UNIVERSITY OF FORT HARE
EAST LONDON CAMPUS

MEE212E

Mathematics Education 2 (English)

BACHELOR OF EDUCATION

Year 2

June 2023 MEMO

Time:	**3 Hours**
Subject:	**Mathematics Education 2 - English**
Marks:	**100**

This paper consists of 7 pages including the cover page

Examiners
Ms. B. Williams

Internal Moderator
Ms Z. Qwesha

Instructions:

1. **There are four compulsory questions in this examination paper.**
2. **Answer ALL questions.**
3. **Please number your questions correctly.**
4. **No calculators are allowed to be used in this exam.**
5. **Please ensure that your student number is clearly written on the front page of your examination book.**

QUESTION 1: Numeracy crises in South African schools

"Mathematics is in crisis in SA despite it being a gateway subject for higher education and career options"

1.1 List and explain 5 reasons why mathematics in South Africa is in crises. (25)
The following can be discussed:

- Teachers
- The teaching of mathematics
- Under resourced schools
- Poor socio - economic backgrounds
- Lack of student motivation
- Poor school attendance
- Student Misconceptions: Societal Views

Since this is an open-ended question it, different responses are expected and will be marked accordingly

1.2 List the content areas that we focus on in the Foundation Phase? (2)
Numbers, Operations and relationships,
Patterns functions and algebra,
Measurement,
Space and shape
and data handling

1.3 Which content area is the main focus in Grades R-3 and why? (3)
In Grade R - 3, it is important that the area of Numbers, Operations and Relationships is the main focus of Mathematics. Learners need to exit the Foundation Phase with a secure number sense and operational fluency. The aim is for learners to be competent and confident with numbers and calculations

[30 marks]

QUESTION 2: Methods of Teaching Mathematics

"In order to succeed in teaching mathematics, teachers should be aware of different teaching methods so, they can employ this knowledge as a basis of their mathematics education strategies"

2.1 Discuss the following: behaviourist

2.1.2 The Traditional method of teaching mathematics. (5)

- The Traditional method is based on the behaviorism learning theory. Behaviorist refers to the learning theories emphasizing on changing behavior which results from learners' associations of stimulus-response.
- In a mathematics class using the traditional method, the teacher reviews previous material and homework, and then demonstrates low-level problem solving followed by seatwork imitating the teacher's demonstration
- The primary focus is on the teacher as a transmitter of knowledge (that is, teaching by telling) is representative of behaviorist theory
- The common method of teaching mathematics using traditional method is a teacher-centered and giving a lecture is the dominant situation.

2.1.2 The Problem-solving method of teaching mathematics. cognitive (5)

This method is based on the cognitivisim learning theory.
Problem solving in mathematics help students to develop a wide range of complex mathematics structures and gain the capability of solving a variety of real - life problems
The National Council of Teachers of Mathematics (NCTM 1980) has emphasized that the mathematics teachers should focus on problem solving throughout their teachings since it "encompasses skills and functions which are an important part of everyday life"
Problem solving lies beyond mathematics teaching dimensions so that students experience the influence of mathematics in the world around them

2.1.3 The Discovery method of teaching mathematics. Constructive (5)

This method is based on the constructivist approach which is a learner-centered approach that emphasizes the importance of individuals actively construct their knowledge and understanding by the guidance from the teacher
In this method, teachers should not attempt to simply pour information into children's minds. Rather, children ought to be given confidence to discover their world, find out knowledge, consider, and think critically with vigilant supervision and significant guidance of the teacher
Within mathematics education, students have to build their own understanding of every concept of mathematics, so that the main responsibility of teaching is not explaining, lecturing, or attempting to convey mathematical knowledge, but creating situations for students to promote their mental structures
. This method is the best method to move away from traditional method or teacher-center practices, and more empowers teacher and students both for better critical thinking and creating changes in old teaching methods

2.2 Multiple Choice: Write down only the question number and the letter of your choice

2.2.1 Which of the following best describes how we develop knowledge, from the perspective of a constructivist? (2)

a. We are born with most of our knowledge.
b. We develop knowledge by engaging with others and continually learning as we go.
c. We are primarily sponges that absorb what we are told by authority figures.
d. Knowledge can only be gained by going to school.

2.2.2 These activities describe what learning method? (lecture, drill and practice, rote learning, multiple choice tests). (2)

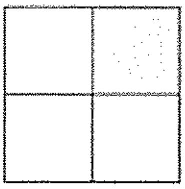
a) Constructivism
b) Behaviourism
c) Cognitivism
d) None of the above

2.2.3 These activities describe what learning method? (Discovery, collaborative group work, scaffolding, self-guided learning based on personal experience, peer grading and review). (2)

a) Constructivism
b) Behaviourism
c) Cognitivism
d) Connectivism

2.2.4 What is the decimal of the shaded part? (1)

b
b
a
b



a) 0.20

b) 0.25

c) 0.50

d) 0.75

2.3 Polya's major contribution to mathematics is for his work in problem solving.

2.3.1 Explain Polya's four- step approach to problem solving. (5)

1. Understand the problem: it is impossible to solve a problem, if you do not know what the problem is. What is known or unknown?
2. Devise a plan: the way we solve the problem. Possible strategies: (a) Draw pictures (b) Use a variable and choose helpful names for variables or unknowns. (c) Be systematic. (d)Solve a simpler version of the problem.
3. Carry out the plan: If the plan does not seem to be working, then start over and try another way. Often the first approach does not work. Do not worry just because an approach does not work. It does not mean you did it wrong
4. Look back: Did you answer the question? Is your result reasonable? Is there another way of doing the problem which may be easier?

