



<u>FACULTY</u>	: Education
<u>DEPARTMENT</u>	: Childhood Education
<u>CAMPUS</u>	: Soweto Campus
<u>MODULE</u>	: Mathematics for the Intermediate Phase 2B (MATINB2)
<u>SEMESTER</u>	: Two
<u>EXAM</u>	: November 2020

<u>ASSESSOR(S)</u>	: Dr K. Fonseca		
<u>MODERATOR</u>	: Mr K Baloyi (University of Johannesburg)		
<u>SUBMISSION</u>	:	<u>MARKS</u>	: 100

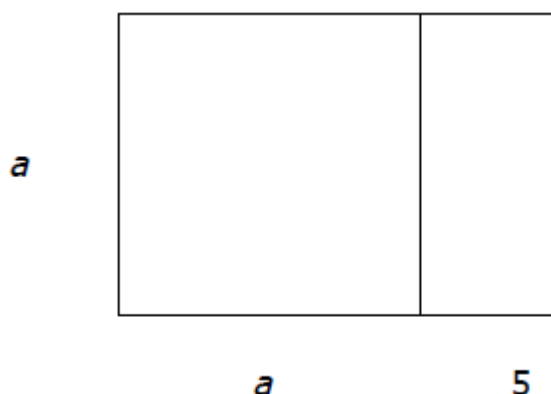
NUMBER OF PAGES: 7 PAGES

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. Memorandum may be written out by hand.
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QUESTION 1**[40 MARKS]**

Ms. Mbele was surprised when her students wrote many different expressions to represent the area of the figure below. She wanted to make sure that she did not mark as incorrect any that were actually right.



For each of the following expressions, decide whether the expression correctly represents or does not correctly represent the area of the figure.

Tom: $a^2 + 5$

Jerry: $(a + 5)^2$

Scrooge: $a^2 + 5a$

Phineas: $(a + 5)a$

Ferb: $2a + 5$

Bart: $4a + 10$

1.1 Redraw the table and indicate whose expression correctly represents or does not correctly represent the area of the figure. (6)

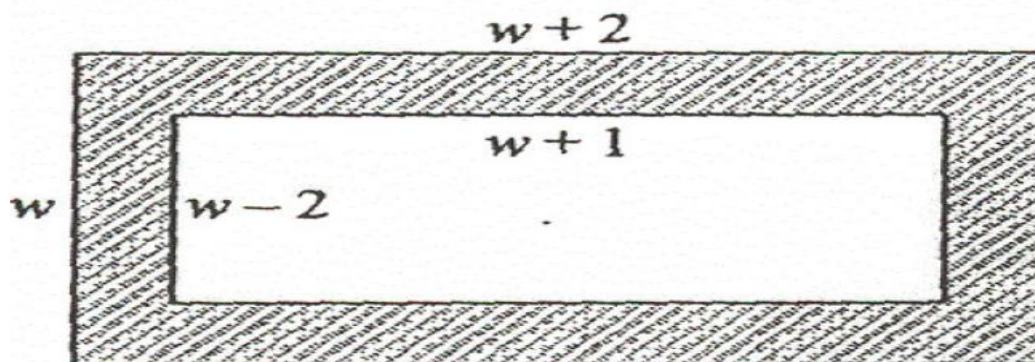
Correctly represents	Incorrectly represents
E.g. Bart $4a + 10$	

1.2 Explain Bart's thinking. (4)

1.3 Which mathematical concepts and skills can be promoted through the solving of this mathematical problem? Explain. (5)

1.4 In a conversation with Ms. Mbele she mentioned that she can't understand why the children in her grade 7 class struggle to understand key algebraic concepts, like operating with integers and algebraic conventions. You decided that you will use the following mathematical problem to help Ms. Mbele gain a deeper understanding of the learning and teaching of integers and algebraic conventions.

The two rectangles shown below have dimensions as can be seen in the diagram



Determine the area of the shaded region

To help Ms. Mbele in gaining a deeper understanding of the aspects associated to the learning and teaching of integers and algebraic conventions, you decided to do the following:

1.4.1 Solve the problem by determining the area of the shaded region.

(3)

1.4.2 Explain to Ms. Mbele the transitions children need to make from arithmetic by referring to the problem. Meaning, explaining the various transitions and using the processes used in solving the problems as examples of the transitions needed to be made.

(10)

1.4.3 Explaining and demonstrating how Ms. Mbele can use representations and real-life models to teach addition, subtraction, and multiplication of integers. Use two representations and two real-life models in your explanation and demonstration. (8)

1.4.4 Explain the difference between an expression and an equation. (4)

Question 2

[30 MARKS]

You are given the following mathematical problem to solve.

2.1 The Sum of Consecutive Numbers

$$2 + 3 = 5$$

$$2 + 3 + 4 = 9$$

$$4 + 5 + 6 + 7 = 22$$

The above statements are examples of sums of consecutive numbers. The number 5 is the sum of two consecutive numbers. The number 9 is the sum of three consecutive numbers. The number 22 is the sum of four consecutive numbers.

