FACULTY	:	Education
DEPARTMENT	:	Childhood Education
CAMPUS	:	Soweto Campus
MODULE	:	Introduction to Mathematics 1B (MATINB1)
SEMESTER		Two
EXAM		November 2020

ASSESSOR	Dr K. Fonseca
MODERATOR	Mr E Libusha (University of Johannesburg)
SUBMISSION DATE	November 2020
TOTAL	100 marks

NUMBER OF PAGES: 8 PAGES

INSTRUCTIONS:

1. You must answer all questions.
2. **You may not collaborate with other students about this submission. Your work will be screened for plagiarism and any evidence of copying directly from other sources (including other students and your own earlier assignments) will result in you failing this assessment**.
3. Clearly number each question and submit in the correct order.
4. All text must be 12 Arial font size, 1.5 line spacing and justified text.
5. Hand written work should be neat and legibly.
6. Complete and sign the declaration.

FIRST NAME & SURNAME:

STUDENT NUMBER:

I DECLARE THAT:

- This is my own work
- I have not plagiarised form any source
- I have not sought help from any one
- I have numbered each question in accordance with the question paper

SIGNATURE:

QUESTION 1: **[40 MARKS]**

Read the following case study and answer the following questions

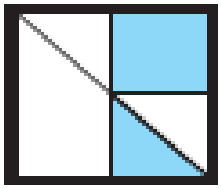
One of the parent's in your neighborhood is very concerned about her child's level of understanding, fractions and measurement related concepts. She approached you, and kindly requested you to tutor her son. You eagerly agreed to assist him with his first homework activity but before you meet with him you first want to work through the mathematical problems on your own to identify the possible errors and misconceptions the boy might have. As part of your preparation answer the following questions.

1.1.1 The set shown is $\frac{3}{4}$ of a unit what is the unit? Draw the unit. (2)

1.1.2 The set shown is $\frac{5}{3}$ of a unit. What is the unit? Draw the unit. (3)

1.1.3 What fraction represents the part of the whole region that has been shaded? Demonstrate how you obtained your answer (6)

(a)



(b)

1.1.4 Explain which fraction related concepts can be developed by solving problems such as the problems in question 1.1.1 – 1.1.3. Then explain the importance of understanding these concepts for further fraction concept development. (5)

1.2 When asked to evaluate the sum of $\frac{1}{3} + \frac{3}{5}$, a learner claimed that the answer when simplified is $\frac{1}{2}$.

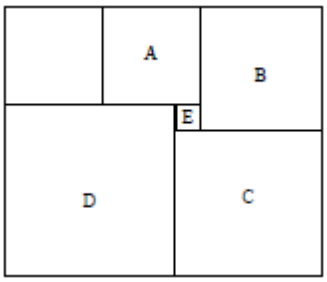
1.2.1 How do you suspect the learner arrived at this answer? (2)

1.2.2 Discuss what you might do to help this learner understanding the mathematical concepts without giving a step by step guide on how the problem can be solved.

Marking rubric	
Mathematical pre knowledge required	1
Mathematical concepts required on this problem	4
Models you intend to use and how you will use them	3

(8)

1.3 In this diagram, A, B, C, D and E are all squares. The area of A is 16 cm^2. The area of B is 25 cm^2. What is the area of the whole figure? Show all working out. (5)



1.4 Tom, Jerry and Scrooge are three stuffed animals. They are weighed two at a time. Here are the results.

T + J = 12kg

J + K = 14kg

K + T = 16kg

How much will all three weigh together? (5)

1.5 What are the most effective models to teach learners converting from millilitres, litres and kilolitres? Explain and give at least 2 examples. (4)

QUESTION 2 **[25 MARKS]**

2.1 Write a reflective essay on the knowledge of rational numbers gained in this course. In reflecting on the knowledge gained you need to use the concept-map on fractions you submitted in the beginning of the semester as a reference point. You therefore, need to copy and paste the concept-map you submitted as section A.

In section B, you need to write the reflective essay in which you reflect on:

- The conceptual and procedural knowledge gained
- Key aspects of learning and teaching fractions
- Importance of representations and models

NB! Your essay should be 1 ½ -page long. Do not plagiarise as you will receive zero for this question and face a disciplinary hearing.