2.4 In mathematics, the "things" that we quantify can either be discrete or continuous.
Explain what is meant by "discrete" and "continuous" counting (3)
Discrete objects or discrete events can be separated from each other or which can be counted using a counting unit; or
Continuous quantities or extents, can be measured by focusing on a particular attribute and using standard or non-standard units of measurement

[30 marks]

QUESTION 3 (Show all your working. No CALCULATORS are allowed)

By studying numerical relationships that exhibit patterns, we can learn much about mathematics and have a lot of fun doing so. A very familiar pattern is found in the ordinary "times" multiplication table.

3.1 Study the multiplication table for 9 below and explain the pattern to your learners. (4)

1 x 9 = 9
2 x 9 = 18
3 x 9 = 27
4 x 9 = 36
5 x 9 = 45
6 x 9 = 54
7 x 9 = 63
8 x 9 = 72
9 x 9 = 81
10 x 9 = 90

a. Patterns will vary from, as you increase the product, the units decrease by 1 and the tens increase by10 (units: 18 27 36 ...);(tens (18 , 27 , 36 ,...)

3.2 Using mathematical laws that are applied to 'multiplication, explain the following problem to your Foundation Phase learners. (1)

9 x 3 and 3 x 9

According to the commutative property, 9 x 3 = 3 x 9

3.3 The first number in a pattern is 5. The pattern follows the rule "Add 3". What are the next 4 numbers in the pattern? (1)

a) 1, 4, 7, 10
b) 5, 10, 15, 20
c) 8, 11, 14, 17
d) 3, 6, 9, 13

3.4 Caleb wants to rent a boat. Boat rentals cost R14.50 for a half hour. If

Caleb rents a boat for one hour and forty-five minutes, how much will it cost him? (2)

R14.50 – 30min

R7.50 - 15 min

R29 – 1 hour

Caleb paid R 29 + R14.50 + R7.25 = R50.75 =

3.5 Dezné wants to organize her books in order of most number of pages to least number of pages. Dezné's longest book has 396 pages and her shortest book has one-fourth as many pages as the longest. If the book in the middle of her shelf has three times the number of pages of the shortest book, then how many pages does the middle book have? (2)

3.6 Bernine is stuffing envelopes. She has eight hours to complete the task, and there are 1,500 envelopes. The first hour, Bernine stuffs 135 envelopes. The second hour she stuffs 141 envelopes. How many envelopes more envelopes will Bernine need to stuff in order to finish the job? (2)

3.7 Georga is baking cookies. She bakes three dozen oatmeal raisin cookies, two dozen sugar cookies, and four dozen chocolate chip cookies. Georga gives away two dozen oatmeal raisin cookies, 1.5 dozen sugar cookies, and 2.5 dozen chocolate chip cookies. How many total cookies does she keep? (2)

3.8 Siyanda is having a concert in a hall. He invited 778 people. He ordered 350 pies to be sold at the concert. 89 people cannot come to the concert. How many people will be at Siyanda's concert? (2)

3.9 The coach bought 6 extra-large pizzas for the team. There were 16 slices in each pizza. After the team ate some of the slices, there were 9 slices left. How many slices of pizza did the team eat? (2)

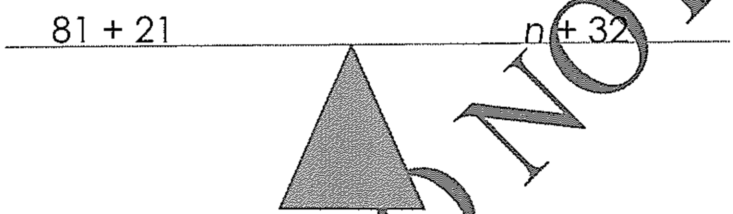
3.10 Traci and Pam are going on a 159 Km hike. Traci's backpack weighs 35kg. Pam's backpack weighs 7kg less. They hike 37km on the first day. How many kilometres do they have left? (2)

3.11 644+393 ❑ 646+391

Put <; > or = in place of ❑ (2)

3.12 Taxis are waiting to pick up passengers at the taxi rank. There are 3 taxis waiting at each pick up point. There are 4 pick-up points. How many taxis are in the rank? (2)

3.13 We need to balance both sides of the equation. What is n? (2)

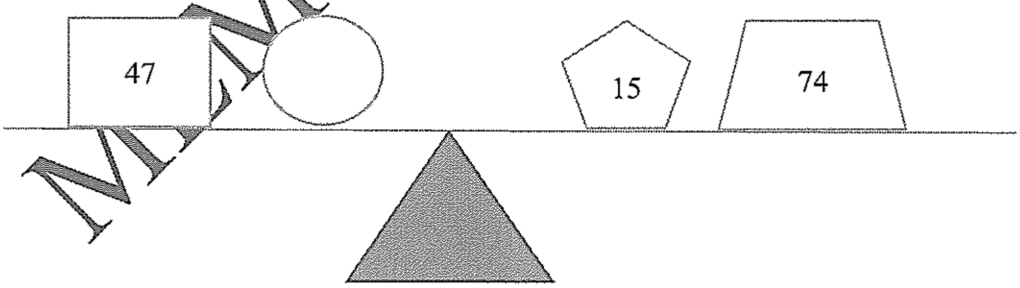


81 = 21 = 102

n = 102 – 32

n = 70

3.14 What is the value of the circle? (2)



The circle is 42

3.15 Use the column method to show

1258 + 364 = 1622 (2)

[30 marks]