MPMAT2B

**UNIVERSITY OF JOHANNESBURG**

**FACULTY OF EDUCATION**

**NOVEMBER EXAMINATION 2016**

**PROGRAMME:** Bachelor of Education

**MODULE:** Teaching Methodology and Practicum for Mathematics

**CODE:** MPMAT2B

**TIME:** 2 hours

**MARKS:** 100 marks

**EXAMINER:** K Fonseca

**MODERATOR:** Mrs S Ramsaroop

(This paper consists of **6** pages)

**INSTRUCTIONS**

Read the following instructions carefully before answering the questions.

1. This question paper consists of TWO questions based on **TWO** case studies.
2. Answer all the questions.
3. Number the questions correctly as in the question paper.
4. Write NEATLY and LEGIBLY.

**QUESTION 1**

Read, case study 1, and answer the questions below.

**CASE STUDY FOR QUESTION 1**

*While you were on Work Integrated Learning (WIL), the grade 5 mathematics teacher asked you to mark one of the class tests, the learners wrote. The purpose of the test, was to assess learners' knowledge and skills about whole numbers. With specific reference to multiplication of two and three-digit whole numbers.*

*As you were busy marking you noticed that the learners represented their work in various ways. Some learners represented their answers in the following way:*

| Student A | Student B | Student C |
|---|---|---|
| 35<br>x 25<br>125<br>+75<br>875 | 35<br>x25<br>175<br>+700<br>875 | 35<br>x25<br>25<br>150<br>100<br>+600<br>875 |

**Question 1**

1.1 Analyse the three students' solution methods. Give a detailed explanation about the method **each student** used to solve this multiplication of whole numbers task. (**Explanation ½ page long).** (10)

1.2 Which of the above method/s could be used to multiply any two digit whole numbers? Prove your answer by giving examples. (10)

1.3.1 Define what a mathematical 'Big Idea' is. (2)

1.3.2 Write an appropriate mathematical 'Big Idea' for the mathematical concept of whole numbers. (2)

1.3.3 Give a detailed description of the mathematical concepts needed to be understood to solve multiplication of two or three-digit whole number tasks. Explain how these concepts link to make a coherent understanding of multiplication of whole number. (10)

1.4 Design an appropriate grade 5, word problem, where learners have to multiply a two-digit number by a two-digit number. (2)

1.4.1 Demonstrate how grade 5 learners can solve the task implementing a different solution method. A method other than the ones demonstrated in question 1.1. Explain the mathematical concepts needed to solve the task. (7)

1.4.2 Explain how you will introduce a lesson to achieve the objective of multiplying three-digit numbers by two-digit numbers using your method, described in **question 1.4.1. Furthermore**, explain why you think this is the most appropriate way to introduce the lesson. (7)

**[50 marks]**

**Question 2**

Read, case study 2 and answer the following questions below.

**CASE STUDY FOR QUESTION 2**

*Learners, in Mr. Mphofu's class were given an exercise where they had to rearrange decimals in ascending order. Three learners, Kamogele, Nhati and Vuyiswa, ordered their decimals from the smallest to the biggest in the manner, shown below:*

**1.1; 12; 48; 102; 31.3; .675**

**Question 2**

2.1 Differentiate between, a slip, an error and a misconception. Give one example of each. (6)

2.2 Provide a critical discussion of the errors that Kamogele, Nhati and Vuyiswa are making in the case study. Critically analyse all the possible error/errors these learners are making. (6)

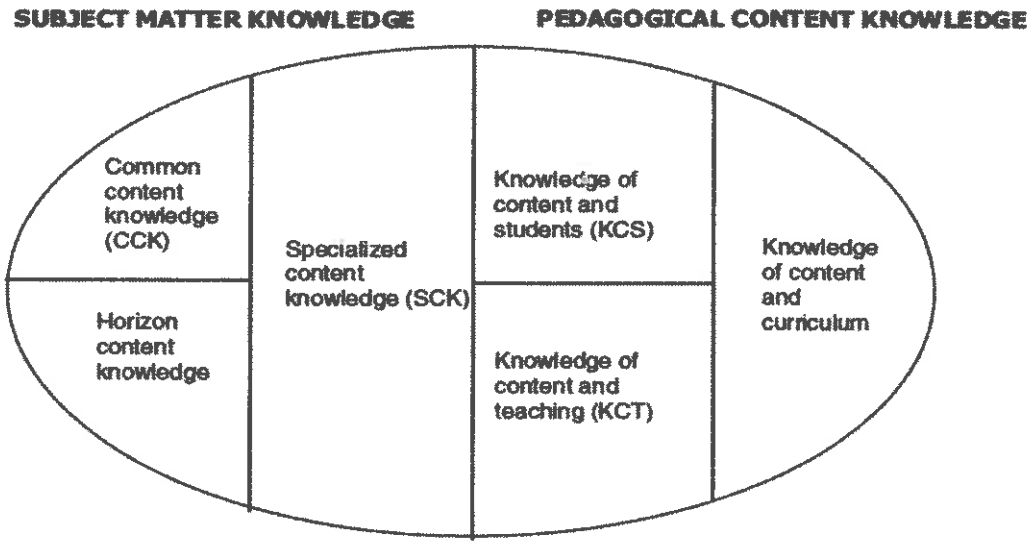
2.3 Explain possible misconceptions about decimal numbers/fractions. (4)

2.4. Apart from content knowledge and pedagogical content knowledge mathematics teachers need to teach mathematics, they also need other domains of knowledge. Explain what are the knowledge domains needed to teach a lesson *'on the ordering of decimals'* by using the Mathematical Knowledge for Teaching (MKT), framework to analyse these knowledge domains. **NB!**

2.4.1 You first need to explain what each of the domains mean in this framework.

2.4.2 Then apply these knowledge domains in terms of the above mentioned task on *'ordering of decimals'*. Give a detailed description. **(Combined both questions should be 1 ½ pages long).** (20)

## Domains of Mathematical Knowledge for Teaching



2.5 As a mathematics teacher we want to find out what and why our learners think about mathematics in the way they do. For instance, when one looks at the response given by the three learners mentioned above in Mr. Mphofu's class, it is important to find out what is the mathematical thinking behind this solution. As a mathematics teacher you should thus be:

- Able to ask appropriate questions that will elicit learners' mathematical misconceptions.
- Create opportunities for learners to discuss their solutions in the classroom.

2.5.1 Explain how you will create an opportunity or opportunities for learners to engage in discussion with one another during a lesson on the ordering of decimals. Give practical examples. (7)

2.5.2 Describe a questioning episode during a lesson on the '*ordering of decimals*' which will facilitate the eliciting of the learners' mathematical thinking. **(NB! Refer to list of question type below).**

- Describe by giving examples of the various types of questions you will be posing during the lesson.
- You also need to explain why these questions are the most suitable questions to elicit learners' mathematical thinking. (8)

**List of question type**

- **Gathering information**
- **Inserting terminology**
- **Exploring mathematical meanings and/or relationships**
- **Probing, getting learners to explain their thinking**
- **Generating discussion**
- **Linking and applying**
- **Extending thinking**
- **Orienting and focusing**
- **Establish a context**

**[50 marks]**