

**UNIVERSITY OF SWAZILAND
FACULTY OF EDUCATION**

FINAL 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 : ANSWER FOUR QUESTIONS
EACH QUESTION IS WORTH 20 MKS

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

**THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN
GRANTED BY THE INVIGILATOR. THIS PAPER HAS THREE PAGES**

Answer four questions

Question 1

Give an explanation of each of the following learning theories:

- a) Behaviourism [5]
- b) Situated Learning [5]
- c) Social Constructivism [5]
- d) Vygotsky's Constructionism [5]

Question 2

Prepare an investigation which you could use to teach each of the following circle angle properties (you need appendix 1 and book 4):

- a) The angle between the radius of a circle and the tangent at the point of contact is a right angle. [5]
- b) The angle at the centre of a circle is twice the angle at the circumference. [5]
- c) Angles in the same segment are equal. [5]
- d) Opposite angles in a cyclic quadrilateral are supplementary. [5]

Question 3

Mr. Dlamini noted the following answers from several pupils in his form three end of year examination.

Question	Wrong answer Given
1. Round off 12 499 to the nearest thousand	13 000
2. Work out 0.1×0.1	0.1
3. Find an equivalent fraction for 3.236	There is no equivalent fraction
4. $(a + b)^2$	$a^2 + b^2$

- a) Identify the misconceptions displayed by the pupils' answers. [5]
- b) Identify possible sources of the misconceptions. [5]
- c) Choose **two** of the misconceptions from the above and devise a method you would use to correct each of them. [10]

Question 4

Appendix 2 and 3 are copies from Miss Shabangu's scheme and daily preparation books respectively.

- a) Read through the scheme and write out a list of errors and omissions she has made. [5]
- b) Complete a similar list for the lesson plan. [5]
- c) Write your own lesson presentation for this lesson starting from an introduction. [10]

Question 5

(i) Explain each of the following dimensions of knowledge

- a) Factual knowledge [2]
- b) Conceptual knowledge [2]
- c) Procedural knowledge [2]
- d) Meta-Cognitive knowledge [2]

(ii) The changes from the original Bloom's taxonomy to the new version occur in three broad categories which are terminology, structure and emphasis. Explain each of the three changes. [12]

THEME OR TOPIC	CORE	SUPPLEMENT
22. Functions		- use function notation, e.g. $f(x) = 3x - 5$, $f: x \mapsto 3x - 5$ to describe simple functions, and the notation $f^{-1}(x)$ to describe their inverses; form composite functions as defined by $gf(x) = g(f(x))$
23. Indices	- use and interpret positive, negative and zero indices	- use and interpret fractional indices, e.g. solve $32^{\frac{1}{5}} = 2$
24. Solutions of equations and inequalities	- solve simple linear equations in one unknown; solve simultaneous linear equations in two unknowns	- solve quadratic equations by factorisation and <i>either</i> by use of the formula <i>or</i> by completing the square; solve simple linear inequalities
25. Linear programming		- represent inequalities graphically and use this representation in the solution of simple linear programming problems (the conventions of using broken lines for strict inequalities and shading unwanted regions will be expected)
26. Geometrical terms and relationships	- use and interpret the geometrical terms: point, line, parallel, bearing, right angle, acute, obtuse and reflex angles, perpendicular, similarity, congruence; use and interpret vocabulary of triangles, quadrilaterals, circles, polygons and simple solid figures including nets	- use the relationships between areas of similar triangles, with corresponding results for similar figures and extension to volumes and surface areas of similar solids
27. Geometrical constructions	- measure lines and angles; construct a triangle given the three sides using ruler and compasses only; construct other simple geometrical figures from given data using protractors and set squares as necessary; construct angle bisectors and perpendicular bisectors using straight edges and compasses only; read and make scale drawings	
28. Symmetry	- recognise rotational and line symmetry (including order of rotational symmetry) in two dimensions and properties of triangles, quadrilaterals and circles directly related to their symmetries	- recognise symmetry properties of the prism (including cylinder) and the pyramid (including cone); use the following symmetry properties of circles: (a) equal chords are equidistant from the centre (b) the perpendicular bisector of a chord passes through the centre (c) tangents from an external point are equal in length
29. Angle properties	- calculate unknown angles using the following geometrical properties: (a) angles at a point (b) angles on a straight line and intersecting straight lines (c) angles formed within parallel lines (d) angle properties of triangles and quadrilaterals (e) angle properties of regular polygons (f) angle in a semi-circle (g) angle between tangent and radius of a circle	- use in addition the following geometrical properties: (a) angle properties of irregular polygons (b) angle at the centre of a circle is twice the angle at the circumference (c) angles in the same segment are equal (d) angles in opposite segments are supplementary; cyclic quadrilaterals
30. Locus	- use the following loci and the method of intersecting loci for sets of points in two dimensions: (a) which are at a given distance from a given point (b) which are at a given distance from a given straight line (c) which are equidistant from two given points (d) which are equidistant from two given intersecting straight lines	
31. Mensuration	- carry out calculations involving the perimeter and area of a rectangle and triangle, the circumference and area of a circle, the area of a parallelogram and a trapezium, the volume of a cuboid, prism and cylinder and the surface area of a cuboid and a cylinder	- solve problems involving the arc length and sector area as fractions of the circumference and area of a circle, the surface area and volume of a sphere, pyramid and cone (given formulae for the sphere, pyramid and cone)

APPENDIX 2

Week	Date Started	Topic	Sub-Topics	Objectives/content	Materials	References	Teaching/Learning method(s)	Expected date of completion	Actual date of completion	Comments
4	22-02-05	Estimation and Limits of Accuracy	Limits of Accuracy	<p>1) To define a lower and an upper boundary or limits</p> <p>2) To give appropriate upper and lower boundary for data given to a specified accuracy (e.g. measured lengths)</p> <p>3) To obtain appropriate upper and lower bounds to solutions of simple problems (e.g. the calculations of perimeter and area of a rectangle) given data to a specified accuracy.</p>		<p>PRIS M book 4</p>	<p>Lecture</p> <p>Question and answer.</p>	23-02-05		
								24-02-05		

APPENDIX 3

Lesson Plan

Name: Thobile Shabangu
ID No.: 158789
Class: 4B
Date: 22-02-2005
Time: 0900-0940h
Subject: Mathematics
Topic: Estimation and Limits of Accuracy
Sub-Topic: Limits of Accuracy

Lesson Objectives

At the end of the lesson pupils should be able to:

- 1) Identify limits of accuracy as upper and lower bounds of rounded off numbers*
- 2) Calculate the limits of accuracy given a rounded off number*

Resources

- *PRISM book 4*
- *Teacher's guide*

<i>Time</i>	<i>Stage</i>	<i>Teacher's Activity</i>	<i>Students' Activity</i>
<i>5 minutes</i>	<i>Introduction</i>	<i>Ask pupils to use their rulers to measure the length of sides of their text book.</i>	<i>Measure</i>
<i>25 minutes</i>	<i>Presentation</i>	<ul style="list-style-type: none"> • <i>Ask pupils to say the lengths and writes them on the board</i> • <i>Show them the limits of accuracy and how to calculate them</i> 	<i>Give the answers</i> <i>Watch and listen</i>
<i>10 minutes</i>	<i>Conclusion</i>	<i>Gives summary and asks students some questions. Gives students some exercises. Also gives clarity where needed.</i>	<i>Attempt to solve problems in the exercise.</i>