



<u>FACULTY</u>	: Education
<u>DEPARTMENT</u>	: Science and Technology Education
<u>CAMPUS</u>	: APK
<u>MODULE</u>	: TEACHING METHODOLOGY AND PRACTICUM 3B (MFSPMB3)
<u>SEMESTER</u>	: Second
<u>EXAM</u>	: November 2019

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MODERATOR : DR ED SPANGENBERG

DURATION : 2 HOURS **MARKS** : 100

NUMBER OF PAGES: 5 PAGES

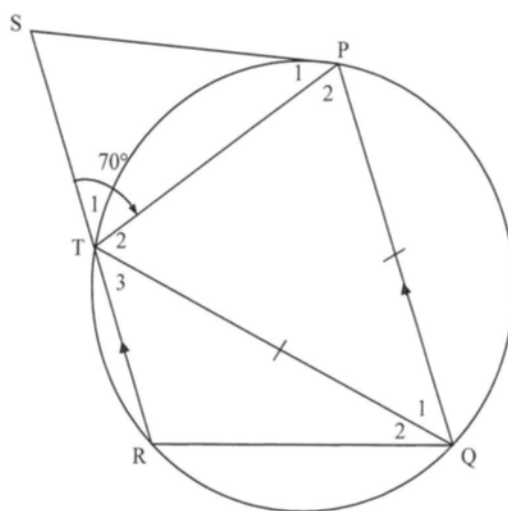
INSTRUCTIONS:

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: Teaching and learning Euclidean Geometry

- 1.1 In this course, you have been introduced to the five (5) Van Hiele levels of geometric understanding. Briefly name and describe each of these levels in your own words. **(10)**
- 1.2 Motivate why you think it is important to understand the level learners work on. **(3)**
- 1.3 Mrs Ngubane gave her Grade 12 learners the following geometry problem to work on, in pairs. The following information was provided:

In the diagram below, $PQRT$ is a cyclic quadrilateral having $RT \parallel QP$. The tangent at P meets RT produced at S . $QP = QT$ and $\hat{P}TS = 70^\circ$

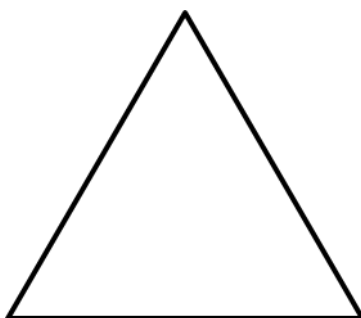


- 1.3.1 Refer to the diagram above. Write down two (2) other angles, with reasons, which are equal to 70° ? **(4)**
- 1.3.2 On what Van Hiele level would you say the above question (1.3.1) is? **(1)**
- 1.3.3 Provide one (1) reason for your answer in 1.3.2 above, by making specific reference to the diagram. **(2)**

[20]**QUESTION 2: Working with learner errors and misconceptions**

- 2.1 Explain why it is important for a teacher to know something about common learner misconceptions and their causes. **(5)**
- 2.2 Discuss two (2) causes of learner misconceptions. **(8)**

2.3 Grade 10 learners were given a triangle, with sides of length s , as shown below:



They were instructed to calculate the area of the triangle in terms of s .

S'thabiso's response to the task was: $Area = \frac{1}{2} (s \times s) = \frac{s^2}{2}$

- 2.3.1 Explain carefully what error S'thabiso has made. (2)
- 2.3.2 What, do you think, could have led to such an error? (2)
- 2.3.3 Describe one (1) teacher intervention that could help S'thabiso avoid making such an error again. (3)
- [20]

QUESTION 3: Contextual factors in mathematics teaching and learning

- 3.1 Discuss what you understand by the term 'contextual factors' in teaching and learning (5)
- 3.2 Provide two (2) examples of contextual factors. (2)
- 3.3 In South African education, multilingualism refers to the act of using, or promoting the use of, multiple languages in teaching and learning.
- 3.3.1 Explain how the use of multiple languages in the mathematics classroom can impact on the teaching and learning of mathematics. (8)
- [15]

QUESTION 4: Teaching and learning Analytical Geometry

- 4.1 1 Analytical geometry links algebra and geometry, so there are many ideas and concepts that are regarded as prior knowledge. List any two (2) ideas that you believe constitute important prior knowledge for learners to be successful at analytical geometry. (4)
- 4.2 Suppose you ask the learners to solve equations simultaneously e.g. a straight line

and a circle. (4)

4.2.1 What does it mean if there are two solutions, one solution and no solution to the simultaneous equations? Draw a sketch to illustrate your answer. (6)

4.3 Learners are provided with the following points: M (-3; -1), N (-2; -2), O (1; 3) and P (0; 0) and are asked to prove that these points are the vertices of a parallelogram.

4.3.1 Describe two (2) methods you would use to prove that M, N, O and P are vertices of a parallelogram. (6)

4.3.2 Which of the two methods in 4.3.1 above would you encourage the learners to use? (1)

4.3.3 Provide a motivation for the method of your choice. (3)

[20]

QUESTION 5: Conceptual understanding and representations in data handling

Grade 12 learners were given an array of test marks, out of 100 (as below).

48	39	98	54	61	93	42	82	63	42	70	98
30	74	70	58	74	64	74	92	41	76	96	23

5.1 What percentage of the learners scored below 45 in this test? What is the term for this value? (2)

5.2 Discuss how you would explain the term 'skewness' to learners. (2)

5.3 Briefly explain how you test if the data distribution is skewed or not. (3)

5.4 Is it possible to estimate the mean of the distribution using a box-and-whisker plot? Explain if it is possible or not, and why. (3)

[10]

QUESTION 6: Teaching and learning Trigonometry

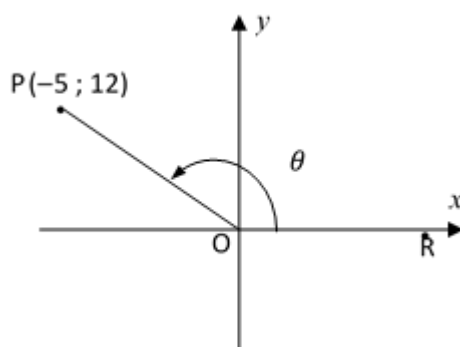
6.1 When introducing trigonometry to grade 10 learners, many teachers choose to begin with the tangent (tan) function. Suggest a reason for this. (3)

6.2 Mrs. Smith asks her learners to plot the following points in the Cartesian plane: (2; 1), (4; 2); (6; 3), and then to join these points to the origin. Explain what you notice about these sets of points that Mrs. Smith would want the learners to notice

as well.

(4)

- 6.3 You decide to follow Mrs. Smith's example (i.e. using the tan function) and give your Grade 10 learners the following diagram, in which P $(-5; 12)$ is a point in the Cartesian plane and $\widehat{ROP} = \theta$



- 6.3.1 Discuss what you would want the learners to 'see' when the angle lies between 90° and 180° . **(4)**
- 6.3.2 When you ask the learners to sketch the tangent graph, what do you expect them to discover at 90° and at 270° ? **(1)**
- 6.3.3 Provide an explanation to the learners for their discovery in 6.3.2 above. **(3)**
- [15]**

TOTAL: 100