Explore what numbers and what numbers cannot be made by the sum of consecutive numbers.

Sum of * consecutive numbers				
	Sum of 2	Sum of 3	Sum of 4	Sum of 5
1				
2				
3				
4				
5				
6		1+2+3		
7	3+4			
8				

9				
10			1+2+3+4	
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
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28				
29				
30				
31				
32				
33				
34				

35				
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2.1.1 For each of the numbers 1 to 35, find out which numbers can be written as the sum of two consecutive numbers. Complete column 1. Then complete column 2, by writing out three consecutive numbers next to its sum. (2)

2.1.2 What do you notice about the sum of two and three consecutive numbers? Explain. (4)

2.1.3 Explain how you will use your observation of the sum of three consecutive numbers to engage grade 6 learners in mathematical thinking, with a specific focus on:

- Specialising
- Conjecturing
- Generalisation
- Convincing/proving

(14)

2.1.4 Explain how you will use your observation of the sum of two consecutive numbers to teach grade 7 learners the three predominant representations of linear functions. (10)

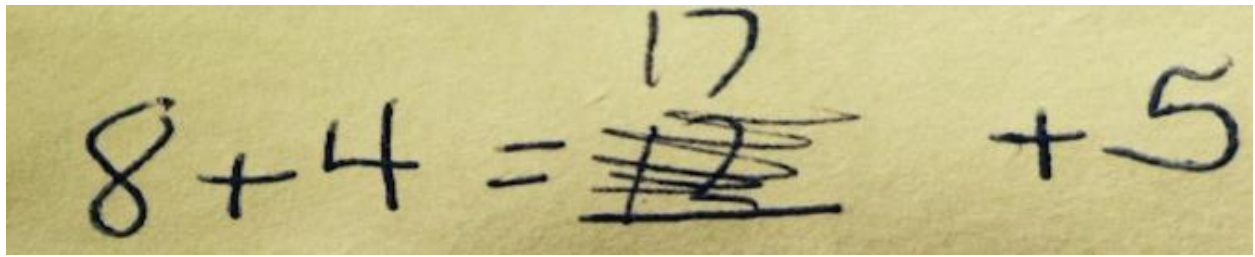
QUESTION 3

[30 MARKS]

There are some grade 5 learners who are still struggling with answering the following type of problems:

$$8 + 4 = \square + 5$$

For instance, Paul gave the following answer:



A photograph of a piece of paper with handwritten text. The text shows the equation $8 + 4 = 17$. The number 17 is written above the equals sign. Below the equals sign, the number 12 is written and then heavily crossed out with multiple horizontal lines. To the right of the crossed-out 12, there is a plus sign followed by the number 5, making the full expression $8 + 4 = 17$ ~~12~~ $+ 5$.

3.1 Discuss in a $\frac{1}{2}$ -page long essay the error/s made by Paul, the underlying misconception and the implication for learning and teaching of understanding equations. (7)

3.2.1 Solve the following equation: $4x + x(x - 8) = (x + 1)(x - 2) - 7$. (3)

3.2.2 There are specific conceptual and procedural knowledge one needs to solve equations. Draw a concept-map to illustrate the conceptual and procedural knowledge needed to solve equations. (20)

TOTAL: 100

Rubric for Question 2.3: Concept Map

Assessment Criteria	Outstanding	Exceeds standard	Adequately meets standard	Below standard
	4	3	2	0-1
Organization	- Well organized - Logical format - Contains main concepts - All key words and concepts necessary to promote an overview of the unit are used and well organized to give added meaning.	- Thoughtfully organized - Easy to follow most of the time - Contains most of the main concepts - Most key words and concepts from the units are covered in a meaningful way and are thoughtfully organized.	- Somewhat organized - Somewhat incoherent - Contains only a few of the main concepts - Many key words and concepts from the unit are covered and are somewhat organized.	- Choppy and confusing - Contains a limited number of concepts. - Many key words and concepts from the unit are missing.
	6-8	4-5	2-3	0 - 1
Content, concepts and terminology	- Shows an understanding of the topic's concepts and principles and uses appropriate terminology and notations - No misconceptions/errors evident.	- Makes some mistakes in terminology or shows a few misunderstandings of concepts - Few misconceptions are evident.	- Makes many mistakes in terminology and shows a lack of understanding of many concepts - Some misconceptions are evident.	<i>Shows no understanding of the topic's concepts and principles</i> <i>Many misconceptions are evident.</i>
	6-8	4-5	2-3	0 - 1
Connections and knowledge of the relationships between concepts	- All words accurately connected. - Connections indicate superior organization/understanding and enhance meaning. - Arrows easily connect concepts in an informative manner. - Identifies all the important concepts and shows an understanding of the	- All words accurately connected. Connections are clear and logical. - They connect concepts to promote clarity and convey meaning. - Identifies important concepts but makes some incorrect connections - Some meaningful connections made	- Most words accurately connected. - Connections are somewhat clear and convey some meaning. - Makes some incorrect connections	Some words accurately connected. Connections aren't clear, they convey little meaning and do not promote clarity. Fails to use any appropriate concepts or appropriate connection