statements expressed in words or symbols;

8. recognise and use spatial relationships in two and three dimensions, particularly in solving problems;

9. recall, apply and interpret mathematical knowledge in the context of everyday situations;

10. make logical deductions from given mathematical data;

11. recognise patterns and structures in a variety of situations, and form generalisations;

12. respond to a problem relating to a relatively unstructured situation by translating it into an appropriately structured form;

13. analyse a problem, select a suitable strategy and apply an appropriate technique to obtain its solution;

14. apply combinations of mathematical skills and techniques in problem solving;

15. set out mathematical work, including the solution of problems, in a logical and clear form using appropriate symbols and terminology.

(UCLES, 2004)

9   **Answer all of this question on a sheet of graph paper.**

A shop buys x pencils and y pens.
Pencils cost 15 cents each and pens cost 25 cents each.

(a)   There is a maximum of $20 to spend.
      Show that $3x + 5y \leqslant 400$.   [1]

(b)   The number of pens must not be greater than the number of pencils.
      Write down an inequality, in terms of x and y, to show this information.   [2]

(c)   There must be at least 35 pens.
      Write down an inequality to show this information.   [1]

(d)   (i)   Using a scale of 1 cm to represent 10 units on each axis, draw an x-axis for $0 \leqslant x \leqslant 150$
            and a y-axis for $0 \leqslant y \leqslant 100$.   [1]

      (ii) Draw three lines on your graph to show the inequalities in **parts (a), (b) and (c)**.
            Shade the **unwanted** regions.   [5]

(e)   When 70 pencils are bought, what is the largest possible number of pens?   [1]

(f)   The profit on each pencil is 5 cents and the profit on each pen is 7 cents.
      Find the largest possible profit.   [3]

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