QUESTION 3 **[35 MARKS]**

3.1 Use the information in the photo to determine the height of the Mandela Statue. (7)

3.2 What mathematical content did you use to solve this problem? Explain. (3)

3.3 Do you think this is a suitable mathematical task to engage learners in measurement estimation? Explain, what is measurement estimation and how one can or cannot use this task to engage learners in measurement estimation.

(10)

3.4 Look at the table below, identify at least 5 and write out the mathematical processes involved in solving this problem and give an example.

(15)

1. Playful engagement to develop, or search for, mathematical insight		
a) Act	Use action and perception to develop mathematical insight	
b) Explore	Explore relationships in patterns and processes (contextual and mathematical) to generate mathematical structure.	
c) Connect	Identify, construct and formulate connections between mathematical patterns and/or representations.	
d) Clarify	Pose and investigate questions to clarify understanding.	
2. Represent and use mathematics		
a) Model	Make sense of real-life situations using mathematical models (contextual problem solving)	
b) Identify properties	Identify properties that can be counted, measured or form geometrical invariants.	
c) Attend to precision	Decide upon and generate precision appropriate to the task.	
d) Represent	Form and manipulate mathematical representations (including names, diagrams, figures, symbol systems, and functions / relations).	
e) Describe and define	Describe and define in mathematical ways.	
3. Develop mathematical productions		
a) Specialise	Consider special cases to generate mathematical insight.	
b) Generalise	Generalize patterns, relationships and attributes	

c) Conjecture	Generate and test conjectures (educated guess).	
d) Classify	Distinguish and organize mathematical objects to create systems.	
4. Reason and reflect		
a) Justify	Provide supporting reasons for claims.	
b) Prove	Validate conjectures (guess).	
c) Refute	Construct counterexamples (example to disprove conjecture).	
d) Critique	Compare mathematical productions for efficiency, effectiveness and elegance.	
e) Regulate	Reflect to regulate task process.	

Marking rubric **For each mathematical process**	
identify	1x5
Writing out of the mathematical processes involved	1x5
Example extracted from the question	1x5

Rubric for reflective essay

Criteria	Exemplary (4)	Exceeds standard (3)	Adequately meets standards (2)	Below standard (1)
Depth of Reflection **(60%)**	Response demonstrates an in-depth reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials, as well as own resources. Viewpoints and interpretations are insightful and well supported. Clear, detailed examples are provided, as applicable.	Response demonstrates a general reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are supported. Appropriate examples are provided, as applicable.	Response demonstrates a minimal reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are unsupported or supported with flawed arguments. Examples, when applicable, are not provided or are irrelevant to the assignment.	Response demonstrates a lack of reflection on, or personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.
Required Components **(15%)**	Response includes all components and meets or exceeds all requirements indicated in the instructions. Each question or part of the assignment is addressed thoroughly. All attachments and/or additional documents are included, as required.	Response includes all components and meets all requirements indicated in the instructions. Each question or part of the assignment is addressed. All attachments and/or additional documents are included, as required.	Response is missing some components and/or does not fully meet the requirements indicated in the instructions. Some questions or parts of the assignment are not addressed. Some attachments and additional documents, if required, are missing or unsuitable for the purpose of the assignment.	Response excludes essential components and/or does not address the requirements indicated in the instructions. Many parts of the assignment are addressed minimally, inadequately, and/or not at all.
Structure **(5%)**	Writing is clear, concise, and well organized with excellent sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner. There are no more than three spelling, grammar, or syntax errors per page of writing.	Writing is mostly clear, concise, and well organized with good sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner. There are no more than five spelling, grammar, or syntax errors per page of writing.	Writing is unclear and/or disorganized. Thoughts are not expressed in a logical manner. There are more than five spelling, grammar, or syntax errors per page of writing.	Writing is unclear and disorganized. Thoughts ramble and make little sense. There are numerous spelling, grammar, or syntax errors throughout the response.

Evidence and Practice **(15%)**	Response shows strong evidence of synthesis of ideas presented and insights gained. The implications of these insights for the respondent's overall understanding are thoroughly detailed, as applicable.	Response shows evidence of synthesis of ideas presented and insights gained throughout the entire course. The implications of these insights for the respondent's overall understanding are presented, as applicable.	Response shows little evidence of synthesis of ideas presented and insights gained throughout the entire course. Few implications of these insights for the respondent's overall understanding are presented, as applicable.	Response shows no evidence of synthesis of ideas presented and insights gained throughout the entire course. No implications for the respondent's overall understanding are presented, as applicable.