



<u>FACULTY</u>	: Education
<u>DEPARTMENT</u>	: Science and Technology Education
<u>CAMPUS</u>	: APK
<u>MODULE</u>	: TEACHING METHODOLOGY AND PRACTICUM 3A (MFSPMA3)
<u>SEMESTER</u>	: First
<u>EXAM</u>	: May 2019

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MODERATOR : DR ED SPANGENBERG

DURATION : 2 HOURS **MARKS** : 100

NUMBER OF PAGES: 5 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.
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QUESTION 1: Beliefs of the nature of mathematics, teaching and learning

The following extract is taken from the Curriculum and Assessment Policy Statement (CAPS) document for Mathematics. The extract reflects the South African DBE's position on Mathematics as a subject, how it should be taught and learned.

What is Mathematics?

Mathematics is a language that makes use of symbols and notations for describing numerical, geometric and graphical relationships. It is a human activity that involves observing, representing and investigating patterns and qualitative relationships in physical and social phenomena and between mathematical objects themselves. It helps to develop mental processes that enhance logical and critical thinking, accuracy and problem solving that will contribute in decision-making. Mathematical problem solving enables us to understand the world (physical, social and economic) around us, and, most of all, to teach us to think creatively.

- 1.1 Ernest (1991) developed three categories of mathematics teachers based on their belief systems. Name these three categories. (3)
 - 1.2 In which of Ernest's categories would you place the above extract? (1)
 - 1.3 Provide a motivation for your answer in 1.2 above. In your motivation, refer to the beliefs of mathematical knowledge, mathematics teaching and learning that you see as being reflected in the extract. (6)
 - 1.4 Research (e.g. Beswick, 2012) suggests there exists a close relationship between mathematics teachers' beliefs and their classroom practice. What do you understand by this? (3)
 - 1.5 Discuss one (1) disadvantage when mathematics teachers try to place themselves in only one of Ernest's categories. (2)
- [15]**

QUESTION 2: Teacher knowledge

- 2.1 Shulman (1986) conceptualised PCK as an important type of knowledge that only teachers possess. What does *PCK* stand for? (2)
 - 2.2 Explain clearly your understanding of the PCK concept. (3)
- 3/...**

- 2.3 Why, would you say, is it important for mathematics teachers to develop this type of knowledge? (5)

[10]

QUESTION 3: Instructional strategies

- 3.1 Teachers use several different teaching strategies in their practices every day. Two popular teaching strategies are direct instruction and facilitation. Discuss what each of these teaching strategies entails. (4)
- 3.2 Many educationists warn that teachers should not focus on the extreme positions that direct instruction and facilitation promote. Do you agree with this? (1)
- 3.3 Provide a motivation for your answer in 3.2 above. (4)
- 3.4 Direct instruction is often seen as an outdated teaching strategy, but it has many advantages. List three (3) advantages of direct instruction. (3)
- 3.5 Provide three (3) reasons why facilitation is strongly promoted in South African curriculum documents. (3)

[15]

QUESTION 4: Assessment

- 4.1 Assessment of learners is considered to be one of the most important, and most difficult, aspects of teaching. Explain clearly what you understand by the terms formative and summative assessment. (4)
- 4.2 Why is summative assessment often regarded with negativity in South Africa education circles? (4)
- 4.3 List three (3) purposes of summative assessment. (6)
- 4.4 Hattie (2002) argued that the most effective teachers are those who provide learners with regular feedback on their assessments. Discuss two (2) advantages of giving learners feedback versus only giving them marks? (6)

[20]

QUESTION 5: Theories of teaching and learning mathematics

- 5.1 There are several theories related to mathematics education. One such theory is RME. What does RME stand for? (2)
- 5.2 RME theory consists of three (3) underlying principles. Name these three principles. (3)
- 5.3 Using the principles of RME identified in 5.2 above, discuss how this theory can be used in the teaching and learning of mathematics. (7)
- 5.4 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)
- 5.5 Describe two (2) ways in which you can engage learners in the learning of mathematics to promote relational understanding. (4)
- [20]**

QUESTION 6: 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 Mathematics 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

- 6.1 Use the mathematics teaching and learning theories that you have been introduced to this year, and discuss how you would introduce the topic of numeric patterns to grade 8 learners. Your response must include: 5/...

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- The reasons for the teaching and learning theory that you choose; (6)
 - The teacher's actions when introducing the topic (e.g. questions the teacher may ask); and (7)
 - The learners' actions (e.g. any physical activity such cutting, drawing, etc.). (7)
- [20]**

TOTAL: 100