UNIVERSITY
— OF —
JOHANNESBURG

FACULTY	: Education
DEPARTMENT	: Science and Technology Education
CAMPUS	: APK
MODULE	: MFSPMA3 TEACHING METHODOLOGY AND PRACTICUM 3A (MATHEMATICS)
SEMESTER	: First
EXAM	: July 2018

ASSESSOR(S)	: DR V RAMDHANY		
MODERATOR	: DR ED SPANGENBERG		
DURATION	: 2 HOURS	**MARKS**	: 100

NUMBER OF PAGES: 4 PAGES

INSTRUCTIONS:

1. Answer ALL the questions.
2. Number your answers correctly according to the numbering system used in this question paper.
3. Write legibly and present your work neatly.
4. Please submit your question paper and answer sheet.

QUESTION 1: The Nature of Mathematics, teaching and learning

1.1. Ernest (1989) developed three (3) categories of teacher beliefs: the Instrumentalist, Platonist and Problem-solving teachers. Describe each of these categories in terms of the view of learning. **(9)**

1.2. Research (e.g. Beswick, 2012) suggests there exists a close relationship between mathematics teachers' beliefs and classroom practice. What do you understand by this? **(3)**

1.3 In which category would you choose to place yourself? Provide one (1) reason for your choice. **(3)**

[15]

QUESTION 2: Theories of teaching and learning

2.1. Skemp (1976) proposed that there are two types of understanding: *relational* and *instrumental* understanding. List two (2) advantages of developing instrumental understanding in learners. **(4)**

2.2. Describe three (3) ways in which you can engage learners in the learning of mathematics to promote relational understanding. **(6)**

2.3. Kilpatrick et al. (2001) conceptualised five (5) strands of mathematical proficiency. What are these five strands called? **(5)**

2.4. Provide a short description of each strand of mathematical proficiency. **(10)**

[25]

QUESTION 3: Teaching strategies

3.1. A typical lesson is usually divided into three phases. What are these three lesson phases called? **(3)**

3.2. Give a brief description of what each phase entails. **(6)**

3.3. List at least three (3) factors that mathematics teachers need to consider before they actually start teaching. **(3)**

3.5 Distinguish between the two (2) main types of instruction you encountered in this module, namely direct instruction and facilitation. **(4)**

3.5 What would you say are the disadvantages of direct instruction? Provide at least two (2) disadvantages. **(4)**

[20]

QUESTION 4: Assessment in Mathematics education

4.1 In your own words, explain what you understand by summative assessment.   **(3)**

4.2 In South Africa, summative assessments are often regarded with negativity. Discuss why you think this is so.   **(4)**

4.3 List three (3) purposes of formative assessment.   **(3)**

4.4 Which assessment form do you consider more important in teaching mathematics: formative or summative? Provide a motivation for your answer.   **(4)**
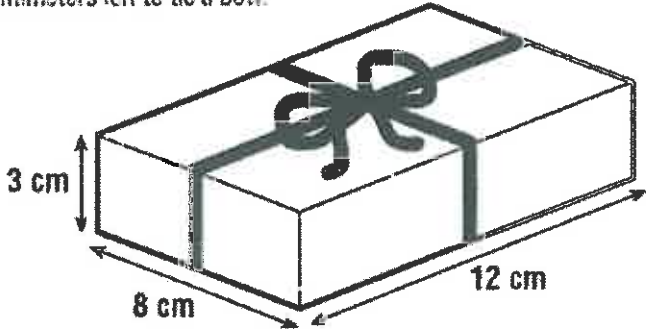
4.5 Consider the following assessment item.

Figure 1

MATHEMATICS GENERAL KNOWLEDGE ITEM

Stu wants to wrap some ribbon around a box as shown below and have 25 centimeters left to tie a bow.

How long a piece of ribbon does he need?

A. 46 cm
B. 52 cm
C. 65 cm
D. 71 cm
E. 77 cm

Correct answer: E
U.S. Average: 32 percent
International Average: 45 percent
SOURCE: Third International Mathematics and Science Study, 1994-1995

3 cm

8 cm

12 cm

Discuss at least two (2) problems you think such an item may pose to different learners.
(6)
[20]

QUESTION 5: Teaching and learning of patterns, functions and algebra

The topic of *numeric and geometric patterns* is part of the SP mathematics curriculum (i.e. grades 7 – 9). The following extract is taken from the SP CAPS document.

Investigate and extend patterns
• Investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns:
➢ represented in physical or diagram form
➢ not limited to sequences involving a constant difference or ratio
➢ of learner's own creation
➢ represented in tables
➢ represented algebraically
• Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language

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5.1 Discuss how you would introduce the topic of patterns to grade 8 leaners.   **(4)**

5.2 Design a short classroom activity in which you introduce the concept/topic of patterns to learners. In your activity, you must include:

- The teacher's actions, including some questions the teacher may ask.
- The learners' actions, including any physical activity (e.g. cutting, drawing, etc.).
- Any resources that may be used/required in the activity.

(16)
[20]

TOTAL: 100